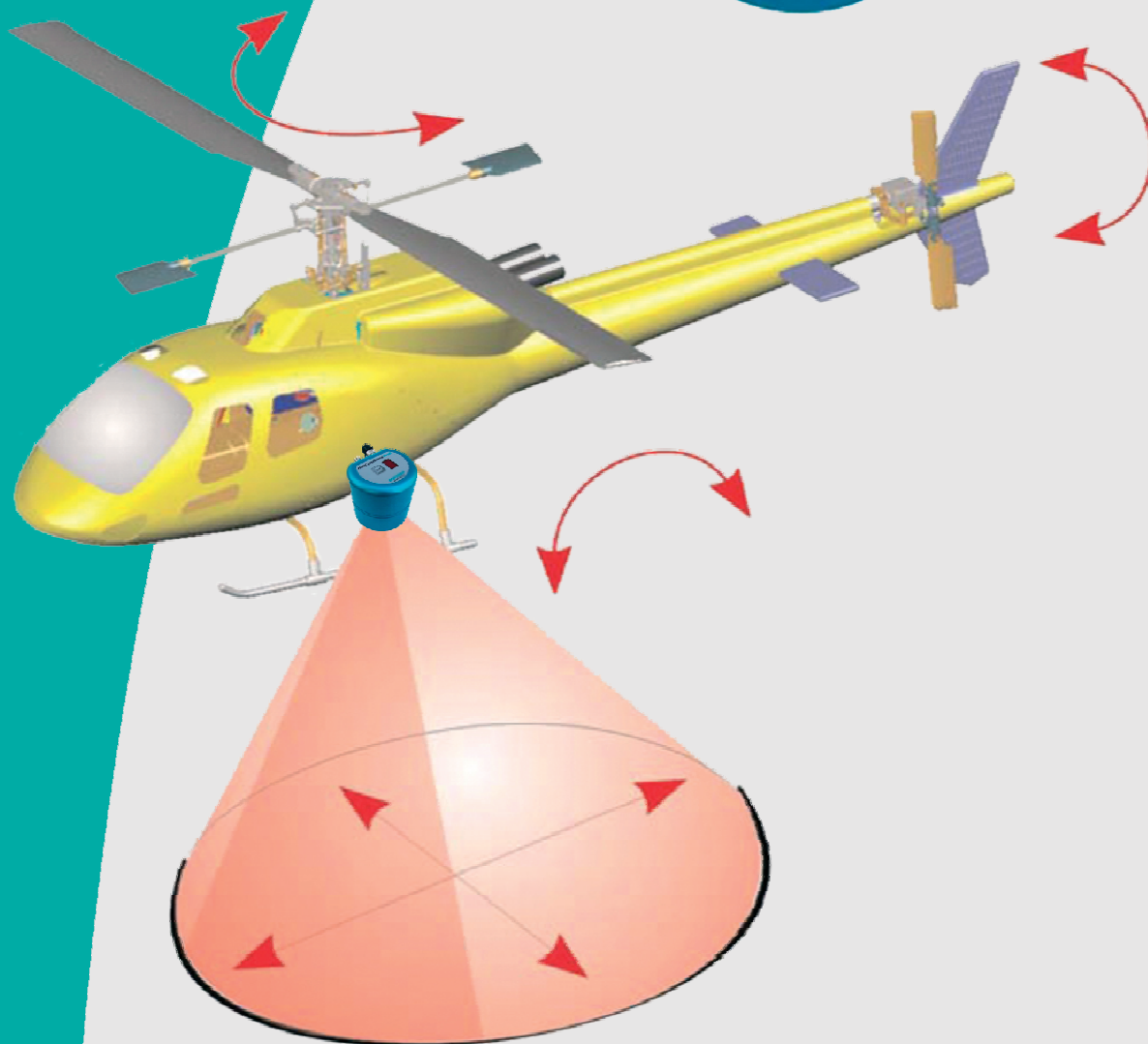


HeliCommand Profi

Autopilot for remote controlled helicopters

- Increased precision and reliability when used with industrial helicopters
- Commercial applications such as filming, aerial photography, surveying, monitoring
- Reduction of crash risk
- Ideal training aid
- Additional support for long-range flying

WORLD NOVELTY



CAPTRON

The Breakthrough...

Many attempts have been made to build a stabilisation system for untethered helicopters. Existing control aids designed for models are either just a supplementary x-y gyro system, or a circuit based on simple light or infra-red sensors, which only work if the horizon is absolutely level, and there are no visual obstructions. Until now it has only been possible to provide genuine autonomous control at great expense whilst incurring considerable compromises. The unavoidable fact is that inclination measurement with gravitation is impossible when we are dealing with a helicopter; with conventional systems at least one GPS system has to be included in the on-board equipment if geographical stability is required. If a normal helicopter is left alone for just a few seconds, it quickly drifts off in an arbitrary direction, accelerating continuously - which means, it would not survive for long.

The **HeliCommand** unit stabilises the helicopter's position as well as its attitude. It incorporates a new form of ground sensing which works incomparably more accurately than a GPS system when at very low altitude, i.e. the helicopter's movements can be measured and corrected more finely. In contrast to GPS, the new process also works even when there are buildings or trees in the immediate vicinity, and in indoor locations - provided that the lighting conditions and contrast are adequate.

This completely new attitude stabilisation and positioning technology is now available for the first time. It was developed primarily for professional and industrial applications, but now includes a version specifically for modelling use. The system contains multiple control and measuring circuits which provide impressively reliable results.

Characteristics are not previously achieved quality of regulation, compact architecture and low weight, and all this for an affordable price.

Applications

- Improved precision and reliability with industrial (or particularly valuable) helicopters.
- Commercial applications such as aerial photography, filming, surveying and monitoring.
- Safety function: reduced crash risk (emergency button)
- Ideal training aid. When set to maximum stabilisation the system makes it possible to learn helicopter flying "solo".
- Ideal support for long-range flying, in situations where the pilot does not have clear vision, and for piloting using a radio-video link.

Technical features

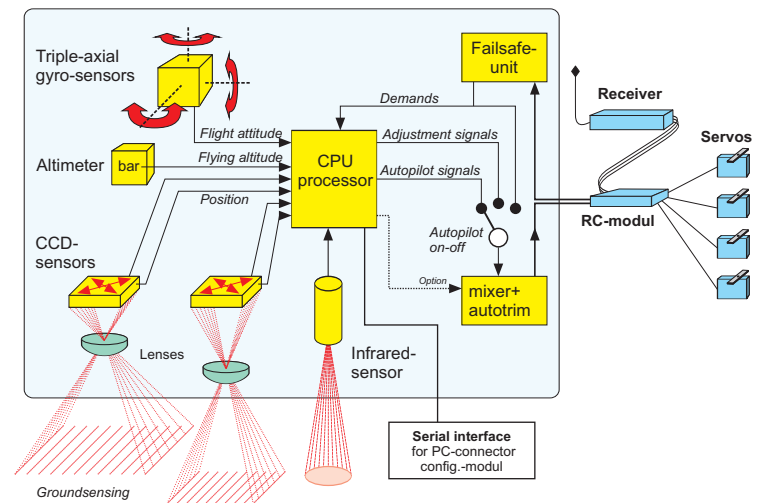
- Multiple independent instrument systems for high security.
- A new kind of optical sensing process for positional measurement, independent of the horizon, i.e. it also works adjacent to buildings, trees, hills etc.
- Geographical position stabilisation, i.e. far more than "inertial control" or tilt stabilisation.
- Attitude stabilisation (inertial control) with artificial horizon and electronic triple-axis gyro based on high-quality drift-free SMM gyros!
- Instruments can be activated individually; variable stabilisation rates.
- High-quality fail-safe function (with PPM / FM receivers); fully automatic landing if the radio link fails.
(PCM receivers can be configured in such a way that a failed radio link causes maximum stabilisation to be activated at the "full" setting; the helicopter takes up a stationary position).

Method of working

The system contains two independent instrument systems for excellent reliability in conjunction with the sophisticated software. The professional version contains additional instruments which provide autonomous control of all functions. The position is measured by sensing the ground, using a principle similar to that of the optical computer mouse; the difference is that the positioning system continues to work at altitudes of up to 20 m and more, and even at the onset of dusk. A movement sensor senses the ground in flight, i.e. it virtually replaces the eyes of an airborne pilot. Almost every ground surface exhibits contrast, and this allows the system to detect all relative movements in the horizontal direction, just as accurately as a computer mouse on its mat. The supplementary attitude stabilisation features an artificial horizon and three electronic gyros, and works completely independently of the prevailing visual conditions. As a result, the **HeliCommand** is capable of stabilising the helicopter in the horizontal attitude independent of the visual circumstances (in contrast to previous types of stabilisers). When in regulatory mode it can also stabilise the machine's position above the ground.

The **HeliCommand Profi** was developed for commercial applications, and is equipped with additional instruments, including a ground distance sensor for automatic landing, and an air pressure sensor for altitude stabilisation, plus a second redundant ground sensor for drift measurement. The **Profi** version also contains ultra-precise hardware, enabling it to provide enhanced stability and precision even in unforgiving mission conditions.

Of course, in exceptional visual conditions, e.g. in the dark, above water, over smooth floor coverings or a featureless snow blanket, the visual sensing systems are unable to supply a signal. If this should occur, the other airborne instruments automatically assume the stabilising role. Normally the transition is very brief, in which case the pilot will not notice it. If it lasts longer, the stabilisation automatically switches from "position mode" to "horizontal mode". In this case the pilot will notice the difference, as he has to compensate for any slow drift by giving straightforward control commands. Even in this situation the level of stabilisation is equivalent to that provided by conventional "inertial control" technology, i.e. it provides tilt stabilisation, as if you had switched off the altitude regulation and several other features of the **HeliCommand**.



Additional integrated functions

Tail rotor gyro

The **HeliCommand** incorporates a high-quality heading-hold gyro. Alternatively - as you would expect - a separate gyro can be used.

Auto-trim

Another useful feature is automatic trimming. Pressing a button on the transmitter neutralises the three control axes elevator (pitch-axis), aileron (roll-axis) and rudder (tail rotor; yaw-axis). If the stabilisation system is fitted, trimming is only required for the first flight (after installation). However, the trim can also be used for conventional manual control. Any period of reasonably calm flight lasting at least seven seconds is sufficient for the automatic trim system to record correct trim values. These values are stored in the unit, but they can be re-defined at any time.

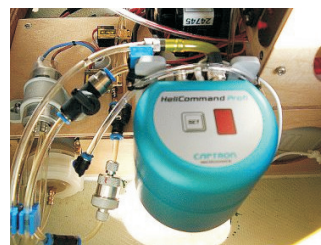
Swashplate mixer

An integral fully featured swashplate mixer (H1, HR3, H4, 140°) is present, as is virtual swashplate switching and an electronic servo travel linearisation circuit which compensates for mechanical irregularities due to the angular offset of H-4 linkages.

The unit can also stabilise "flybar-less" rotors. This effective stabilisation reliably prevents the characteristic tendency of flybar-less rotor heads to balloon up, and makes the helicopter impressively stable in gusty conditions.

Additional RC functions

Stepless adjustment of the stabilisation intensity and mode switching for horizontal mode, position mode, height mode and tail gyro mode.



Differences between *HeliCommand Profi* and the modelling versions

The differences in brief:

Features:

- **Accurate, ultra-smooth hover stabilisation**
- **Geographic stabilisation up to around 20-30 m altitude in winds up to approx. 5 m/s**
- **Can also be used in built-up areas** (legal restrictions permitting)
- **Darkness adaptation of the positional measurement** (continues to work at the onset of dusk)
- **Expanded safe temperature range**
- **High-quality fail-safe function (for PCM / FM) with option for automatic landing if the radio link should fail**
- **Robust, weatherproof aluminium housing**
- **Integral vibration damping and shock absorption**
- **High-quality instrumentation for maximum possible reliability**

The system features the following hardware:

- **Four optical imaging systems**
- **Accelerometers acting on three axes**
- **Three high-quality SMM gyros**
- **Air pressure altimeter**
- **Four micro-processors**
- **Second, redundant CCD sensor for drift monitoring**

The price includes individual configuration to suit the helicopter. This can also be done by the customer himself, as the required software is included.

3 high-quality SMM gyros:

SMM gyros of the highest possible quality with associated hardware, in conjunction with sophisticated three-dimensional movement / compensation software specifically developed for this application. A full 24-bit algorithm is used for centre adjustment (internal resolution: 16 million steps).

Together with a 3-axial-acceleration-sensor, this results in high-quality attitude stabilisation (also known as inertial control), which works entirely independently of ambient influences.

Second redundant CCD sensor:

A second CCD sensor complete with its own optics is arranged at an offset orientation; in conjunction with the first sensor this provides much more accurate sensing, improved contrast detection performance, failure bridging (redundancy) and an expanded measurement range. This design achieves the level of performance required to protect valuable camera systems, high-quality filming apparatus and any other professional application.

Barometric altitude measurement:

The system includes an integral air pressure measuring system for regulating and maintaining a constant altitude up to heights of 2500 m. In calm conditions the helicopter's altitude can be maintained constant to within 10 cm when hovering, and to within 1.5 m during high-speed flight or in windy conditions.

At start-up (when the system is switched on) the sensor calibrates itself automatically to the altitude of the take-off site. New hardware has been specially developed for this purpose; optimised 18-bit resolution (equating to 262,144 steps) is used for height measurement.

The altitude regulation system can be adjusted individually by the Service department to suit the helicopter you are using. It is also possible to adjust the unit to meet individual requirements in terms of capture range, gain (strength of action) and control behaviour. Various modes can already be set for such purposes:

- Conventional "control characteristics", i.e. altitude maintenance, once the approximate nominal height has been set by the pilot.
- Comprehensive automatic systems which also control the Rate of climb and descent. In this case a centring spring can be installed in the stick unit instead of the ratchet.
- The intelligent software links horizontal and vertical regulation, compensating dynamic inter-actions. For example, this can be exploited to reduce the helicopter's tendency to climb when braking.

Interference suppression:

To ensure smooth hovering the sensor system includes special interference suppressors. These provide outstanding results for static flying, e.g. when filming.

Infra-red ground distance measurement:

- This innovation expands the measurement range and the accuracy of the air pressure altitude measurement when the helicopter is very low.
- Gentle flare-out when close to the ground, followed by automatic landing (option can only be used with FM / PPM receivers).

The horizontal position stabilisation exploits an optical beam directed at the ground, with the result that its performance necessarily varies according to its altitude.

Due to this technical limitation the modelling version is considerably restricted in terms of accuracy, maximum altitude range, effectiveness of overall regulation, etc.

The *HeliCommand Profi* circumvents these disadvantages because its altimeter and its comprehensive algorithms compensate for these effects in such a way that the measured data (and with it the stabilisation effect) is consistent in three-dimensional terms.

The optical horizontal position-holding system therefore works at altitudes of up to ten metres and more, depending on the wind strength, and its accuracy exceeds that of conventional GPS systems.

The purchase price includes basic configuration of all these settings, matched to the individual helicopter and its rotor linkage type. This procedure can also be done by the customer himself, as the required software and manual is included.

We are also able to adjust the **HeliCommand** to suit individual wishes, and even test-fly the system, as part of our range of extra-cost services.

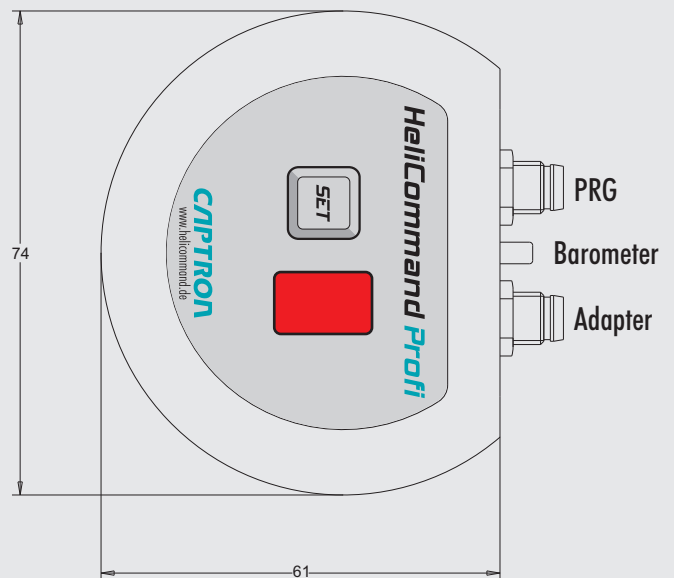
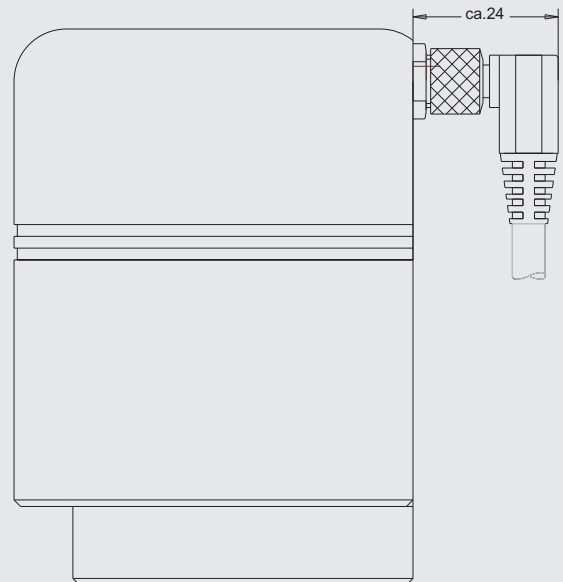
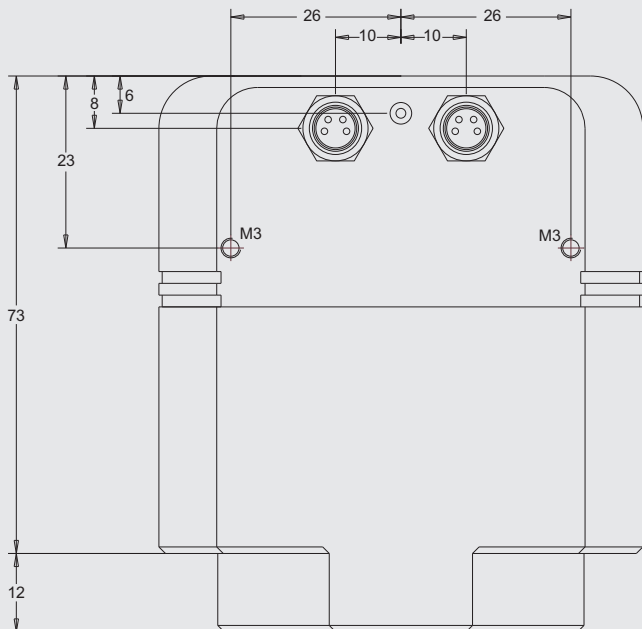


Please visit www.helicommand.com for more information and a list of dealers and service centres.

Technical Data

Supply voltage: 4.8 - 7 Volt (4 - 5 NC)
Current drain: ca. 200 mA at 5V (without GPS)
Weight: 230g (without GPS)
Temp. in operation: -15°...+50°C

Special versions available on request !



www.helicommand.com

CAPTRON Electronic GmbH
Bodenseestraße 129
D- 81243 München
☎ +49 (0)89 - 88 96 95 - 0
✉ +49 (0)89 - 88 96 95 - 55
www.captron.de
info@captron.de

CAPTRON