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# Operating Manual **ALPHAMFD**

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Preliminary Operating Manual **ALPHAMFD** Version 1.09, 12.07.2002  
Technical details subject to change!



 **BRAUNIGER**

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## 2 Introduction

With its innovative ideas and modern technology the **ALPHAMFD** offers a complete system for flight and engine-management for ultralight/microlight pilots. Important information for navigation and engine control are easily readable, presented on an integrated Liquid Crystal Display.

The **ALPHAMFD** was carefully designed to be extremely reliable, safe and maintenance free. A self-test on power-on, detection and warning of faulty senders and the audio alarm through the Intercom make the **ALPHAMFD** an extremely reliable and safe flight information system.

Because of modern processors and a flashable memory the software of the **ALPHAMFD** can be updated any time and thus being brought up to the latest software version without hassle and cost. The **ALPHAMFD** is a sound long-term investment.

In order to avoid an information overload of the pilot, only the most important information like speed, vario, altitude, RPM, EGT, CHT or water/oil-temperature, flight time, real-time, fuel state and consumption, are being permanently displayed. More information can be called up by pressing only a few keys, e.g. flight log or engine hours, etc.

The innovative LC-display is easy to read in any light conditions, all read-outs are designed following ergonomic rules.

Because of the logical and clearly structured menus, the **ALPHAMFD** is very easy to operate. You basically only have to switch on the instrument and off you go. However we recommend you read the operation manual carefully to make the best out of the many functions the **ALPHAMFD** offers.

We wish you many fantastic and safe flights with your new **ALPHAMFD**.

### Note:

The operating manual contains important information concerning the safe operation of the **ALPHAMFD** . Please read carefully!



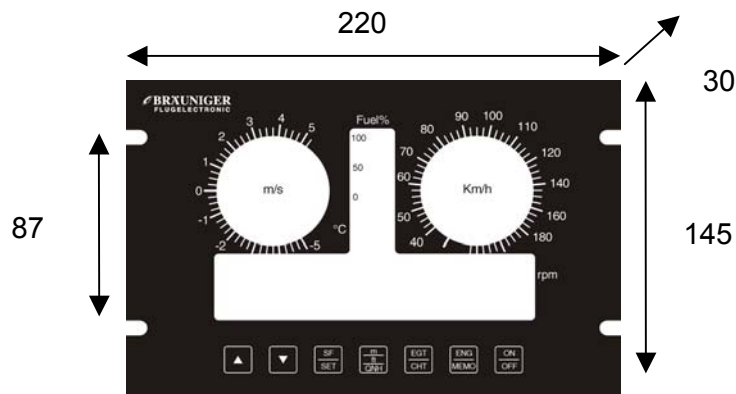
**WARNING!** This symbol highlights important information concerning safety. Please read carefully!

## 3 Mounting and Connection

### 3.1 Mounting into Cockpit

It is very easy to mount the **ALPHAMFD** in your cockpit. You only need a little skill, no special tools are required.

Dimensions of **ALPHAMFD**:



Front 220 x 145 mm  
Panel cut-out 137 x 194 mm  
Drillings 208 x 87 mm

All measurements in mm  
Total weight 600 gms only

### 3.2 Electrical Connections

If you have never before installed electrical instruments and you are not exactly sure what to do, please ask someone who has experience to help you with the installation.

Only use high-quality cables (highly flexible, stranded and shielded) and connectors. Check that your cables run untangled and clean. Disconnect the aircraft battery before working on electrical components!

Ni-Cr-Ni temperature senders require special cables which are supplied with the senders!

All wires should be protected by small metal terminals to ensure a lasting and safe connection to the **ALPHAMFD**.

All cables and the Pitot tube should be secured against pull.

The NiCrNi ports of the **ALPHAMFD** do not work with PT100 senders! Special low-temperature senders (e.g. for oil or water temperature) are available from *BRÄUNIGER*.

Please follow the technical information of the senders you are using.

NOTE: *BRÄUNIGER* provides complete cable looms and sender kits as an option for most popular engines. With these connection kits it is even easier to connect the **ALPHAMFD**

### 3.2.1 Connection Board **ALPHAMFD**:

Open cable clamp with screw driver and insert cable



<input type="checkbox"/>	-	<b>EGT 1</b>	Connection of 1 <sup>st</sup> Ni-Cr-Ni high temperature sender for exhaust gas temperature of 1 <sup>st</sup> cylinder
<input type="checkbox"/>	+	<b>EGT 2</b>	Connection of 2 <sup>nd</sup> Ni-Cr-Ni high temperature sender for exhaust gas temperature of 2 <sup>nd</sup> cylinder
<input type="checkbox"/>	-		
<input type="checkbox"/>	+	<b>CHT 1</b>	Connection of 3 <sup>rd</sup> Ni-Cr-Ni high temperature sender for cylinder head temperature of 1 <sup>st</sup> cylinder
<input type="checkbox"/>	-		
<input type="checkbox"/>	+	<b>CHT 2</b>	Connection of 4 <sup>th</sup> Ni-Cr-Ni high temperature sender for cylinder head temperature of 2 <sup>nd</sup> cylinder
<input type="checkbox"/>	-		
<input type="checkbox"/>	S	<b>Tank</b>	Connection of flow sender. CAUTION: Proper function can only be guaranteed with flow sender of <b>BRÄUNIGER</b> (S = signal)
<input type="checkbox"/>	-		
<input type="checkbox"/>	+	<b>Inter com</b>	Connection of Intercom for audio alarm
<input type="checkbox"/>	-		
<input type="checkbox"/>	+	<b>Batt</b>	Battery
<input type="checkbox"/>	-		
<input type="checkbox"/>	+	<b>12V Out</b>	Power connection of flow sender
<input type="checkbox"/>		<b>RPM</b>	Connection of RPM sender or cable wound around spark plug cable

Because the **ALPHAMFD** does not have an internal battery it must be connected at all times to a 12 V source in order to keep the real-time and flight log memory. If you plan to completely disconnect the main aircraft battery when parking the aircraft, we recommend a separate fused cable from the main battery to the **ALPHAMFD**. It is also possible to install an additional external back-up battery. This must be isolated by a diode. Further information can be obtained from **BRÄUNIGER**.

If the **ALPHAMFD** is switched off normally and the 12 V power is disconnected afterwards, the fuel state is stored in memory.

## 4 Power On and Built-In Self-Test (BIT)

By pressing the <ON/OFF>-key the instrument is switched on. For a short period of time all segments of the LC-display are illuminated in order to test the function of the display. Next the instrument goes into CHECK-Mode. An internal self-test is executed and all senders are checked for correct signals. If the **ALPHAMFD** discovers a fault, it displays an ERROR-code. A list of all possible ERROR-codes is listed in section 8.1.7. If everything is OK, you will see the message "CHECK OK" and the instrument is ready for operation.

## 5 Flight Management

### 5.1 Speed Indicator (IAS, CAS)

The **ALPHAMFD** has an easy to read large analogue display of the speed. By using a standard Pitot tube the Indicated Air Speed (IAS) is displayed. Note: IAS shows the speed in every altitude according to the measured dynamic air pressure. At high altitudes the actual True Air Speed (TAS) is higher than the IAS. Displaying the IAS has several advantages and is also required by various aviation authorities because for example the speed never to exceed (Vne) or the stall speed (Vso or Vs1) can always be read at the same spot at every altitude.

Standard, commercially available, Pitot tubes are used for speed-senders. The speed indicator is calibrated by **BRÄUNIGER** according to the corresponding dynamic air pressure. For individual calibration **BRÄUNIGER** offers a separate low pressure calibration tool with a resolution of 1 Pa.

The pilot can individually calibrate the speed indicator in SET-Mode #12 by adjusting the SPEED GAIN factor. This way measurement errors, caused e.g. by a not optimal position of the Pitot tube, can be individually corrected. After calibration, CAS (Calibrated Air Speed) is indicated. The default value is <100>. If you adjust the SPEED GAIN e.g. to <120> the speed indication will show a approx. 10% higher CAS. Additionally the speed zero point can be calibrated. This is done in SET-Mode #11 (SPEED ZERO).

The current version of the **ALPHAMFD** comes with a scale in km/h. A planned later software version will also allow for miles per hour (mph) or knots (kts).

In order to make the indication more precise, the speed scale is expanded from 40 km/h to 120/h, i.e. from 40 to 120 km/h the speed is displayed in 2.5 km/h increments. From 120 to 220 km/h the increments are 5 km/h. Below 40 km/h no speed is displayed.

Note: Different scales with higher speed ranges and different spreads will be available soon!

In SET-Mode #13 two different ways of display can be chosen, single pointer display or sector display. More information on this in section 5.4 VSI.

Because it is very important to comprehend the different speed ranges at a single glance, self adhesive coloured marker rings in white, green, yellow and red are included with every **ALPHAMFD**. These rings can be mounted to the speed indicator corresponding to the speeds of the individual aircraft (Vno, Vne, Vso, Vs1, etc.)

In SET-Mode #6 the audio warning for stall speed in landing configuration (V<sub>so</sub>) can be programmed. After switching to SET-Mode by pressing the > **FUNC/SET**< key (SF = special functions) for a few seconds, select Mode #6 = STALL ALARM by pressing the >ARROW<-keys. After pressing the >**ENTER/MEMO**< key the <SET< icon will start flashing. Now the speed of the stall alarm can be adjusted. By pressing >**ENTER/MEMO**< again, the new value is stored. Pressing the >**FUNC/SET**< key leaves the SET-Mode.



WARNING! For safety reasons the **ALPHAMFD** cannot be switched off as long as the speed exceeds 40 km/h!!

## 5.2 Altimeter and Air Pressure

We recommend setting the correct QNH prior to every flight. This is easily done by just pressing the >ARROW< keys.

Usually the altimeter is set to altitude above mean sea level MSL. If the >**m/ft/QNH/AGM**< key is pressed once, the display switches over from meter to feet. If the same key is pressed again, the corresponding QNH is displayed in hPa.

It is also possible to set the altimeter to zero while on the ground. This way the altitude shows Above Ground Level (AGL or GND). When switching over to air pressure while AGL is set, the **ALPHAMFD** automatically calculates the corresponding QFE.

On many airports the QNH is given by ATC prior to take-off. You can also set the QNH by pressing the >ARROW< keys and the **ALPHAMFD** automatically calculates the corresponding altitude above MSL.

## 5.3 Altitude Guidance Mode (AGM)

The Altitude Guidance Mode (AGM) helps pilots to maintain a chosen altitude with the help of an acoustic alarm. If the chosen altitude is exceeded, either too high or too low by a difference set in the SET-Mode, an audio alarm starts to sound through the Intercom and the altitude display starts flashing.

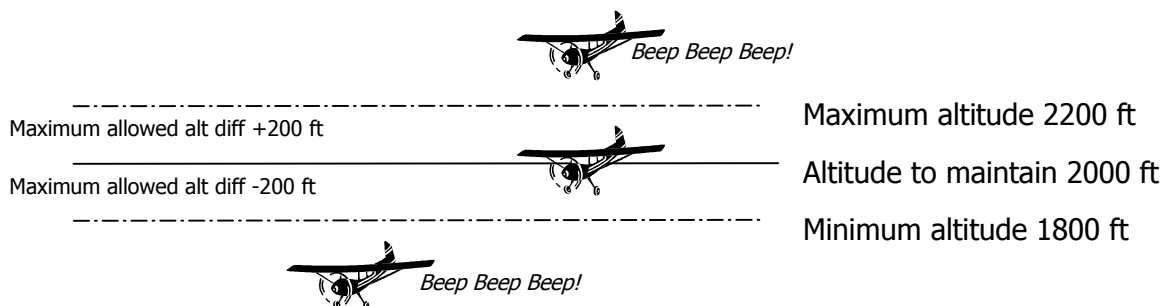
Example: A pilot flies 2000 ft MSL and wants to maintain this altitude for a longer period of time because he would enter C airspace when flying higher. He doesn't want to check the altimeter all the time so he activates AGM which will warn him if he flies too high or too low. The altitude difference which triggers the alarm can be set in SET-Mode #5.

As soon as the desired altitude to be maintained is reached, the AGM is activated by pressing >**m/ft/QNH/AGM**< for several seconds. The display shows <AGM ON>.

By pressing >**m/ft/QNH/AGM**< again for several seconds, AGM is deactivated and <AGM OFF> is displayed.

Example:

2000 ft shall be maintained. Altitude difference of 200 ft or greater above 2000 ft and 200 ft and greater below 2000 ft will trigger the audio alarm. As soon as the pilot inadvertently climbs to 2200 ft and more, the alarm goes off and the altitude display starts flashing. The same happens if the pilots descends to 1800 ft or less. As soon as the pilot returns to within the desired altitude range (2000 ft + 200 ft or – 200 ft), the alarm stops automatically and the altitude display stops flashing.



The altitude range is set in SET-Mode #5, the set value represents the maximum allowed altitude difference for above and below the desired altitude

#### 5.4 VSI (Vertical Speed Indicator)

Climbing or descending speeds are shown on a large, easy to read, analogue display with a resolution of 0.25 m/s. Values between +/- 10 m/s are displayed.

The **ALPHAMFD** has two different ways of indication values on the round analogue scales. They can be chosen according to personal preferences in SET-Mode #13.

##### 5.4.1 Single Pointer Display

The Single Pointer Display indicates rate of climb or sink with a conventional single pointer. If the climb or sink rate exceeds +/- 5 m/s, the values from 5 m/s to 10 m/s are displayed in a second stage which is indicated by a second pointer at 5 m/s.

##### 5.4.2 Sector Display

The Sector Display indicates climb or sink rate by an increasing sector. If the climb or sink rate exceeds +/- 5 m/s, the values from 5 m/s to 10 m/s are displayed in a second stage which is indicated by the sector being cleared. We recommend using the Sector Display in temperatures below 0°C because in low temperatures the LC-display becomes slow and the Sector Display is better to read.

The VSI of the **ALPHAMFD** works electronically and therefore works much faster, crisper and more precise compared to other conventional mechanical VSI instruments with their inherent long time lag.

### 5.5 Flight Time, Take-Off Time and Date of Flight

The flight time is measured as soon as the speed exceeds 50 km/h IAS. This moment is also registered as take-off time and can later be called up in the MEMO-Mode. The flight time is stopped as soon as the **ALPHAMFD** registers speeds of less than 50 km/h IAS.



**WARNING!** As long as speeds of over 50 km/h IAS are registered, for safety reasons the **ALPHAMFD** cannot be switched off.

### 5.6 Temperature and Voltmeter

By pressing the >**FUNC/SET**< key twice (FUNC = Special Functions), the altimeter display is switched to temperature. In SET-Mode #18 (UNIT TEMPERATURE) you can choose between °C Celsius or °F Fahrenheit.



**WARNING!** The **ALPHAMFD** measures the temperature of the instrument (which approx. corresponds to outside temperature in open flex-wing ultralights/microlights or the cabin temperature of closed fix-wing ULs). The indicated temperature is not the actual outside temperature OAT. It may not be used for calculations of correcting factors to ICAO standard atmosphere. It is only suitable for informal information!

At the same time the actual measured voltage of the aircraft is displayed. After a few seconds both displays switch back to altitude and real-time.

### 5.7 Real-Time

The time is shown in hh:mm.

Be careful when disconnecting the power. The real time is lost and must be readjusted in SET-Modes # 15, 16 and 17. (See section 3)

## 6 Engine Management

### 6.1 Engine RPM

Engine RPM is displayed digitally with a resolution of 20 RPM up to 9990 RPM.

In SET-Mode #14 the **ALPHAMFD** can be programmed to work with many different types of engines and ignitions. The measured ignition impulses can be multiplied with a factor of 4, 2, 1 or divided by 2, 4 and 6.

Generators of 582 ROTAX-engines have a special spool with a sine-shaped signal. 6 impulses are given per revolution, therefore you must use the factor "divide by 6" with this type of engine. Because 582 ROTAX-engines produce a special RPM signal, the **ALPHAMFD** can be adjusted to use this signal with a special filter. This adjustment can be done by **BRÄUNIGER** any time.

Most engines have a special 12 V port where the RPM can be measured.



**WARNING!** As long as the engine is running and RPM is measured, for safety reasons the **ALPHAMFD** cannot be switched off.

## 6.2 Engine Hour Meter

The **ALPHAMFD** distinguishes between flight time and engine running time per flight. Both values are displayed and stored for every flight. (See MEMO-Mode section 7)

Additionally the total running time of the engine of all flights (Engine Hour Meter) is displayed in SET-Mode #4. This value can not be changed and does not get lost when disconnecting the power of the **ALPHAMFD**. The value is shown in full hours.

## 6.3 Fuel state and Fuel Consumption

The fuel state is determined by a special flow sender. It is highly recommended to only use the flow sender supplied by **BRÄUNIGER**, because other senders are not adapted to the **ALPHAMFD** and correct function cannot be guaranteed.



**WARNING!** This version of the **ALPHAMFD** can only be used with an engine configuration without fuel flow-back system. A special version which can also determine the fuel flow-back will be available shortly.

### 6.3.1 Measuring the Fuel Consumption

The **BRÄUNIGER** flow sender is placed in the fuel line between filter and engine.



**WARNING!** The flow-sender **MUST** be placed after the fuel filter, because only this ensures that there is no chance of dirt blocking the sender. Also it **MUST** be mounted in an angle between 40° and 90° to the longitudinal axis of the aircraft. The fuel must flow upwards. Please observe the mounting instruction which are enclosed with every sender!

The sender is designed in such a way, that even when the sensor wheel is blocked by dirt, there is always enough fuel being pumped through to the engine. But the flow measurement, and thus the fuel state, can no longer be determined correctly.

The flow sender sends impulses according to the actual fuel consumption to the **ALPHAMFD**. These pulses are being converted to the fuel state display.



**WARNING!** Every time the aircraft tank(s) are filled, the actual contents must be put into the **ALPHAMFD** (SET-Mode #1). If the pilot forgets to do this or if incorrect values are input to the instrument, the fuel state is displayed **INCORRECTLY!**

Although the fuel state and fuel consumption of the **ALPHAMFD** work very precisely, the pilot in command must check the fuel state manually prior to every flight. He must

make sure there is enough fuel in the aircraft for the planned flight. The fuel state display of the **ALPHAMFD** does not relieve the pilot from proper pre-flight planning.

### 6.3.2 Display of Fuel Consumption

By pressing the >**FUNC/SET**< key once, the altitude display switches to the fuel consumption in litres / hour. Pressing >**FUNC/SET**< again switches back to altitude.

In SET-MODE #3 the fuel consumption measurement can be fine tuned to the individual characteristics of each aircraft. The correction factor is set to 100% by default. By increasing the factor to more than 100%, the fuel consumption display is higher, by decreasing the factor below 100% the fuel consumption display is less.

Factor > 100% = higher display of fuel consumption

Factor < 100% = less fuel consumption display

### 6.3.3 Display of Fuel State

The maximum tank capacity is set in SET-Mode #2. The fuel state is displayed continuously by an easy to understand bar-graph, where 1 bar represents 10% of the maximum tank capacity. 10 bars represent 100% = full tank, 1 bar = 10% of maximum tank capacity = reserve. The fuel state is not measured in the tank but is indirectly calculated by actual contents of the tank and fuel consumption. When 10% tank is reached (= reserve!) an audio alarm sounds through the Intercom and the 10% bar starts to flash. When the tank is almost empty, all bars start to flash simultaneously and the Intercom alarm sounds.

HINT: If the max tank contents is set to 10 Litres, one bar of the fuel display corresponds with 1 Litre. This information can be very useful for competitions where low fuel consumption is crucial

### 6.3.4 How to enter the Actual Fuel State after filling up

Switch to SET-Mode #1 by pressing the >**FUNC/SET**< key for a few seconds. After pressing >**ENTER/MEMO**< the >SET< icon starts to flash. This indicates that a value can be changed. Now the maximum tank capacity is entered. If you have really filled up the tank just press >**ENTER/MEMO**< again and the value for full tank is stored.

If the tank is not filled up completely (e.g. when filling up from Jerry cans) you can also store any value you want (in Litres or Gallons). The desired value is adjusted by pressing the >ARROW< keys.



**WARNING!** If incorrect values are entered, incorrect values and alarms for reserve or tank empty will be displayed!

#### **6.4 Cylinder-Head-Temperature (CHT) and Exhaust-Gas-Temperature (EGT)**

The **ALPHAMFD** measures simultaneously the temperatures of two cylinders by using standard Ni-Cr-Ni temperature senders. By pressing the **>TEMP<** key you can switch between Exhaust-Gas-Temperature (EGT) and Cylinder-Head-Temperature (CHT).

All senders are constantly monitored for cable breakage. If the **ALPHAMFD** detects such a fault, an audio alarm sounds through the Intercom and the corresponding display starts to flash. The temperature read-out is replaced by three dashes (---).

Because of the way temperature senders work, they can only give a signal which corresponds to the difference of the measured spot and a comparison temperature. In order to display the actual temperature, this difference must be compensated for with the actual temperature of the environment. This is why the **ALPHAMFD** has a built-in absolute temperature sender. It is used for correction of the temperature senders.

#### **6.5 Water Temperature**

This version of the **ALPHAMFD** does not yet have a separate port for a PT 100 senders for water or oil temperature. However it is possible to use one of the CHT or EGT ports with a specially adapted sender for water or oil temperature. This sender is available from **BRÄUNIGER**.

#### **6.6 Low Oil Pressure Warning**

Not yet available

#### **6.7 Voltmeter**

After pressing the **>FUNC/SET<** key once the altitude display changes to temperature and the real-time display changes to voltage indicated by the **>volt<** icon. If the voltage of the aircraft drops below 12.0 V an audio alarm sounds through the Intercom and the real-time display alternates with the voltmeter display.

### **7 MEMO-Mode (Flight Log)**

The modern processor technology of the **ALPHAMFD** allows storage of the flight data of the last 25 flights. After pressing the **>ENTER/MEMO<** key for several seconds, the instrument switches to MEMO-Mode. This can be done at any time, even during a flight. The following data is displayed:

The MEMO-Mode shows the following information:

- Maximum rate of climb and sink
- Maximum engine temperatures CHT or EGT for both cylinders, switch by pressing **>TEMP<**

- Maximum speed IAS
- Maximum RPM
- Maximum altitude
- Date of flight
- Take-off time (as soon as 50 km/h IAS are exceeded)
- Flight time and engine running time during flight, switch by pressing **>TEMP<**

Note: A flight is only saved as a flight if the engine runs for at least 1 minute and an altitude change of at least 25 m is detected.

By pressing the **>ARROW<** keys you can scroll through the last 25 flights and call up the corresponding maximum values. The flight can be identified by date. Additionally the internal flight number is displayed for a short period of time in the RPM display. If the memory is filled with 25 flights, the oldest flight is erased when a new flight is made. The new flight becomes #1.



**WARNING!** All flight log data is lost when the **ALPHAMFD** is disconnected from the power supply!

## 8 Other Functions

### 8.1 Acoustic and Optical Warnings

The **ALPHAMFD** has a special port for connecting to the Intercom (see section 3.2). The alarm, when sounded, consists of several short beeps. The beeps are repeated every 30 seconds until the pilot switches the alarm off by pressing **>ON/OFF<**.

**Attention:** To come back from the alarm temperatur to the other one, for example EGT to CHT, first press the **ON/OFF** button, than press the **TEMP** button!

Note: The instrument is not switched off during flight when pressing the **>ON/OFF<** key!

The following audio alarms are implemented:

#### 8.1.1 Stall-Alarm

When the aircraft flies slower than the set stall speed (e.g.  $V_{so}$ ) (adjusted in SET-Mode #6), the stall alarm sounds. This sound (low frequency beeps) only stops when the stall speed is exceeded. The alarm can not be switched off. Below 44 km/h the stall alarm is not active.

#### 8.1.2 Low Voltage

If the power supply of the aircraft drops below 12 V a single alarm sounds (several beeps) through the Intercom. Additionally the real-time display alternates with the voltmeter.

#### 8.1.3 Low Fuel

If the fuel gets below the 10% reserve mark, a single alarm sounds through the Intercom and the 10% bar starts to flash. If the fuel gets even lower, this critical condition is signalled by the continuous repetition of alarm beeps in the Intercom. Additionally all bars of the fuel display start to flash

#### 8.1.4 Cable Breakage of Temperature Senders

If the system detects a cable breakage of a temperature sender, an audio alarm is sounded through the Intercom and the corresponding display starts to flash. The temperature read-outs are replaced by 3 dashes (---).

#### 8.1.5 Engine Temperatures too high

If the engine temperature thresholds are exceeded (can be defined in SET-Mode 7, 8, and 9) the audio alarm sounds and the corresponding temperature read-out starts to flash. The temperatures continue to be displayed.

#### 8.1.6 Altitude Guidance Mode

The AGM is an audio warning system which helps pilots to maintain a certain altitude without having to permanently check the altimeter. Detailed information on the AGM can be found in section 5.3.

#### 8.1.7 ERROR-Messages during Power on Self-Test (BIT)

The **ALPHAMFD** performs an automatic Self-Test when powering up. All senders are checked for plausible and correct data and the instrument checks itself.

If the **ALPHAMFD** detects a problem, an ERROR-Code will be displayed.

#### 8.1.8 List of ERROR-Codes

<b>ERROR-Code</b>	<b>Cause</b>	<b>What to do</b>
ERROR 1-16		
ERROR 17 – NO EGT1	Cable breakage at sender EGT 1	Check sender EGT 1
ERROR 18 – No EGT 2	Cable breakage at sender EGT 2	Check sender EGT 2
ERROR 19 – NO CHT 1	Cable breakage at sender CHT 1	Check sender CHT 1
ERROR 20 – NO CHT 2	Cable breakage at sender CHT 2	Check sender CHT 2
ERROR 22 to 25	Altitude sensor defect	Send instrument to manufacturer
ERROR 28-29- USPEED TOO SMALL/BIG	Speed sensor defect	Check dynamic pressure hose, otherwise send instrument to manufacturer
ERROR 30 – UTEMPERATURE OUT Of RANGE	An engine temperature is out of allowed temperature range	Check temperature senders
ERROR 33	Internal Error	Send instrument to manufacturer
ERROR 34-NO FUEL SENSOR	Fuel flow sender not connected	Check fuel flow sender



**WARNING!** All other ERROR-Codes send **ALPHAMFD** to manufacturer!

## 8.2 ***Theft Prevention by Password***

Every **ALPHAMFD** is identified by a unique, unchangeable serial number (can be called up in SET-Mode #22). Every customer receives an alphanumeric password with

his **ALPHAMFD**. The theft prevention function is not activated by default. It can be activated in SET-Mode 21. For this you have to enter the password. Serial number and corresponding password are printed on the back cover of this operating manual.

Operation: After disconnecting the **ALPHAMFD** from the power supply (just as if someone took it out the aircraft) the instrument is being locked and can not be used without first entering the correct password.

If the instrument is connected to power again and switched on, the password must be entered. "AAAAA" is displayed where every "A" must be replaced by the correct digit/letter by pressing the >ARROW< keys and scrolling through the alphabet. After entering each letter/digit confirm by pressing >**ENTER/MEMO**< and the instrument will jump to the next character.



**WARNING!** If you forget the password, it can only be retrieved by the manufacturer. Valid proof of ownership (invoice) must be produced.

The theft prevention can be deactivated any time, but you must enter the correct password prior to deactivation.

### 8.3 Adjustment of Units

In order to be able to use the **ALPHAMFD** internationally, the units of all temperatures, speed, air pressure, fuel and fuel consumption, and altitude can be changed.

Engine temperature and instrument temperature	°C Celsius or °F Fahrenheit
Air pressure	hPa or inHg
Speed	km/h (later versions also knots (kts) and miles per hour (mph))
Altitude	Meter or Feet
Fuel and fuel consumption	Litres (later versions also US Gallons and US Gallon/h)

The various units can be set in SET-Mode #18, 19, and 20. Currently not all units are implemented. If you need one or the other unit please contact **BRÄUNIGER** for a software upgrade.

### 8.4 Software Update

The internal software of the **ALPHAMFD** is continuously being improved. Because the **ALPHAMFD** works with modern processors and flash-memory technology, it can be upgraded to the latest software version at any time. You merely have to send the instrument back to the manufacturer. Because of the possibility for software upgrades, every **ALPHAMFD** is a safe long-term investment.

## 9 SET-Mode

In order to use the many functions of the **ALPHAMFD** and to be able to adjust it to one's personal needs and preferences, some functions can be individually adjusted. The SET-Mode is activated by pressing the **>FUNC/SET<** key for several seconds. Once the SET-Mode is activated, a **>SET<** icon appears in the display. With the **>ARROW<** keys you can scroll through the SET-menus. A SET-Mode number is displayed, so it is easier to get oriented.

If you want to change a function, press the **>ENTER/MEMO<** key. Now the **>SET<** icon starts to flash which indicates that a value or setting can be changed by pressing the **>ARROW<** keys. Pressing the **>ENTER/MEMO<** key again stores the new setting. If the new settings shall not be stored, press **>FUNC/SET<** instead of **>ENTER/MEMO<**. Also if you want to leave the SET-Mode, press **>FUNC/SET<**.

#	Display	Setting (Example)	Remarks
<b>1</b>	FUEL	<23>	Enter the actual fuel tank contents in litres, pressing <b>&gt;SET&lt;</b> -key twice sets fuel tank to full
<b>2</b>	MAX FUEL	<50>	Maximum contents of fuel tank
<b>3</b>	FUEL CORR	<118>	Calibration of flow sensor
<b>4</b>	ENGINE HOURS	<176>	Read-out of engine hours in full hours (can not be changed)
<b>5</b>	AGM RANGE	+/-<300>	Setting of altitude range of Altitude Guidance Mode (AGM), setting of maximum allowed altitude difference
<b>6</b>	STALL ALARM	<65>	Stall speed
<b>7</b>	EGT ALARM	<650>	Maximum exhaust gas temperature alarm threshold
<b>8</b>	CHT ALARM	<200>	Maximum cylinder head temperature alarm threshold
<b>9</b>	PT SENSOR ALARM	<110>	Maximum water temperature alarm threshold (water or oil temperature) (not yet available)
<b>10</b>	RPM ALARM	<5500>	Maximum RPM alarm threshold
<b>11</b>	SPEED ZERO		Speed zero calibration
<b>12</b>	SPEED GAIN	<123>	Speed calibration
<b>13</b>	ANALOGUE SCALE	Example in VSI scale	Single pointer display or sector display
<b>14</b>	REVOLUTIONS FACTOR	</4>	Adaptation of RPM to different engines, correction factor
<b>15</b>	TIME	<12:45>	Real-time in hh:mm
<b>16</b>	DATE	<26:05>	Date, day and month in dd:mm
<b>17</b>	YEAR	<2001>	Date, year in yyyy
<b>18</b>	UNIT TEMPERATURE	<°C> or <°F>	Temperature unit in °C or °F
<b>19</b>	UNIT ALTITUDE	<METER> or <FEET>	Altitude units
<b>20</b>	UNIT PRESSURE	<HPA> or <INHG>	Air pressure units
<b>21</b>	SECURITY CODE	<ON> or <OFF>	Security code on or off

<b>22</b>	SERIAL NUMBER	<1111>	No setting, read-out of serial number
<b>23</b>	VERSION	<013>	No setting, read-out of internal software version

Note: The above values and settings are examples only and do not necessarily represent the correct settings for your aircraft!

## ***10 Periodical Check***

Although the **ALPHAMFD** works completely maintenance free we recommend sending it every 3 years to the manufacturer for checking and calibration. In this way the precise operation of your **ALPHAMFD** is maintained for a long period of time. Additionally it can be upgraded to the latest software version.

## 11 Technical Data

### Altimeter

Range: -500 to 9990 m  
Resolution: 1 m  
Measurement: 1 measurement / sec  
Digital display with 4 ½ digits

### VSI

Range: +/- 10 m/s  
Resolution: 0,25 m/s  
Measurement: 5 measurements / sec  
Hardware time constant: ca. 2 sec

### Fuel

Bar graph with 10 bars  
In 10% increments from reserve (=10%) to full  
User has to input maximum tank volume  
Fuel consumption from 3 to 49.9 litres/hour

### Speed

Range: 40 to 220 km/h  
Resolution: 40 to 120 km/h: 2,5 km/h  
120 to 220 km/h: 5 km/h  
Measurement: 4 measurements / sec  
Pitot tube

Note: **ALPHAMFD** with different speed ranges available!

### Time

Real-time with date  
Engine Hour Meter (can not be changed by user)  
Flight time and engine running time per flight

### RPM

Display: 4-digit digital read-out  
Measurement: 1 measurement / sec  
Factors: Multiplied by 4, 2, 1 and divided by 2, 4 and 6 (ROTAX)  
Resolution: 20 RPM

### Engine Temperatures (CHT, EGT)

Ni-Cr-Ni sender  
Simultaneously for 2 cylinders  
3-digit digital read-out  
Switchable EGT max. ca. 900 °C, CHT max. ca. 350 °C

### Water- /Oil temperature

With PT 100 Sensor  
With special **BRÄUNIGER** PT 100 sender to be used with one of the EGT/CHT ports

**Power supply**

8 V to 28 V

**Power consumption**

Instrument On 35 mA

Instrument Off 0.5 mA

**Environment**

Temperature range  $-30\text{ }^{\circ}\text{C}$  to  $+60\text{ }^{\circ}\text{C}$

Relative Humidity 99%

## ***12 Warranty***

**BRÄUNIGER** offer a 12 month international warranty on all **ALPHAMFD** from the date of purchase. In case of repair please send instrument directly to **BRÄUNIGER** or to the nearest **BRÄUNIGER** Service Center.

**WARNING!**

The activity of flying can be dangerous and can result in personal injury including death. No instrument and no aircraft is perfect. In rare occasions it can happen that instruments break down or show incorrect values. The pilot in command is always fully responsible for a safe conduct of all flights. **BRÄUNIGER** assumes no liability.

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Serial Number:	
Password:	



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