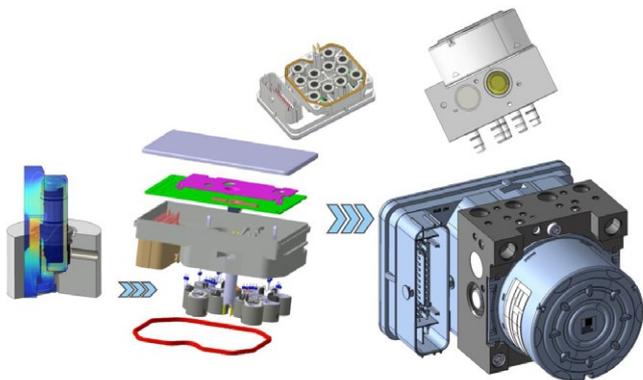


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Ko-Bra RACE ABS

FOR LOTUS EXIGE V6 BY WCS

After one year of development – from simulation to the racetrack to the road – we have succeeded in introducing a RACE ABS / ESP system, whose adaptivity meets the **requirements of both everyday sportive users and ambitious racers.**



For us, it was equally important to design an overall package that can be perfectly integrated into the existing vehicle architecture as well as including the most modern model-based control algorithms.

Many currently available ABS systems only make rudimentary use of the sensor information of modern vehicles because they stem from a time when vehicles were equipped with significantly fewer sensors.

As a result, only program-controlled rather than adaptive components are used since the situational driving behavior cannot be measured or modeled.

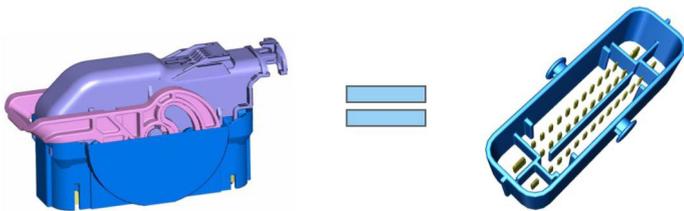
With ABS control it is, in principle, similar: **The more information about current driving behavior is available to the ABS controller, the better it can adjust the braking force on the wheel to the respective situation** and do almost completely without program-controlled components. This is achieved by using as much sensor-based and modeled measurements as possible.

Faster brake pressure build-up after jumps or bumps in the road as well as more precise steering behavior under braking can be achieved this way.

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FACTS

- ▶ **Impressive ABS performance** through modern model-based ABS control algorithm
- ▶ **Three especially adapted model settings** for the ABS controller (road tires/rain tires, semi-slick, slick) through the three Lotus driving mode settings
- ▶ **Individually adjusted to Exige V6**
Special adaptation for our Ko-Bra 4-4 brake in the Exige V6. It was important for us that all warning lights and driving mode switches work just as with the standard system.
- ▶ **RACE ESP**
New: first Race ABS with Race ESP for Lotus Exige V6. Includes 4 sports modes: Road, Sport, RACE, Off
- ▶ **Plug & Play**



Replacing the original component does not require the creation of any additional holes, sensors, cables or switches. The conversion is therefore feasible within one day.

- ▶ **With German TÜV registration**

BENEFITS

ABS

- ▶ Braking deceleration potential is limited exclusively by the tire: no limitation of the vehicle deceleration by the ABS (unlike the series ABS limited by program-based controls). Typical racing deceleration values of 2 g and more when using slicks and a correspondingly high downforce are achievable.
- ▶ Trail braking: braking deeply into bends is particularly supported by the modern control system. The vehicle remains steerable and the typical understeer of the standard brake is eliminated.
- ▶ Exact steering also under ABS: By using the ESP sensors (steering angle, lateral acceleration and yaw rate) in the modeling of the ABS controller, the optimal ratio between the maximum possible braking and lateral force is always maintained.
- ▶ No hard pedal ("ice mode") or underbrake e.g. after jumps: The modern adaptive ABS control approach even allows braking over jumps (e.g. Pflanzgarten). This is possible because the ABS controller continuously models the maximum possible longitudinal force on the wheel and adjusts it immediately. It is not dependent on simple program-controlled situation recognition.

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ESP electronic stability program

- ▶ Intervention only in the event of oversteer and only through specific wheel-selective brake pressure build-up. Undesired overcompensating braking / interventions in case of understeering are history.
- ▶ No engine torque reduction: No drop in engine torque with a greatly delayed re-establishment of momentum. Powerslide out of curves becomes possible. The driver controls the engine torque by solely using the accelerator pedal.
- ▶ The new freedom of the Race-Mode does not inhibit, but rather supports the driver gently but effectively in preventing the car from going into a "spin". In contrast to the standard series, significantly higher drift angles are possible and these are also corrected more gently (note: the driver also plays a role here). Driving in ESP-OFF mode is therefore no longer necessary to achieve top lap times; however it is still possible as the ESP can be switched off completely.

ESP electronic differential lock

- ▶ We have deliberately not built this into the software. A mechanical lock is recommended. The rear axle brake is significantly relieved, so there is no longer any risk of overheating on the racetrack.

TC Traction Control

- ▶ This is also deliberately not built into the software. No collapse in engine torque with delayed rebuilding of propulsion. The vehicle is less restricted and responds better to acceleration. The driver always has full access to the drive torque.

These measures lead to a fast lap time after a short familiarization.

Data recording

- ▶ All variables relevant to driving dynamics are made available on the CAN bus (lateral acceleration, longitudinal acceleration, vehicle speed, yaw rate, yaw rate deviation (from ESP), strength of the ESP correction, steering angle, driver brake pressure, etc.). They can easily be recorded using a CAN logger (not included in the scope of delivery) without need for additional sensors.

Prices

Ko-Bra RACE ABS / ESP system including installation
€ 7,900 incl. VAT



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MODE SWITCHES

ROAD	SPORT	RACE	RACE / ESP OFF
<p>ABS optimized for road tires. Sensitive and stability-oriented.</p>	<p>Noticeably more aggressive ABS, slightly less stability.</p> <p>Ideal for rain or for road tires on the racetrack.</p>	<p>Maximum braking performance on the ABS. The driver must ensure stability. Recommended for the race track with semi slicks.</p>	<p>Like RACE mode</p>
<p>ESP clearly oriented towards stability. Intervention thresholds and strength such that the vehicle is clearly stabilized. For everyone.</p>	<p>ESP noticeably less restrictive.</p> <p>Slightly wider intervention thresholds and somewhat reduced strength of intervention.</p>	<p>ESP vehicle very unlimited. ESP only serves as a backstop and should not obstruct the driver when driving properly. Late and only weak intervention. Only for use on the racetrack</p>	<p>ESP OFF</p>
<p>TC OFF EDS OFF</p>	<p>TC OFF EDS OFF</p>	<p>TC OFF EDS OFF</p>	<p>TC OFF EDS OFF</p>

All model specific vehicle features (flap exhaust, accelerator pedal characteristic & speed increases) remain unchanged.