

## ABS/TCS Antilock Brake System/Traction Control System EU 12 (A 629 540 44 00)

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### Diagnostics

The ECU is provided with a fault memory which stores a specific code for every fault that is detected. The fault memory can store a maximum of 192 faults and can be read-out via a blink code, via KWP 2000 diagnosis, or Star Diagnosis.

If configured with TCS, the brake pedal input is monitored via SLS (Stop Light Switch) input or CAN J1939 interface. If the stop-lamp switch has not been checked since the last "Power On", this fact is stored in the fault memory. It is erased as soon as the SLS (Stop Light Switch) check is successfully completed.

The brakes should be applied and released before calling-up the diagnostic information so that the SLS (Stop Light Switch) information is only displayed when the SLS (Stop Light Switch) check was unsuccessful after brake-pedal operation.

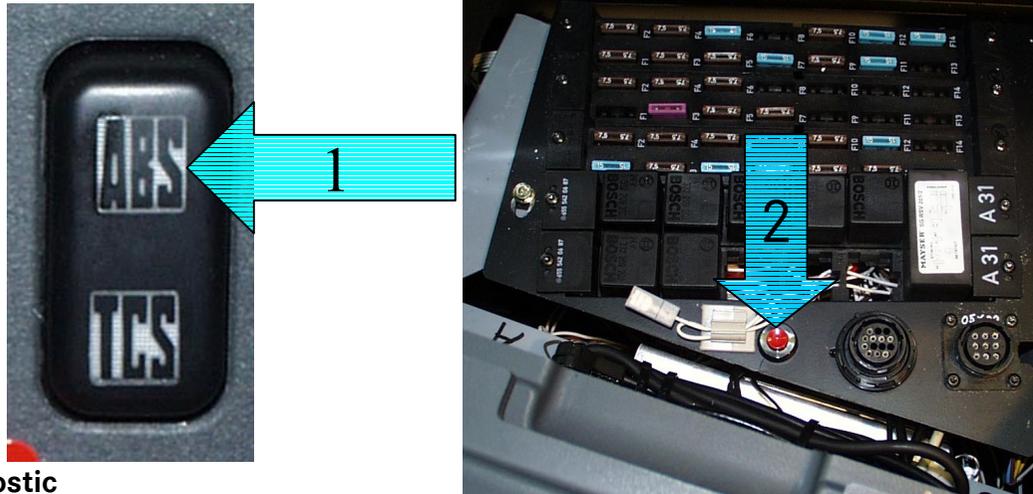
### Diagnostic Button Functions

The diagnostic push-button (2) is used for different functions (depending on configuration):

- triggering of blink code diagnostic:  
by pressing the button for 0.5 to 3 sec. after ignition on (a maximum of 3 sec is recommended because longer times will disable TCS)



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## Blink Code Diagnostic

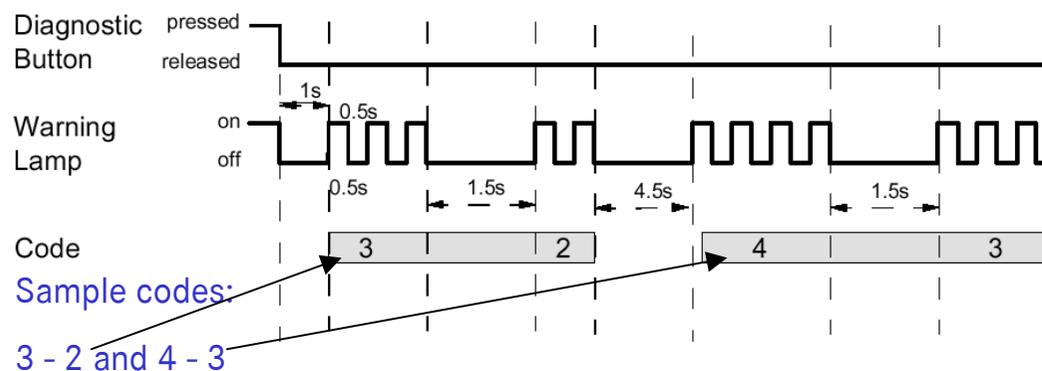
The blink-code function is used to read-out the fault memory. The blink-code output is via the warning lamp (1) and is triggered using a diagnosis push-button (2) at the „Service compartment dash center“. The faults indicated by the blink code can be decoded using the blink-code table (see page 26).

## Blink Code Structure

Blink-code output is triggered by pressing the diagnosis push-button for at least 0.5 seconds and then releasing it again. Pressing the push-button once triggers the fault display and warning lamp (1) lights up.

Each fault is indicated with two blink-code blocks comprising 2 numbers, whereby the first of these blocks represents the “tens” and the 2nd block the “units” of the fault number in question. The following time intervals apply for the blink-code output:

- Duration of a blink pulse: 0.5 sec. light on
- Gap between blink pulses 0.5 sec. light off
- Gap between first block and second block 1.5 sec. light off
- Gap between failure codes 4.5 sec. light off



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## Erasing the Fault Memory

The fault memory can be erased with the Star Diagnosis or the On-board diagnostics.

To erase codes with the Star Diagnosis follow the menu.

To erase codes with the On-board diagnostics follow this procedure: - ignition switch off ; - push red diagnostic button and keep it pushed; - switch on ignition; - wait 2 seconds then release diagnostic button.

**After erasing the fault memory, the storage of error codes in the fault memory is inhibited during the rest of the power on cycle! The ignition key should be cycled off and on again before driving.**

## Failure Mode Description

### Speed Sensor steer axle left

code	description
2 - 1	air gap too large
2 - 2	missing sensor signal at drive off
2 - 3	bad tone wheel, long term ABS control
2 - 4	long term instability
2 - 5	loss of sensor signal
2 - 6	shorted to GND or battery or broken wire
2 - 7	internal failure
2 - 8	sensor configuration error

### Speed Sensor drive axle left

code	description
4 - 1	air gap too large
4 - 2	missing sensor signal at drive off
4 - 3	bad tone wheel, long term ABS control
4 - 4	long term instability
4 - 5	loss of sensor signal
4 - 6	shorted to GND or battery or broken wire
4 - 7	internal failure
4 - 8	sensor configuration error

### Speed Sensor steer axle right

code	description
3 - 1	air gap too large
3 - 2	missing sensor signal at drive off
3 - 3	bad tone wheel, long term ABS control
3 - 4	long term instability
3 - 5	loss of sensor signal
3 - 6	shorted to GND or battery or broken wire
3 - 7	internal failure
3 - 8	sensor configuration error

### Speed Sensor drive axle right

code	description
5 - 1	air gap too large
5 - 2	missing sensor signal at drive off
5 - 3	bad tone wheel, long term ABS control
5 - 4	long term instability
5 - 5	loss of sensor signal
5 - 6	shorted to GND or battery or broken wire
5 - 7	internal failure
5 - 8	sensor configuration error

## Failure Mode Description

### Speed Sensor additional axle left

code	description
6 - 1	air gap too large
6 - 2	missing sensor signal at drive off
6 - 3	bad tone wheel, long term ABS control
6 - 4	long term instability
6 - 5	loss of sensor signal
6 - 6	shorted to GND or battery or broken wire
6 - 7	internal failure
6 - 8	sensor configuration error

### Speed Sensor additional axle right

code	description
7 - 1	air gap too large
7 - 2	missing sensor signal at drive off
7 - 3	bad tone wheel, long term ABS control
7 - 4	long term instability
7 - 5	loss of sensor signal
7 - 6	shorted to GND or battery or broken wire
7 - 7	internal failure
7 - 8	sensor configuration error

### ABS PMV steer axle left

code	description
8 - 1	shorted to battery release solenoid
8 - 2	shorted to GND release solenoid
8 - 3	broken wire release solenoid
8 - 4	broken wire on valve common pin
8 - 5	shorted to battery hold solenoid
8 - 6	shorted to GND hold solenoid
8 - 7	broken wire hold solenoid
8 - 8	valve configuration error

### ABS PMV steer axle right

code	description
9 - 1	shorted to battery release solenoid
9 - 2	shorted to GND release solenoid
9 - 3	broken wire release solenoid
9 - 4	broken wire on valve common pin
9 - 5	shorted to battery hold solenoid
9 - 6	shorted to GND hold solenoid
9 - 7	broken wire hold solenoid
9 - 8	valve configuration error

### Additional Output Stages (IAD)

code	description
8 - 10	IAD shorted to battery
8 - 11	IAD shorted to GND or broken wire
9 - 11	2 <sup>nd</sup> stage shorted to battery <sup>2</sup>
9 - 11	2 <sup>nd</sup> stage shorted to GND or broken wire <sup>3</sup>

### ABS PMV drive axle left

code	description
10 - 1	shorted to battery release solenoid
10 - 2	shorted to GND release solenoid
10 - 3	broken wire release solenoid
10 - 4	broken wire on valve common pin <sup>1</sup>
10 - 5	shorted to battery hold solenoid
10 - 6	shorted to GND hold solenoid
10 - 7	broken wire hold solenoid
10 - 8	valve configuration error

<sup>1</sup> for 4s3m configurations and drive left PMV error code ist 16 - 8

<sup>2</sup> not implemented

<sup>3</sup> not implemented

## Failure Mode Description

<b>ABS PMV drive axle right</b>	
code	description
11 - 1	shorted to battery release solenoid
11 - 2	shorted to GND release solenoid
11 - 3	broken wire release solenoid
11 - 4	broken wire on valve common pin
11 - 5	shorted to battery hold solenoid
11 - 6	shorted to GND hold solenoid
11 - 7	broken wire hold solenoid
11 - 8	valve configuration error

<b>ABS PMV additional axle right</b>	
code	description
13 - 1	shorted to battery release solenoid
13 - 2	shorted to GND release solenoid
13 - 3	broken wire release solenoid
13 - 4	broken wire on valve common pin
13 - 5	shorted to battery hold solenoid
13 - 6	shorted to GND hold solenoid
13 - 7	broken wire hold solenoid
13 - 8	valve configuration error

<b>ABS PMV Ground switches</b>	
code	description
10 - 10	GND wire on diagonal 1 shorted to battery <sup>4</sup>
10 - 11	GND wire on diagonal 1 shorted to GND <sup>4</sup>
11 - 10	GND wire on diagonal 2 shorted to battery <sup>5</sup>
11 - 11	GND wire on diagonal 2 shorted to GND <sup>5</sup>

<b>TCS Valve</b>	
code	description
14 - 1	NA
14 - 2	NA
14 - 3	NA
14 - 4	NA
14 - 5	shorted to battery
14 - 6	shorted to GND
14 - 7	broken wire
14 - 8	valve configuration error

<b>ABS PMV additional axle left</b>	
code	description
12 - 1	shorted to battery release solenoid
12 - 2	shorted to GND release solenoid
12 - 3	broken wire release solenoid
12 - 4	broken wire on valve common pin
12 - 5	shorted to battery hold solenoid
12 - 6	shorted to GND hold solenoid
12 - 7	broken wire hold solenoid
12 - 8	valve configuration error

<sup>4</sup> diagonal 1: steer right, drive left, additional left, Traction Control System valve

<sup>5</sup> diagonal 2: steer left, drive right, additional right

## Failure Mode Description

### Engine Control Interface

code	description
14 - 9	J1939 NA J1922 NA PWM DKR shorted to GND or battery
14 - 10	J1939 NA J1922 NA PWM EDC reports error
14 - 11	J1939 CN12 only: Broken wire or short circuit to GND or plus on CAN wire after power on. J1922 NA PWM broken wire or shorted to battery or GND in DKV
14 - 12	J1939 time out or data out of range on EEC1 J1922 timeout MID 69 PWM DKV timing error on frequency or pulswidth

### Internal ECU failures

code	description
15 - 1	ECU defective
15 - 2	ECU defective
15 - 3	ECU defective
15 - 4	ECU defective
15 - 5	ECU defective
15 - 6	ECU defective
15 - 7	ECU defective
15 - 8	ECU defective
15 - 9	ECU defective
15 - 10	ECU defective
15 - 11	ECU defective
15 - 12	ECU defective

### Power Supply

code	description
16 - 1	PCV1 voltage to high
16 - 2	PCV1 voltage to low
16 - 3	PCV1 broken wire
16 - 4	GND_PCV1 broken wire or voltage difference to GND_ECU to large
16 - 5	PCV2 voltage to high
16 - 6	PCV2 voltage to low
16 - 7	PCV2 broken wire
16 - 8	GND_PCV2 broken wire or voltage difference to GND_ECU to large or broken wire on valve common pin on 4s3m configurations
16 - 9	U_ECU voltage to high
16 - 10	U_ECU voltage to low (or U_ECU to high)
16 - 11	voltage difference PCV1 to PCV2 to large

### Retarder Interface

code	description
17 - 1	retarder disable relay output shorted to battery or broken wire
17 - 2	retarder disable relay output shorted to GND
17 - 3	J1922 interface shorted J1939 interface has bus off detected
17 - 4	J1922 timeout of MID 83 J1939 timeout of ERC1

### Wheel Alignment

code	description
17 - 5	difference of front to rear tire size to large
17 - 6	measured values out of range or EEPROM value faulty

## Failure Mode Description

<b>Special Errors</b>	
code	description
17 - 7	stop light switch not pushed at this powercycle
17 - 8	TCS disabled due to special mode or off road ATC active
17 - 9	ABS disabled due to special mode or off road ABS active
17 - 10	WL defective <sup>6</sup>
17 - 11	TCL defective <sup>7</sup>
17 - 12	sensor memory bit set

others	reserved
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<sup>6</sup> not implemented

<sup>7</sup> not implemented