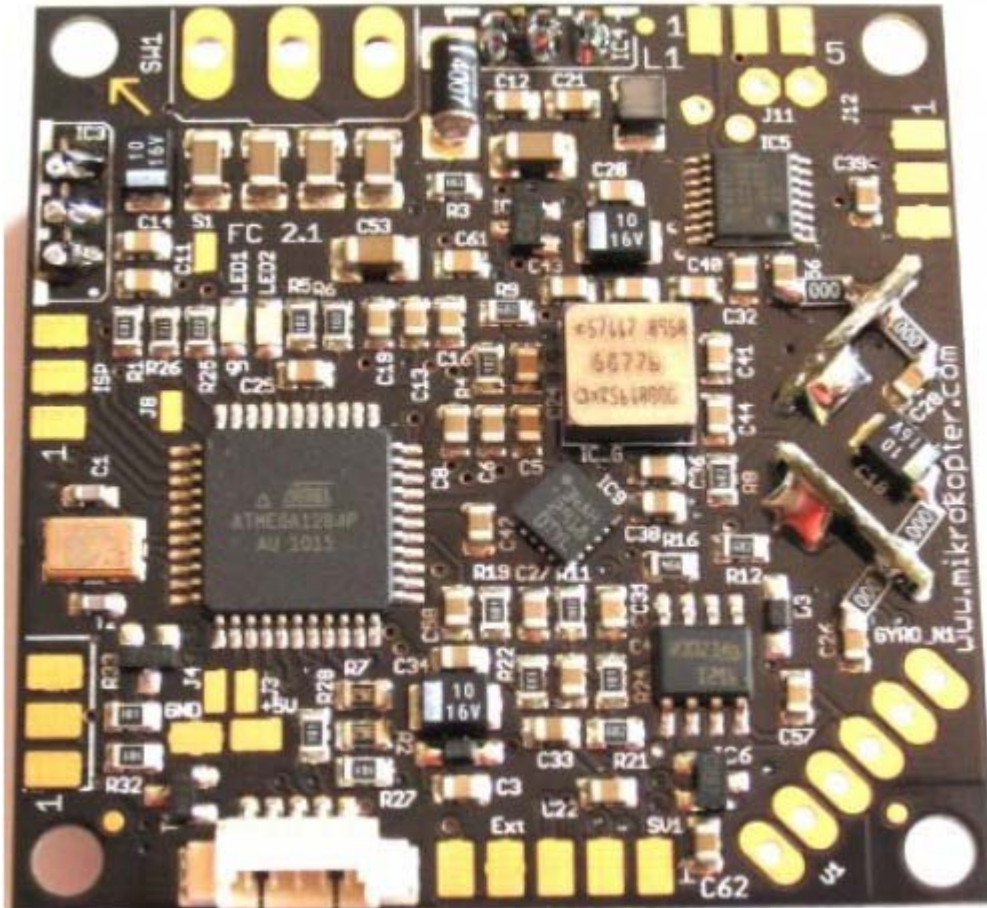# Flight-Ctrl V2.1 ME

1- Price

360 Euro

http://ahm-rc.de/index.php?cPath=64_60

2- Tasks

- measuring the angular velocity of the three axes
- measuring the acceleration data of the three axes
- measuring the atmospheric pressure for altitude control
- evaluation of a digital compass signal
- measuring the battery voltage
- evaluation of the R/C signal
- processing of sensor data and computing the actual angular position

- driving Brushless ESCs (electronic speed controllers)

3- Features

- Dimensions 50 * 50mm
- Two LEDs (e.g. Okay & Error)
- Two transistor outputs for external lights (or other functions)
- Under voltage detection
- A receiver can be powered by 5V
- 4-layer design
- 5 servo outputs

4- Micro Controller

Atmel **ATMEGA644** @ 20MHz: popular 8-Bit-processor

- 64KB self-programming Flash Program Memory
- 4KB SRAM
- 2048 Bytes EEPROM
- 8 Channel 10-bit A/D-converter
- JTAG interface for on-chip-debug
- Up to 20 MIPS throughput at 20 MHz. 1.8 - 5.5V Operation
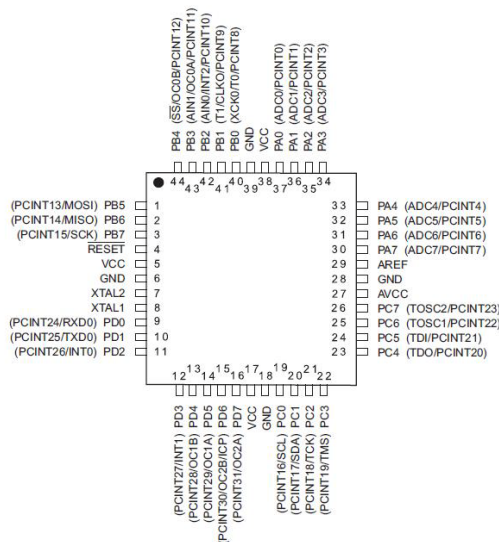

a- Gyro Sensors

The gyroscopes (Gyros) measure the angular velocity (rotating speed) around each axis. Three sensors to stabilize all three axes: Murata ENC-03 or Murata ENC-03R (SMD Gyro)

b- Acceleration Sensor

It is used to measure the actual tilt of the MikroKopter and to support the altitude adjustment. Here we use a three axis sensor.

In the Flight Control "LIS3L02AS4" measures the acceleration on three axes. The acceleration is converted into a proportional voltage, which is evaluated by the micro controller of the flight control.
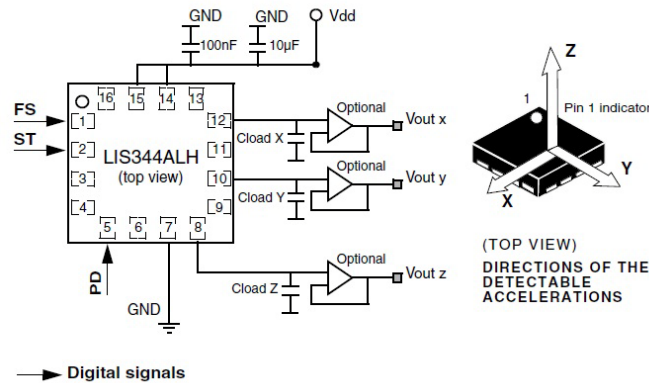
c- Atmospheric pressure sensor

It serves to stabilize the flight altitude. The higher the altitude, the lower the air pressure is. The pressure sensor measures the pressure. The output signal is an analog voltage.

If the Mikrokopter is going to fly at very high altitudes (eg 2500 meters), then it is possible that the air pressure sensor will not operate correctly. The resistors have been calculated for air pressures of 850 to 1100 hpa

In the Flight Control "MPX4115A" pressure sensor is used.

d- Interfaces

- I2C Bus

Brushless Ctrl (or Electronic Speed Controller) is connected to this bus which carries the command sequences. **The Flight-Ctrl needs special brushless ESC, to ensure fast communication via the I2C Bus. Standard ESCs** cannot **be used as they are too slow.**

The I2C Bus has a clock (SCL) and data (SDA) line. The bus connects all SCL and SDA lines together.

- Serial Interface

It is used to connect a PC for testing and calibration.

- **ISP* Interface**

The ATMEL controller will be programmed via an ISP interface. This interface can be also be used for a fast communication (synchronous serial) with other controllers.

*ISP : In-system Serial Programming

- **PPM* input**

This input is used to connect the receiver. 2 wires for the supply voltage and one for the receiver's R/C sum signal.

*PPM : Pulse Position Modulation

- **Compass connection**

A digital compass can be connected to the PC4 input of the universal connector.