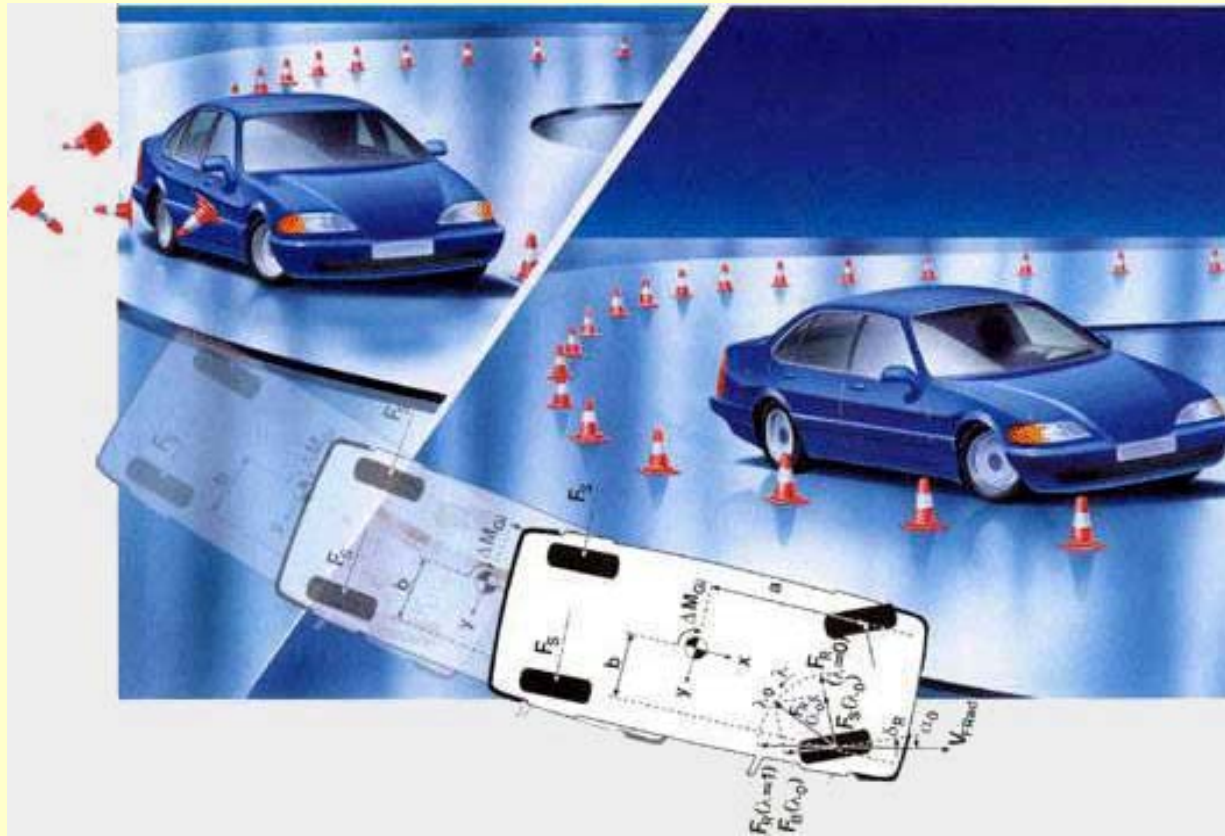


BL BOSCH 5.3 ABS

System Description of BL ABS



BL BOSCH 5.3 ABS

BL ABS Specification

▶ System

- BOSCH ABS 5.3
- 4Sensor 4Channel
- BRAKE Line : X Split
- ABS with EBD Control

▶ Hydro-Electronic Control Unit (HECU)

- Hydraulic Modulator : Size(84 X 118 X 170mm), Weight(2.6Kg)
- Motor : Large Size(180W)
- Solenoid Valve : Sol-Sol Type(Inlet/Outlet)
- ECU : Attached ECU

▶ Wheel Speed Sensor

- Inductive Sensor(Passive Type)
- Minimum P-P voltage : 120mV (2.75KPH)






▶ Acceleration Sensor

- Offset Voltage : 2.5V
- Operating voltage : 4.5V ~ 5.5V



BL BOSCH 5.3 ABS

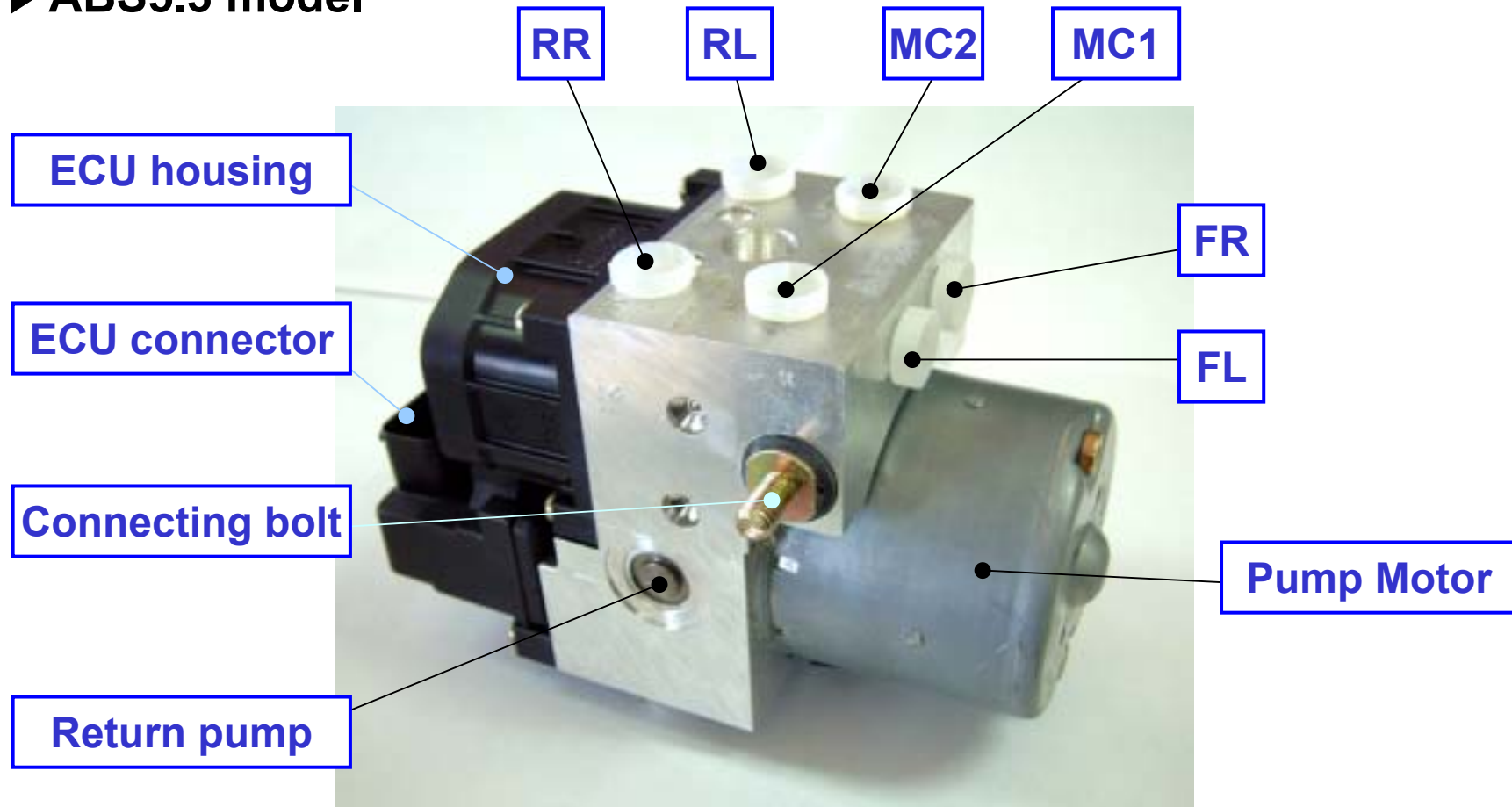
BL ABS Specification

ECU	Operating volt.	8 ~ 16V	
	Operating Temp.	-40℃ ~ 120 ℃	
	Reverse volt.	-13.5V	
HECU (HU+ECU)	Weight	2.7 Kg	
	Pump capacity	4.8 cc/sec	
	Power consum.	230W	
Solenoid Valve	Resistance	Inlet Valve (EV) : $8.54\Omega \pm 0.5\Omega$	 
		Outlet Valve (AV) : $4.29\Omega \pm 0.25\Omega$	
Return Pump Motor	Operating current	45A or less ($10.5V \pm 0.5V$, $23\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$)	 
	Max. current	145A or less ($16V \pm 0.1V$, $23\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$)	
Wheel Speed Sensor	Coil resistance	$1600\Omega \pm 10\%$	- Air Gap Front : 0.3~1.2 mm Rear : 0.3~1.2 mm
	Insulation resist.	1M Ω	
	Tone wheel	48 EA	

BL BOSCH 5.3 ABS

HECU

► ABS5.3 model



BL BOSCH 5.3 ABS

HECU Location



BL BOSCH 5.3 ABS

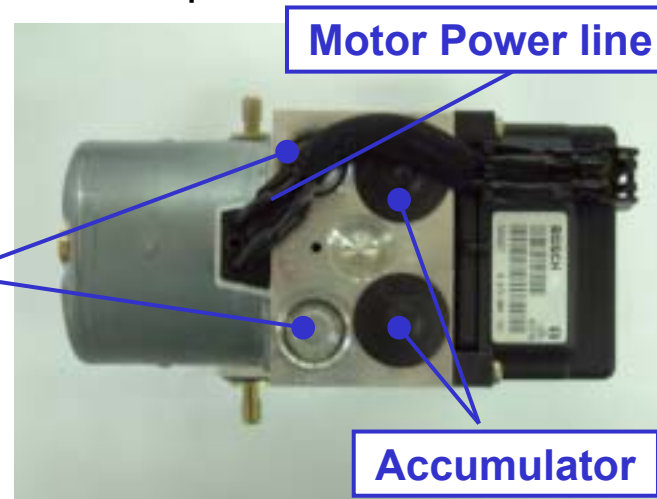
HECU Appearance



▶ ABS 5.3



▶ Top view

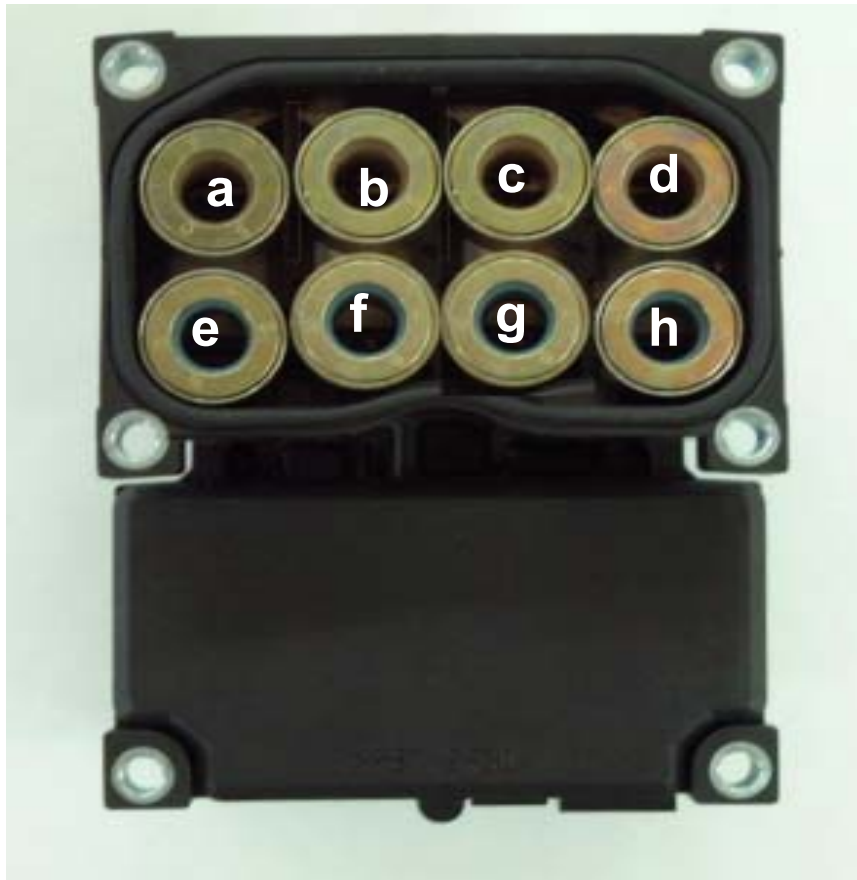


▶ Bottom view

BL BOSCH 5.3 ABS

ABSCM Housing

▶ Never Disassemble HECU

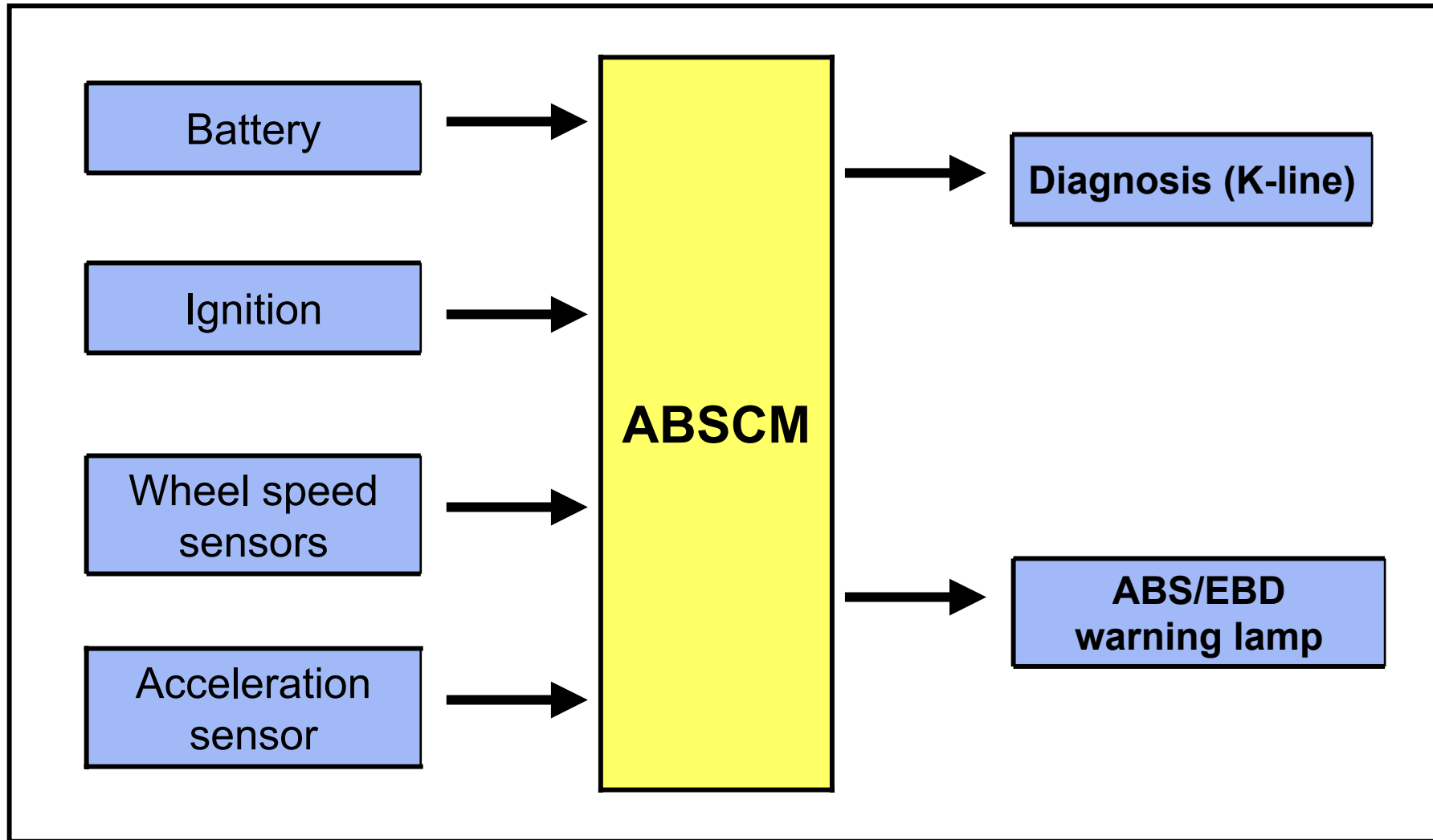


▶ valve seat coil assembly

a	Inlet valve (RR)
b	Inlet valve (FL)
c	Inlet valve (FR)
d	Inlet valve (RL)
e	Outlet valve (RR)
f	Outlet valve (FL)
g	Outlet valve (FR)
h	Outlet valve (RL)

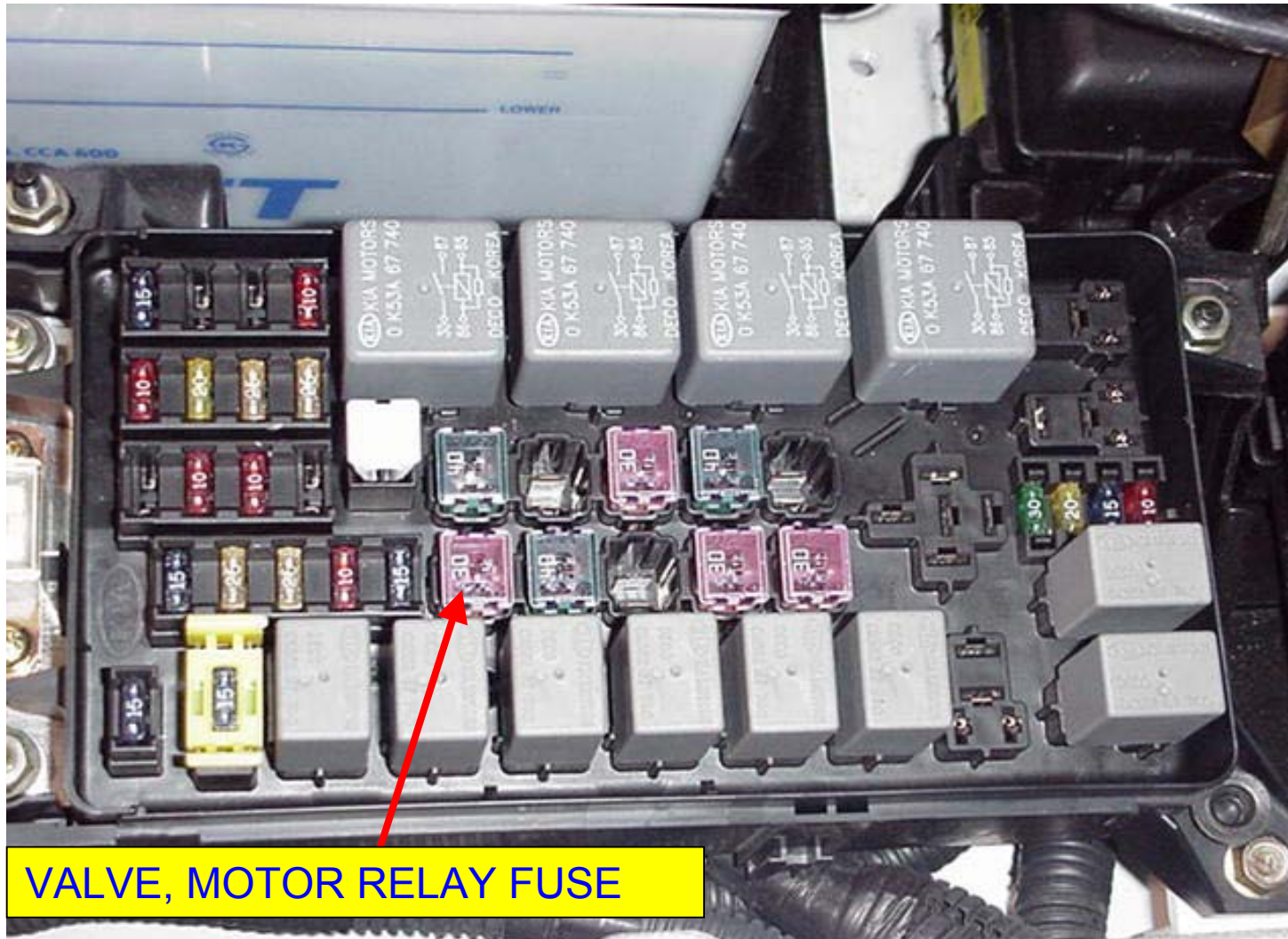
BL BOSCH 5.3 ABS

ABSCM Input & Output



BL BOSCH 5.3 ABS

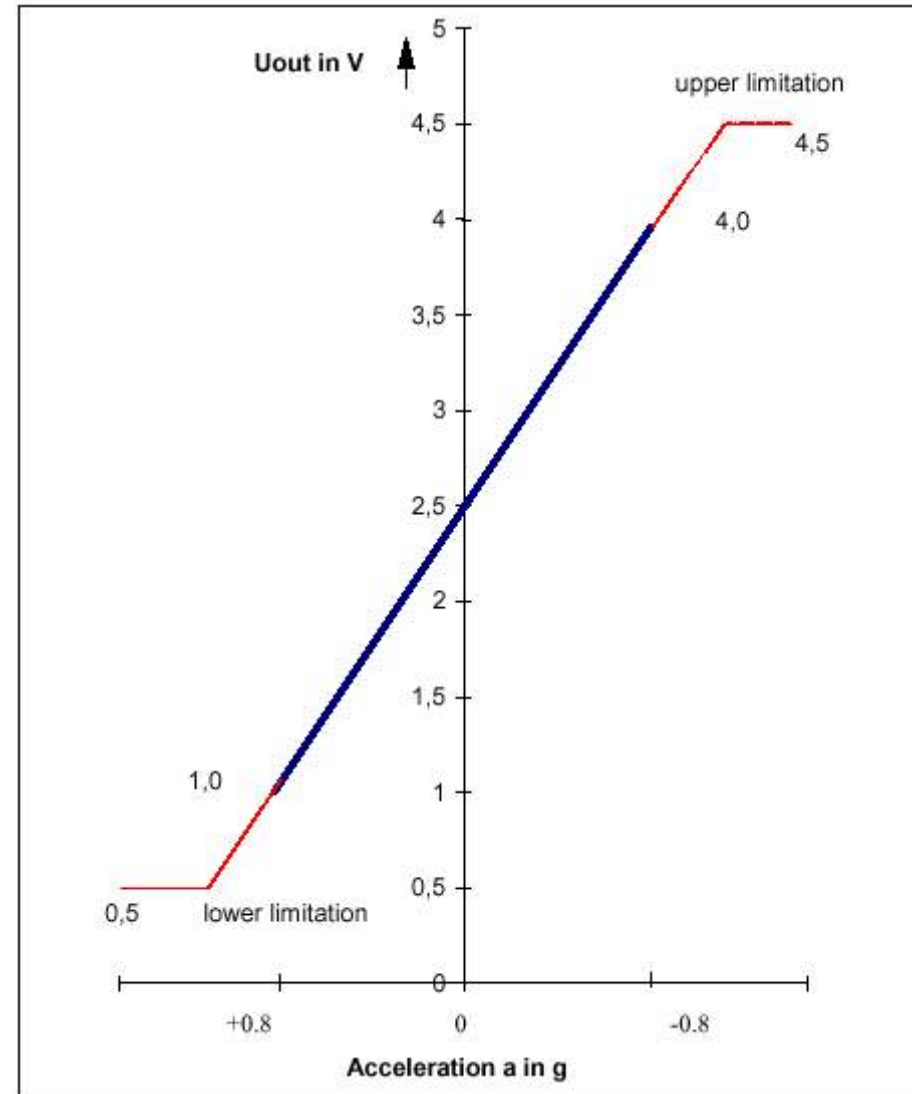
Valve/Pump motor relay fuse



VALVE, MOTOR RELAY FUSE

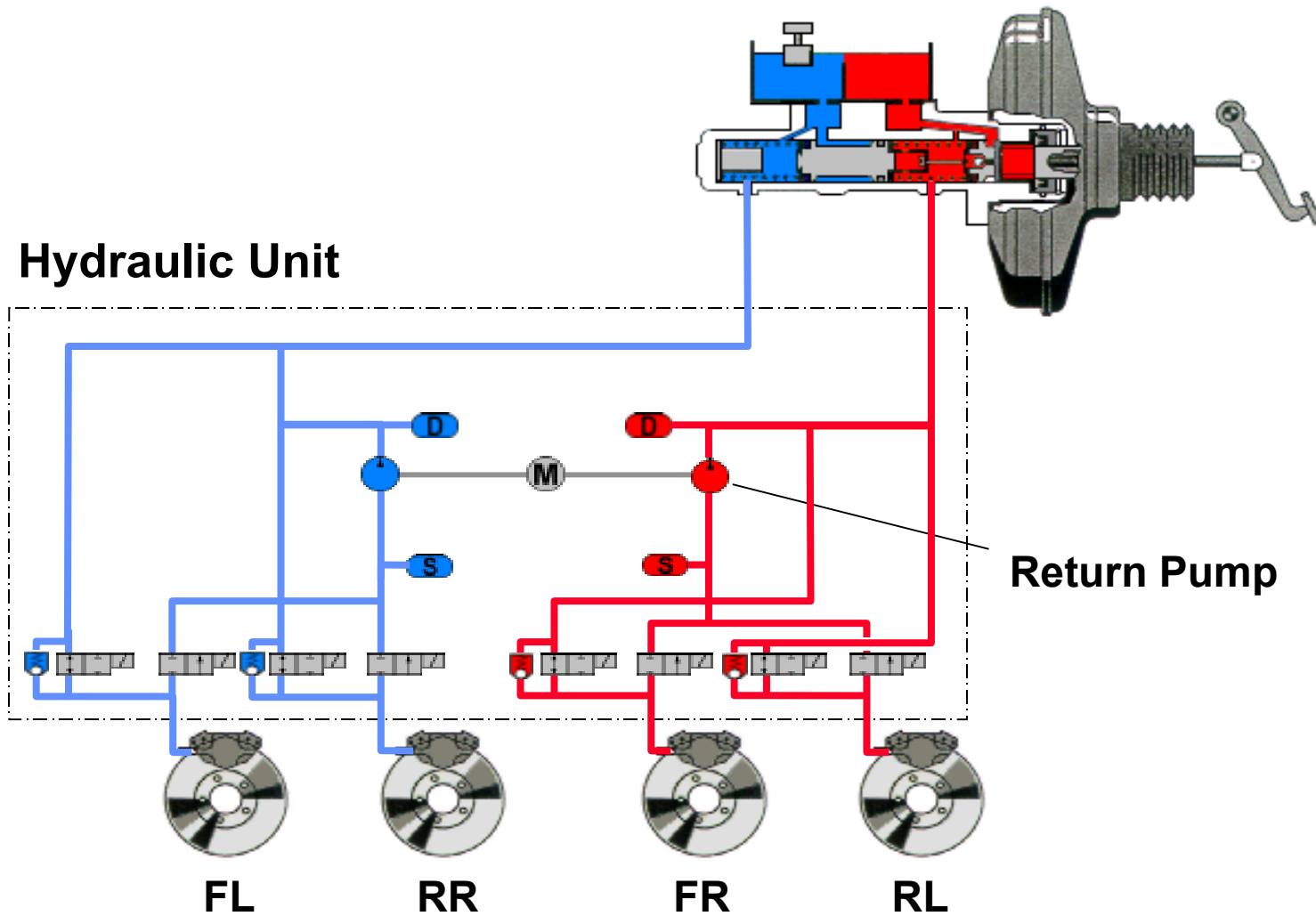
BL BOSCH 5.3 ABS

Acceleration Sensor



BL BOSCH 5.3 ABS

Diagonal Circuit of BL ABS5.3



BL BOSCH 5.3 ABS

Hydraulic Unit (Modulator)

■ Normal Condition

Solenoid Valve	LFEV/RFEV/LREV/RREV	NO
	LFAV/RFAV/LRAV/RAV	NC
Pump Motor	OFF	

LF : LEFT WHEEL OF FRONT
RF : RIGHTWHEEL OF FRONT

LR : LEFT WHEEL OF REAR
RR : RIGHT WHEEL OF REAR

EV : INLET VALVE
AV : OUTLET VALVE

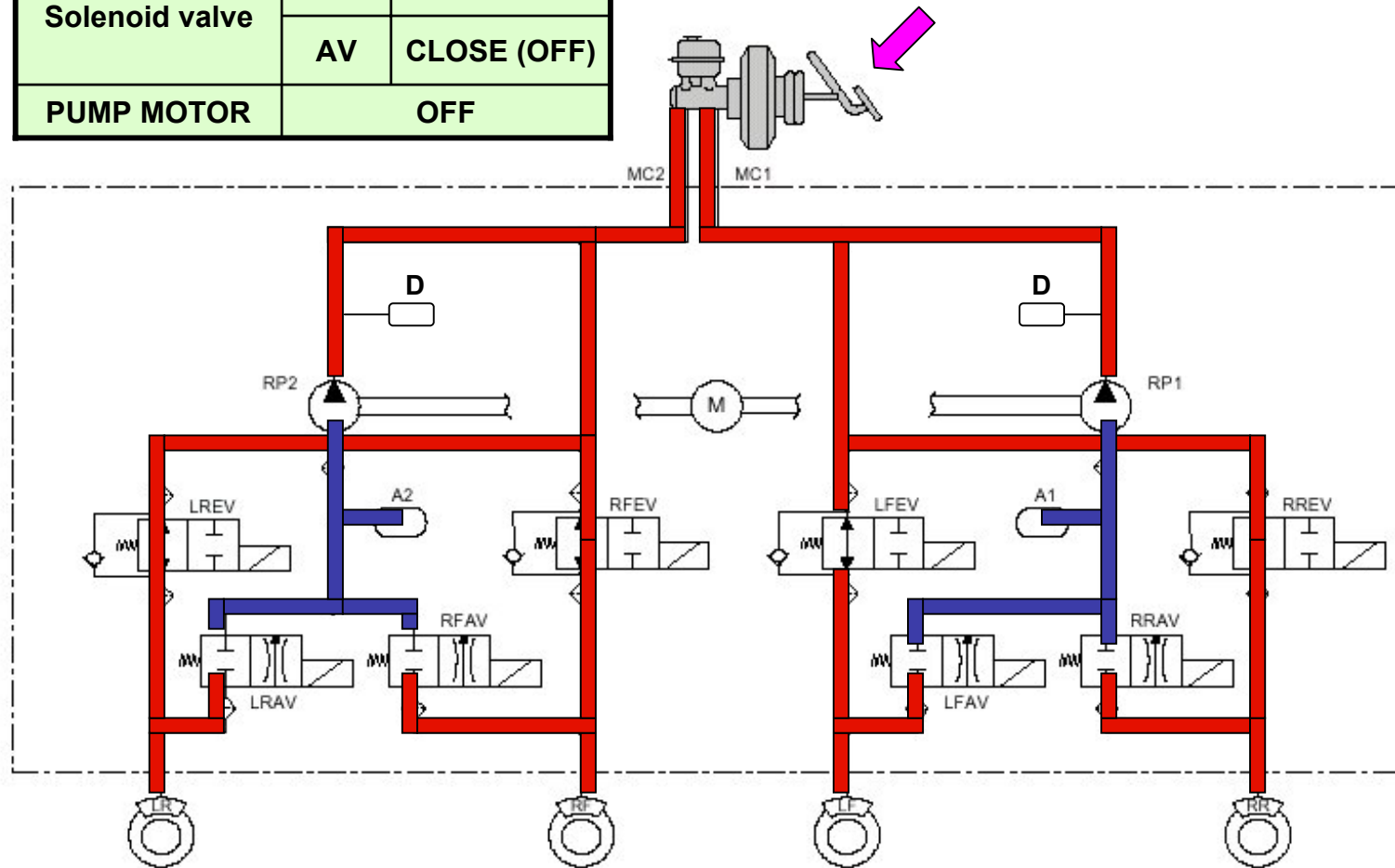
NO : NORMAL OPEN
NC : NORMAL CLOSE

BL BOSCH 5.3 ABS

Normal condition

- Brake pressure from the M/C directly delivers to wheel cylinders
- ABSCM does not operate
- Normal braking without the operation of NO, NC valves

Solenoid valve	EV	OPEN (OFF)
	AV	CLOSE (OFF)
PUMP MOTOR	OFF	

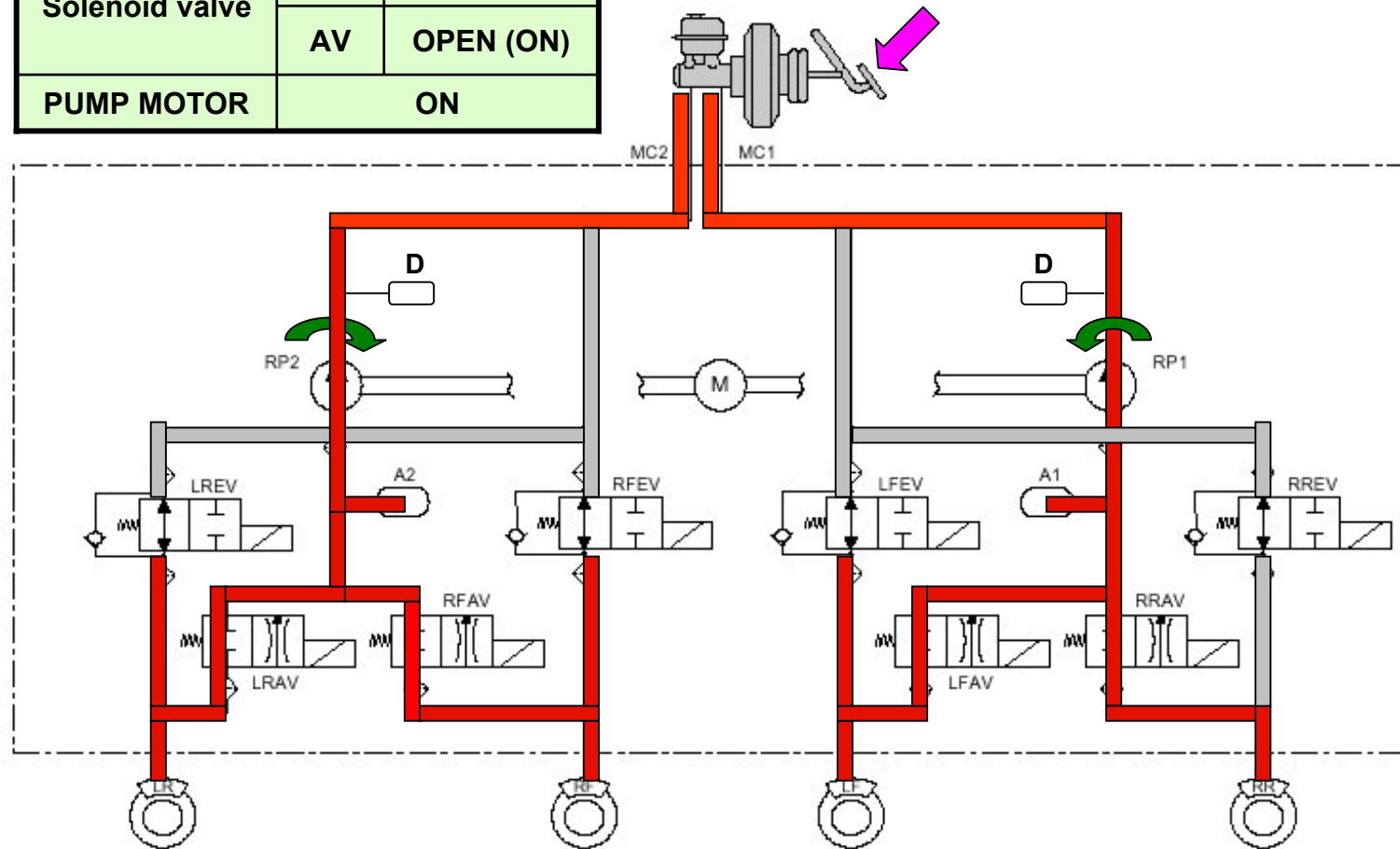


BL BOSCH 5.3 ABS

Pressure Dump

- Stiff braking pressure → reduced friction, Wheel Lock-up tendency
- ABS/CM reduces the brake pressure of corresponding wheels
- Pump Motor dumps brake pressure to the M/C side

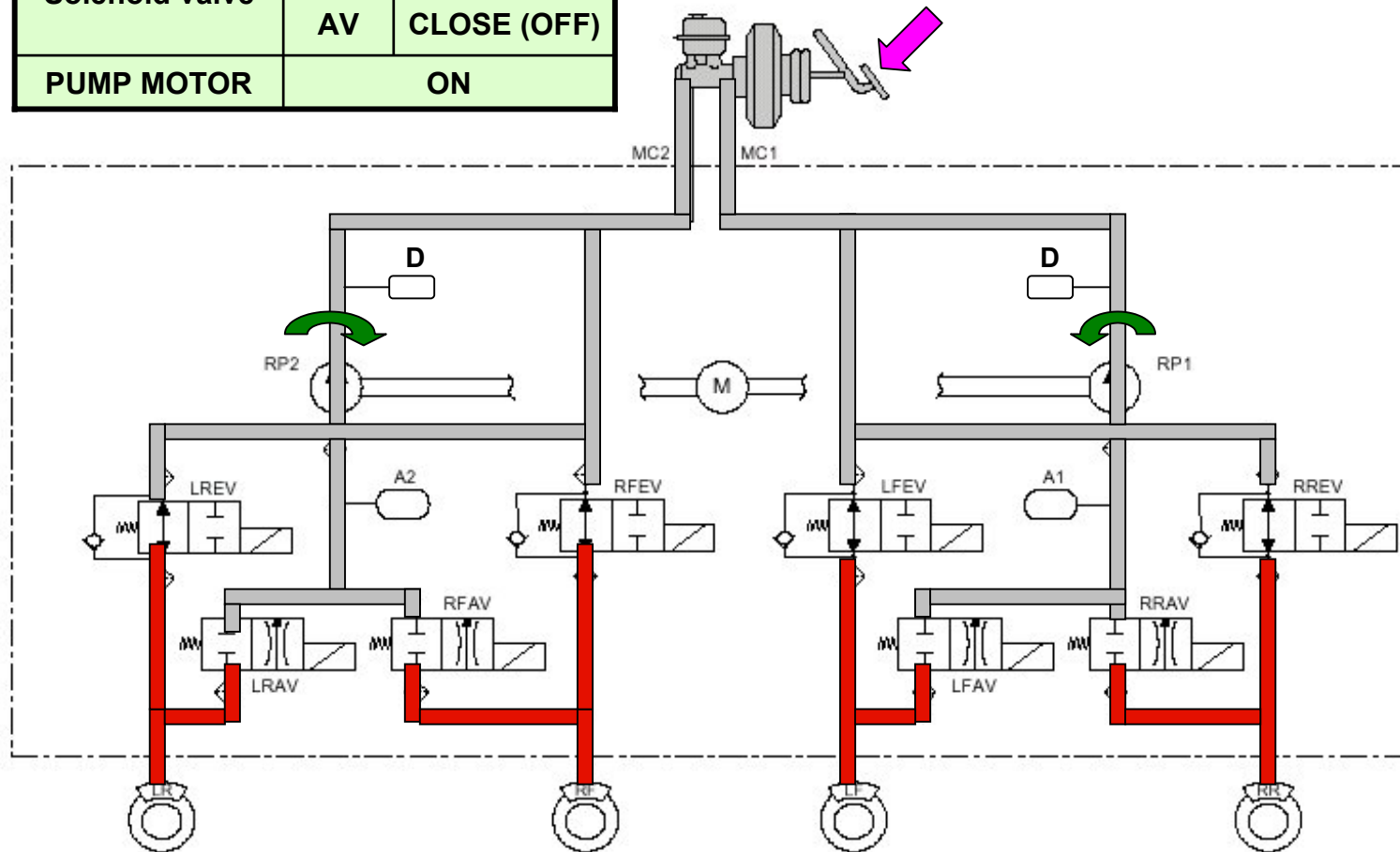
Solenoid valve	EV	CLOSE (ON)
	AV	OPEN (ON)
PUMP MOTOR	ON	



BL BOSCH 5.3 ABS

- Pressure Hold**
- To make a proper decision of wheel rotation while pressure dump or pressure increase mode
 - To hold the brake pressure of wheel cylinder

Solenoid valve	EV	CLOSE (ON)
	AV	CLOSE (OFF)
PUMP MOTOR	ON	

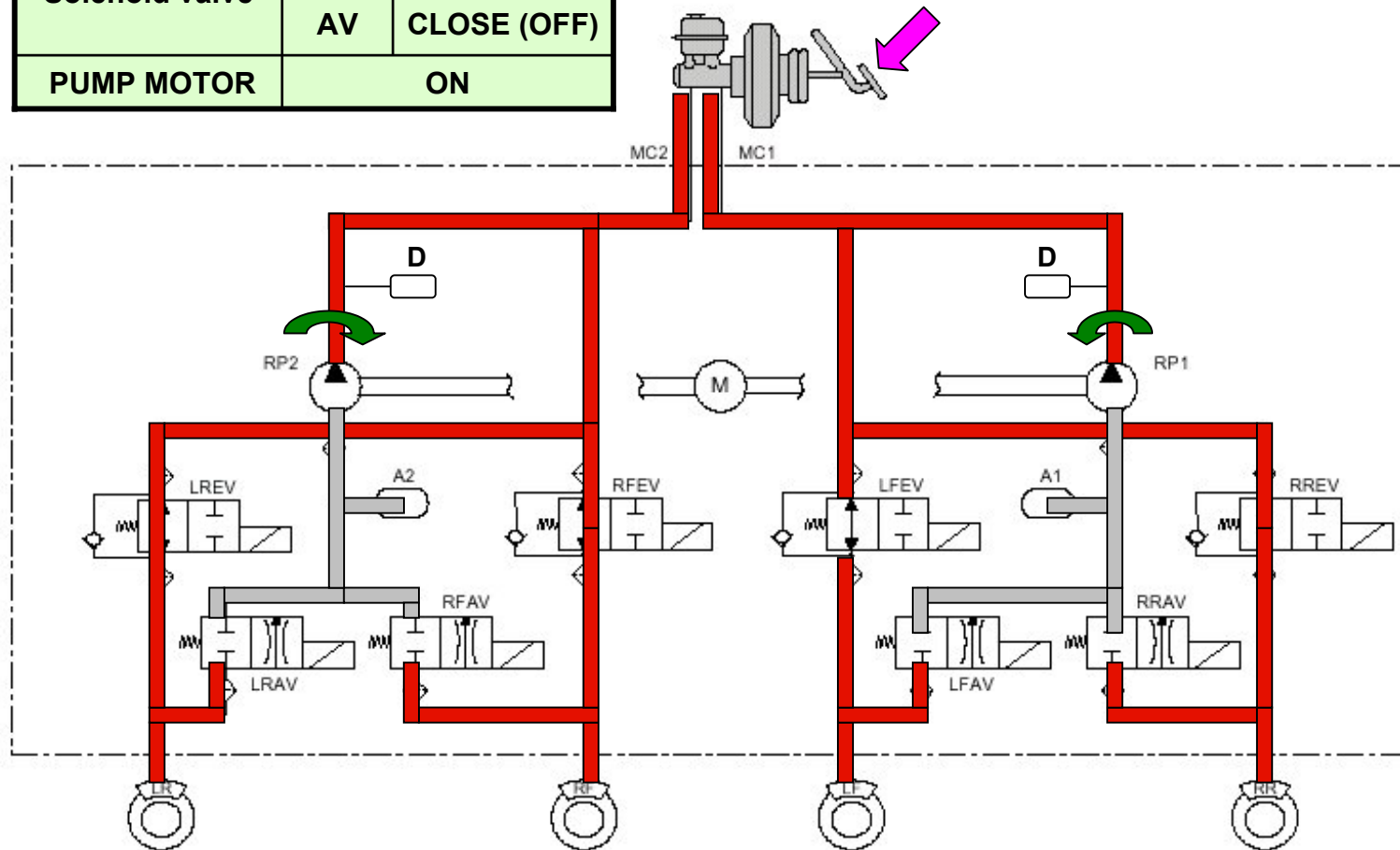


BL BOSCH 5.3 ABS

Pressure Increase

➔ If a frictional force between tire and road surface increases, ABSCM increases brake pressure again

Solenoid valve	EV	OPEN (OFF)
	AV	CLOSE (OFF)
PUMP MOTOR	ON	



BL BOSCH 5.3 ABS

EBD(Electronic Brake-force Distribution)

1. EBD Modulation

2. Advantage of EBD

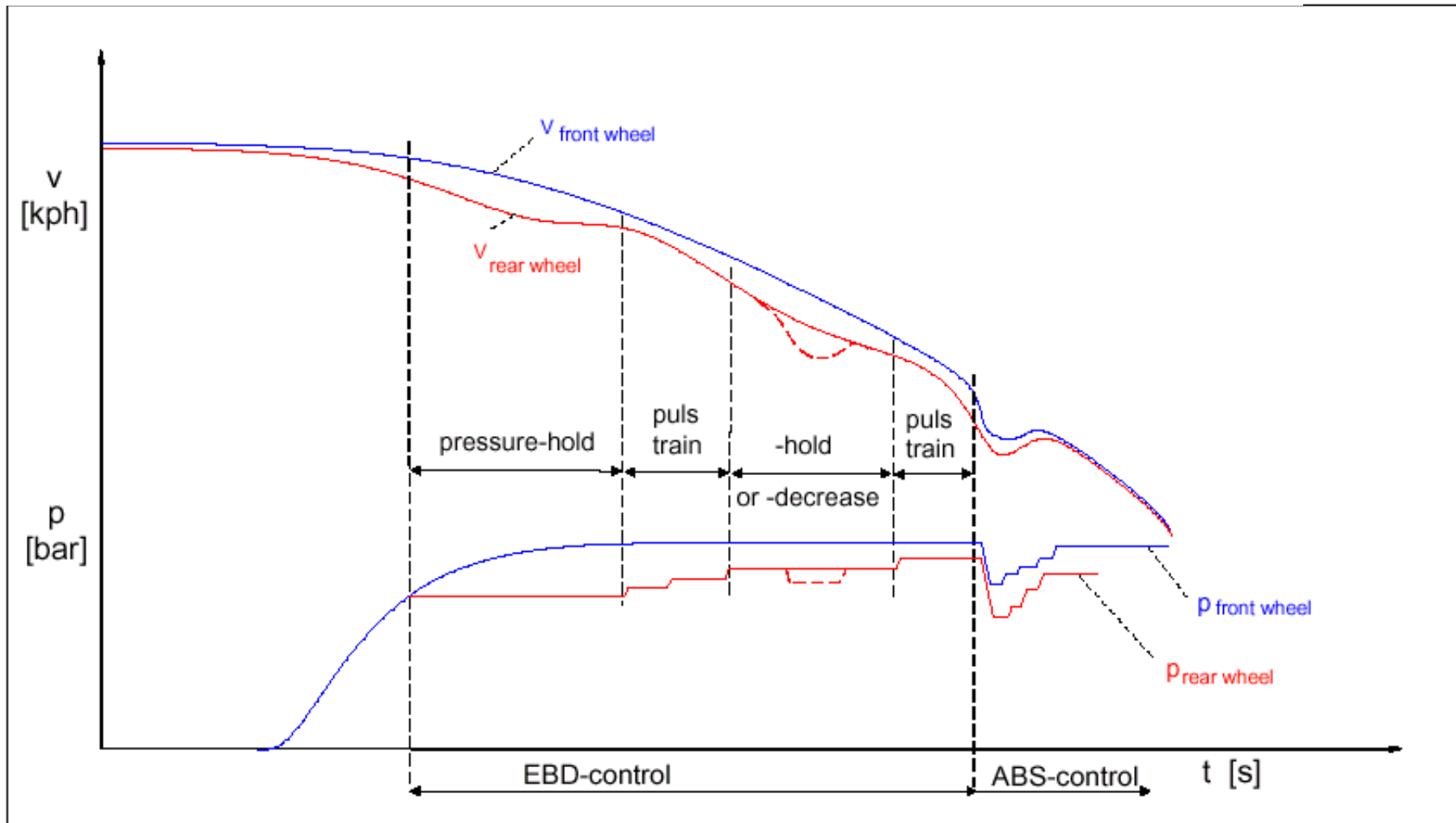
3. EBD Failure Matrix(Rev. 4)



BL BOSCH 5.3 ABS

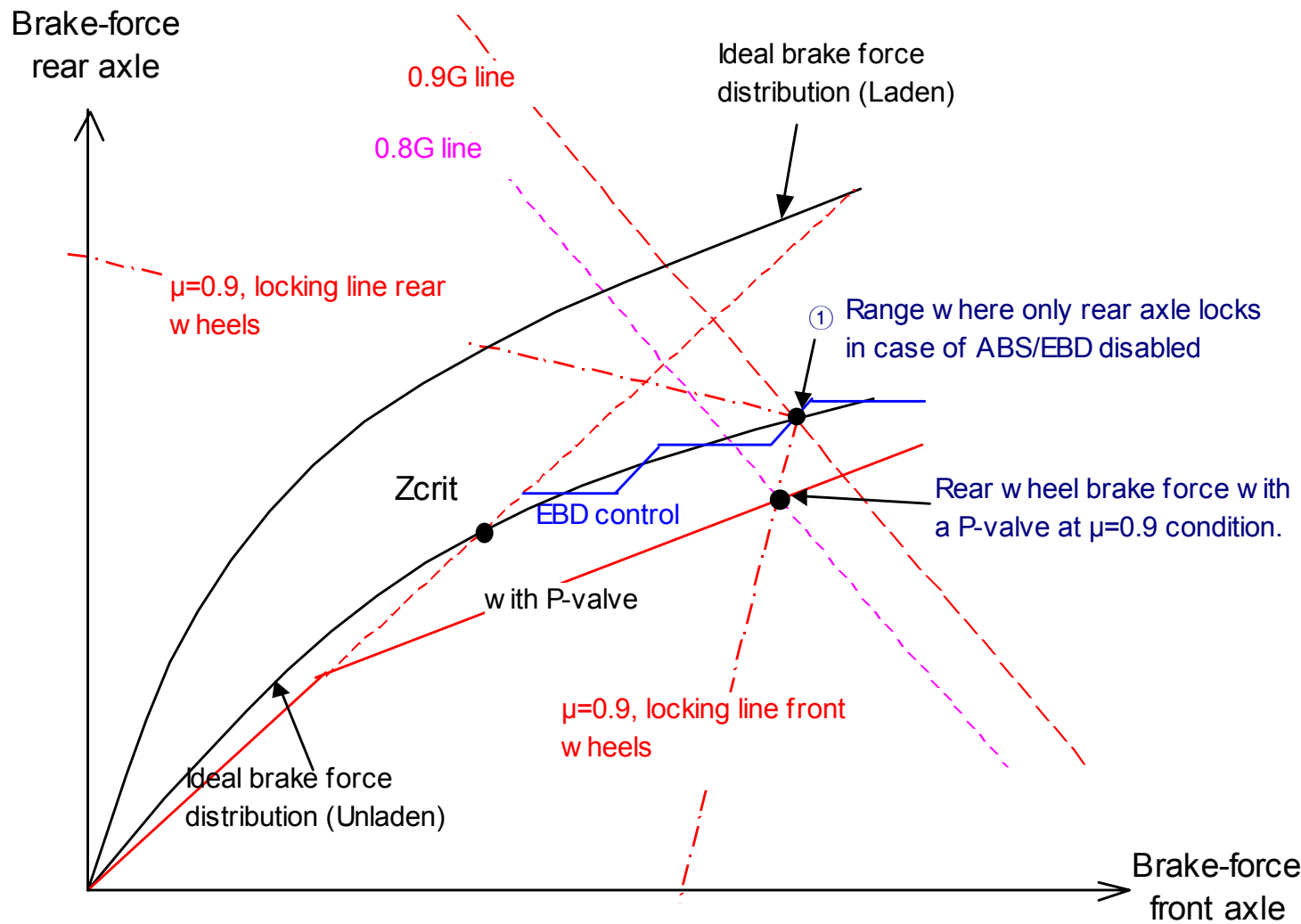
EBD Modulation

* EBD control example



BL BOSCH 5.3 ABS

EBD Curve



BL BOSCH 5.3 ABS

Advantages of EBD

- (load sensitive) proportioning valve may be omitted
- increase of rear axle contribution to brake-force
- Approach to ideal brake-force distribution
(straight-ahead and bend driving)
- Adaptive to different loading conditions
- Constant brake-force distribution during vehicle live time
- Monitoring of EBD-function
- Minimal extension of ABS hardware required



BL BOSCH 5.3 ABS

Failure Matrix of EBD Rev.4

- ABS disabled, EBD enabled(Keep Alive Function)
- ABS and EBD disabled
- ABS and EBD enabled
- X not possible

		low voltage 9,4V > Uz > 6,9V	low voltage <6,9 V <- reversibl. *1)	over-voltage >17,4 V	WSS-failure ohm	WSS-failure non-ohm (FDFP)	WSS-failure high-frequency <- reversible	WSS-failure low-frequency (FFZ)	2 WSS-failures	BLS-Failure	failure	failure	sticking	interruption	sensor failure
		Power-supply *1)	Power-supply *1)	were depended	WSS	WSS	WSS	WSS	WSS	BLS	PM	MR	VR		G-Switch
Power-supply	reversible -> low voltage 9,4V > Uz >	X	X	X											
WSS	wheel speed sensc ohm														
	non-ohm (FDFP)														
	2 WSS-failures														
	reversible -> high-freuzenzy														
BLS	brake light switch									X					
PM	pump motor failure										X	X			
MR	motor relay failure										X	X			
VR	ventil relay sticking												X	X	
G-Switch	sensor failure														X

first failure
that always
leads to keep
alive function

second failure

BL BOSCH 5.3 ABS

ABS & EBD Warning Lamp



EBD & Parking brake lamp

Illuminate for 3 seconds after IG key ON

ABS Warning Lamp

- ECU Failure
- Solenoid Valve Failure
- Parking Brake
- Lacking of Brake Oil
- Short ' G Bar failure

- Wheels sensor failure (Open or short)
- Pump Motor & Valve Fuse Open
- Low / High Voltage
- While diagnosis
- Short ' G Bar failure

BL BOSCH 5.3 ABS

Function of ABS & EBD Warning Lamp Relay

1. ABS & EBD Warning Lamp(Passive Type)

2. ABS External Wiring Diagram

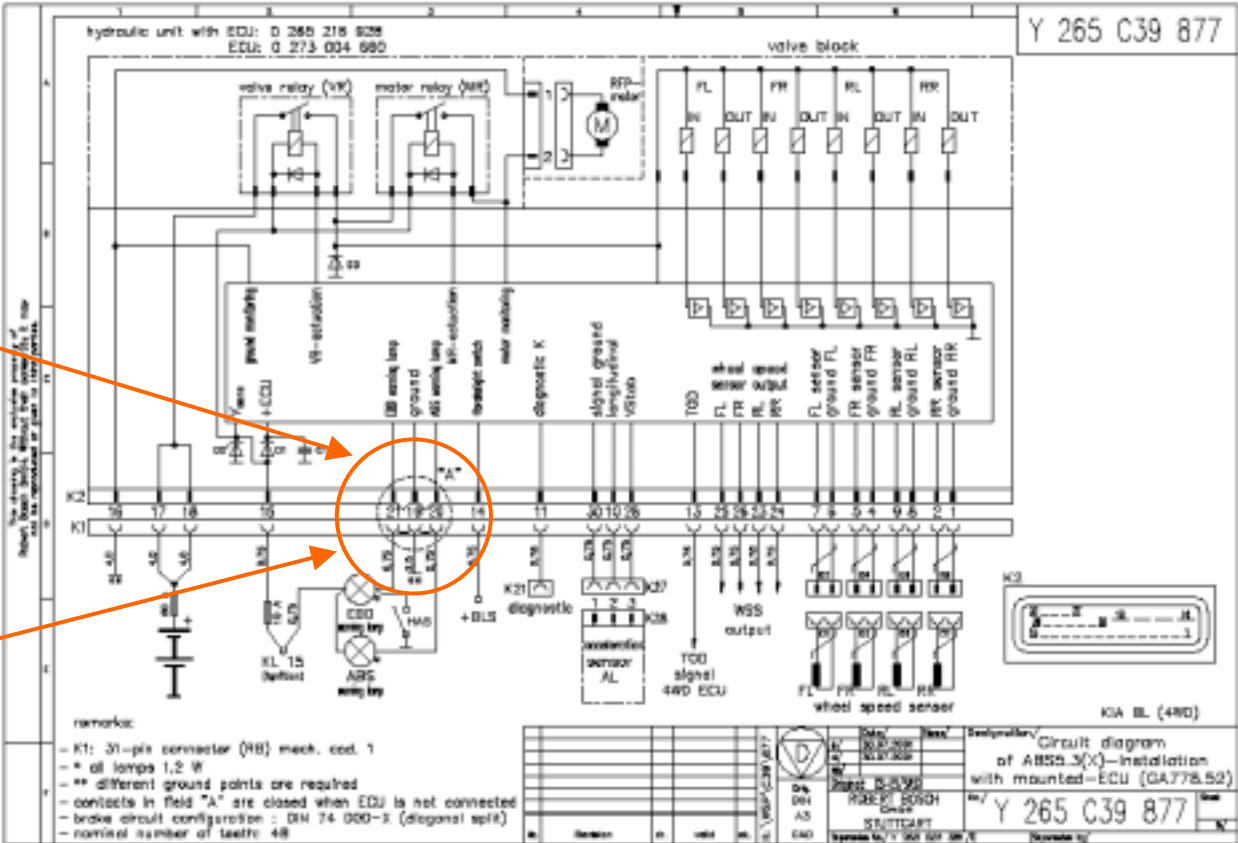
3. ABSCM Connector

4. Pin Assignment



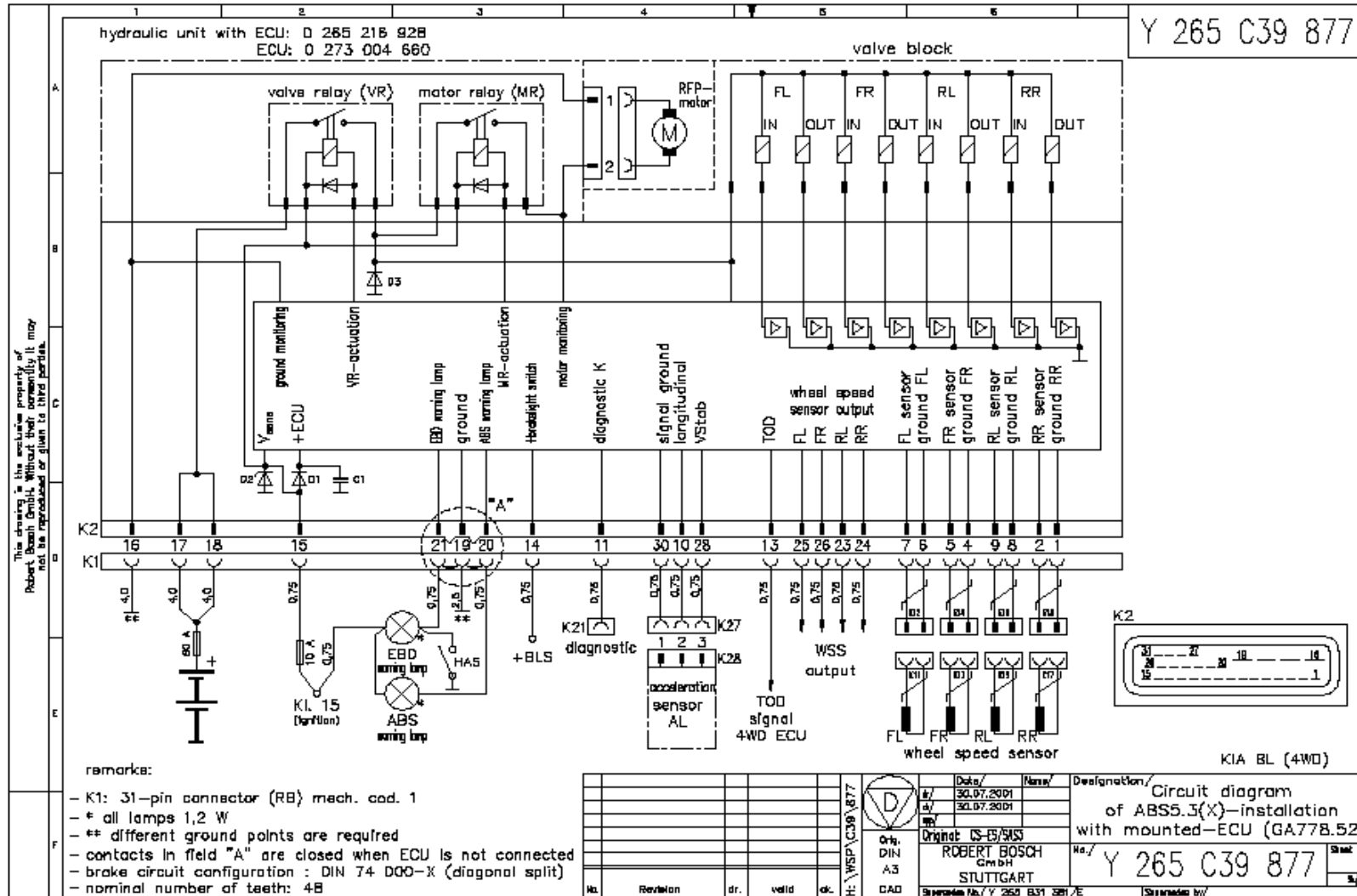
BL BOSCH 5.3 ABS

ABS & EBD Warning Lamp(Passive Type)



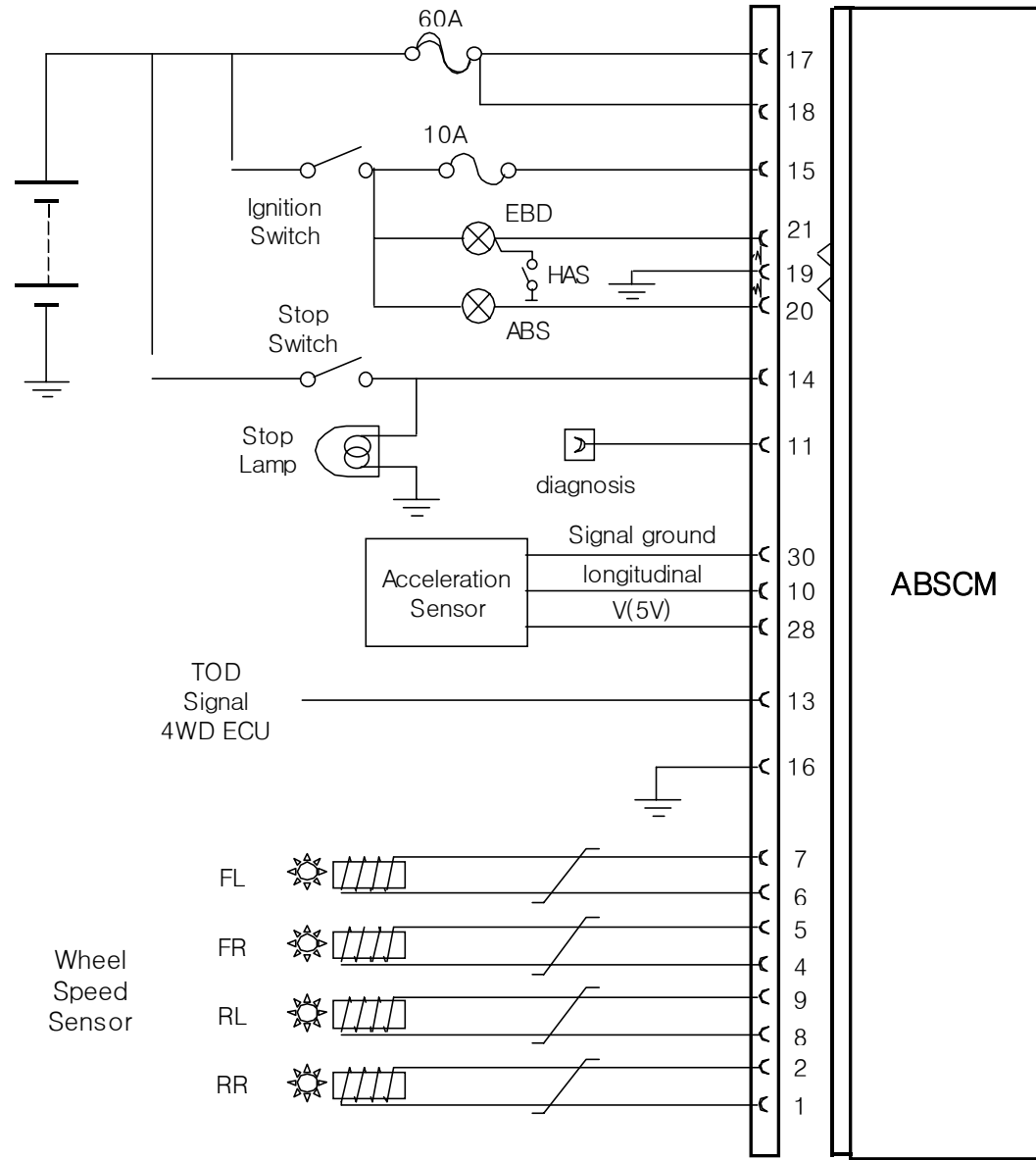
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ABS External Wiring Diagram



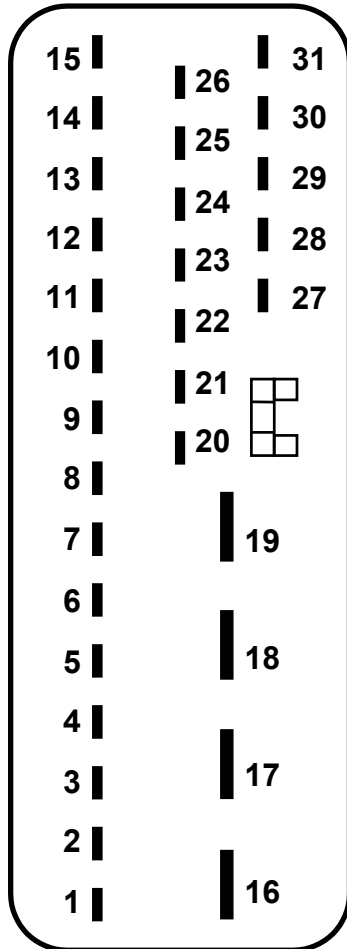
BL BOSCH 5.3 ABS

Wiring Diagram



BL BOSCH 5.3 ABS

ABSCM Connector



15	UZ
14	BLS
13	TOD
12	---
11	DIAGK
10	AL
9	DFRL
8	MDFRL
7	DFFL
6	MDFFL
5	DFFR
4	MDFFR
3	---
2	DFRR
1	MDFRR

26	---
25	---
24	---
23	---
22	---
21	EBVSILA
20	ABSSILA
19	SGND
18	UB-VR
17	UB-MR
16	MGND

31	---
30	AGND
29	---
28	UST
27	---



BL BOSCH 5.3 ABS

Pin Assignment

1	WSS - RR(-)
2	WSS - RR(+)
3	
4	WSS - FR(-)
5	WSS - FR(+)
6	WSS - FL(-)
7	WSS - FL(+)
8	WSS - RL(-)
9	WSS - RL(+)
10	AL sensor output
11	Diagnosis - K line
12	
13	TOD

14	Brake lamp switch
15	ECU power (IG)
16	Ground - motor
17	Power - relay
18	Power - relay
19	Ground - ECU
20	ABS warning lamp
21	EBD warning lamp
28	AL - input voltage
30	AL - ground

BL BOSCH 5.3 ABS

Troubleshooting

1. DTC list

2. System failure diagnosis

3. Air Bleeding

4. Hi-Scan Pro



BL BOSCH 5.3 ABS

Troubleshooting

DTC list

DTC	Description	W/L	Check point
C0800	High voltage (over 16V)	O	Battery voltage, Wire, Fuse
C0800	Low voltage (8V or less)	O	Battery voltage, Wire, Fuse
C0035	WSS FL - Continuity	O	WSS, Conn., Wire Harness
C0035	WSS FL - Plausibility	O	Wire check, Short, Air gap, Tooth
C0040	WSS FR - Continuity	O	WSS, Conn., Wire Harness
C0040	WSS FR - Plausibility	O	Wire check, Short, Air gap, Tooth
C0045	WSS RL - Continuity	O	WSS, Conn., Wire Harness
C0045	WSS RL - Plausibility	O	Wire check, Short, Air gap, Tooth
C0050	WSS RR - Continuity	O	WSS, Conn., Wire Harness
C0050	WSS RR - Plausibility	O	Wire check, Short, Air gap, Tooth

BL BOSCH 5.3 ABS

Troubleshooting

DTC list

DTC	Description	W/L	Check point
C0930	Acceleration sensor	O	Plug Conn., Sensor failure, Wire open
C0060	Solenoid Valve - LF(AV)	O	Short, MV line open
C0065	Solenoid Valve - LF(EV)	O	Short, MV line open
C0070	Solenoid Valve - RF(AV)	O	Short, MV line open
C0075	Solenoid Valve - RF(EV)	O	Short, MV line open
C0080	Solenoid Valve - RL(AV)	O	Short, MV line open
C0085	Solenoid Valve - RL(EV)	O	Short, MV line open
C0090	Solenoid Valve - RR(AV)	O	Short, MV line open
C0095	Solenoid Valve - RR(EV)	O	Short, MV line open
C0110	Motor pump	O	Motor or Relay circuit failure
C0121	Valve Relay	O	Valve relay failure

BL BOSCH 5.3 ABS

Troubleshooting

DTC list

DTC	Description	W/L	Check Point
C0161	Brake Switch	X	SW failure, Brake lamp
C0245	WSS frequency error	O	Poor Tooth Gear or damage
C0550	ECU malfunction	O	ECU failure

