Presentation

ECS Electronic Control System

Industrias Zelu S.L.
Why electronic controls for Retarders?
1. Why electronic controls for Retarders?

- **Improve!**
  - Required by the legislator or the V.O.E.M. to comply with electro magnetic compatibility (EMC - EMI).
  - Integration of the retarder brake torque - BRAKE BLENDING
  - Interface / reliability of brake system (ABS, etc.)

- **Reduce!**
  - Current consumption by using the PWM system.
  - Installation time reduction.

- **Enjoy!**
  - Comfort features (brake-cruise -under development-, onboard diagnostic)!
  - Maintenance free.
2. Features, Advantages and Benefits of the ECS System

- **PWM pulse width modulation**!

  The PWM system will allow the use of all coils simultaneously and proportional (no more stages), it will reduce the current consumption up to 50%. It will reduce the temperature in the coils and increase the durability and lifespan of the stator. This will give benefits to batteries - and alternator specs.

- **Under - and over voltage protection**!

  It will monitor the battery and net voltage, if the power drops due to failure of the alternator or battery the ECS system will reduce brake torque or shut down the retarder function. This will increase the life of the batteries and prevent "draining" of electrical power.
3. Features, Advantages and Benefits of the ECS System

- **Heat / temperature protection**
  The ECS has an internal temperature monitoring feature to reduce brake torque if limits are reached.

- **ABS integrated**
  The integrated ABS will judge the ABS event as it takes place and will enforce the brake torque (after the ABS event) gradually (time delayed), in order not to initiate a new ABS event.

- **Low speed switch off integrated**
  No separate module but direct integration of the speedometer (tacho-graph) signal to provide the retarder switch off if the vehicle is not moving.
4. Features, Advantages and Benefits of the ECS System

- **Brake Cruise function -Under development-**

  This will allow the driver to select any speed downhill and the electronics will control the retarder to maintain the speed and not let the vehicle inertia or weight overtake the selected velocity.

- **Diagnostic on board**

  By simple activation the driver or mechanic is able to analyze the retarder function without taking it off the road. Makes trouble-shooting easy.

- **Comfort factor**

  Programmable software! Reduction of failure (less cables) therefore less installation time! No more moving parts (like relay switch).
5. Features, Advantages and Benefits of the ECS System

- **ECS via CAN-BUS**
  100% compatible with the vehicle CAN-BUS utilizing the SAE J1939 protocol and SW in an electronic level.

- **Unify two modules in one**
  Installation time is considerably reduced due to fewer cables and connections needed in the vehicle.

- **Retarder temperature monitoring feature**
6. ECS Electronic Control System
7. Design ECS housing

ECS module

1. Ambient temperature 70º - vehicle 0 Km/h.

2. Ambient temperature 70º - vehicle 36 Km/h.
8. Components of the ECS System

- Control-light with Winter switch
- Hand control
- Pressure Transducer
9. Flexible Retarder Control System

- Using laptop
- RS 232 interface / adjustment
- Installation verification without “test-ride”
- Trouble-shooting!
- Failure Storage Memory
- Programmable for OE requirement
10. Installation of the ECS

- The location of the ECS needs to be a flat clean surface, e.g. Chassis rail.
- The ECS is connected directly to the battery and vehicle signals (ABS, Tacho...)
- Retarder wires are connected to the ECS by means of eyelet terminals. Battery plus and ground are not interchangeable to make incorrect installation impossible.
- ECS can be installed with all KA and CFK retarders.
11. Installation of the ECS

- ECS is connected to each coil cluster separately for better monitoring.
- No staging just proportional retardation
- Parameter configuration via ECS software
- ECS is connected to the vehicle battery
Setting the pace with retarder technology

12. Installation of the ECS

ECS can be fitted to all CFK and KA Retarders.

ECS (+ & -) and retarder ground are connected straight to the vehicle battery.

All coils are connected with the ECS No stages, but proportional control.

Retarder Technology by Industrias Zelu, S.L.
Manufactured and designed in Spain
13. Diagnosis of ECS

<table>
<thead>
<tr>
<th>DEFAULT DESCRIPTION</th>
<th>FLASH CODE</th>
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</thead>
<tbody>
<tr>
<td>Short-circuit on signal output 1</td>
<td>1</td>
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<tr>
<td>Open circuit on signal output 1</td>
<td>2</td>
</tr>
<tr>
<td>Short-circuit on signal output 2</td>
<td>3</td>
</tr>
<tr>
<td>Open circuit on signal output 2</td>
<td>4</td>
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<tr>
<td>Short-circuit on power output 1</td>
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<td>Open circuit on power output 1</td>
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<tr>
<td>Open circuit on power output 4</td>
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14. Diagnosis of ECS

<table>
<thead>
<tr>
<th>DEFAULT DESCRIPTION</th>
<th>FLASH CODE</th>
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<tbody>
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<td>Motion sensor default (frequency input 1)</td>
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<td>Taco-graph default (frequency input 2)</td>
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<tr>
<td>Short-circuit on analogue input 1</td>
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<td>Open circuit on analogue input 1</td>
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<td>Short-circuit on analogue input 2</td>
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<td>Open circuit on analogue input 2</td>
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<td>Short-circuit on analogue input 3</td>
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<td>Open circuit on analogue input 3</td>
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<tr>
<td>Short-circuit on internal temperature</td>
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<td>Open circuit on internal temperature</td>
<td>22</td>
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## 15. Diagnosis of ECS

<table>
<thead>
<tr>
<th>DEFAULT DESCRIPTION</th>
<th>FLASH CODE</th>
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<tbody>
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<td>CAN network default</td>
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<td>CPU default</td>
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<td>EE Prom default</td>
<td>27</td>
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</table>
16.a. Electronic ECS Vs Electrical

![Graph showing torque comparison between ECS and Relay box system for stages 1 to 4.]

Torque (Nm)

K-160C Brake torque

- ECS
- Relay box system

Stages

600 800 1000 1200 1400 1600 1800 2000

0 2 4 6 8 10 12 14 16 18
16.b. Electronic ECS Vs Electrical

![Bar chart showing K-160C Consumption for ECS and Relay box system across different stages.](chart.png)
16.c. Electronic ECS Vs Electrical

![K-160C Performance Chart]

- **ECS**
- **Relay box system**

Stages:
1. Stage 1
2. Stage 2
3. Stage 3
4. Stage 4
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Setting the pace with retarder technology

Reduction of wear saves money

Improve the safety of the vehicle and the passengers.

Enviromental friendly