

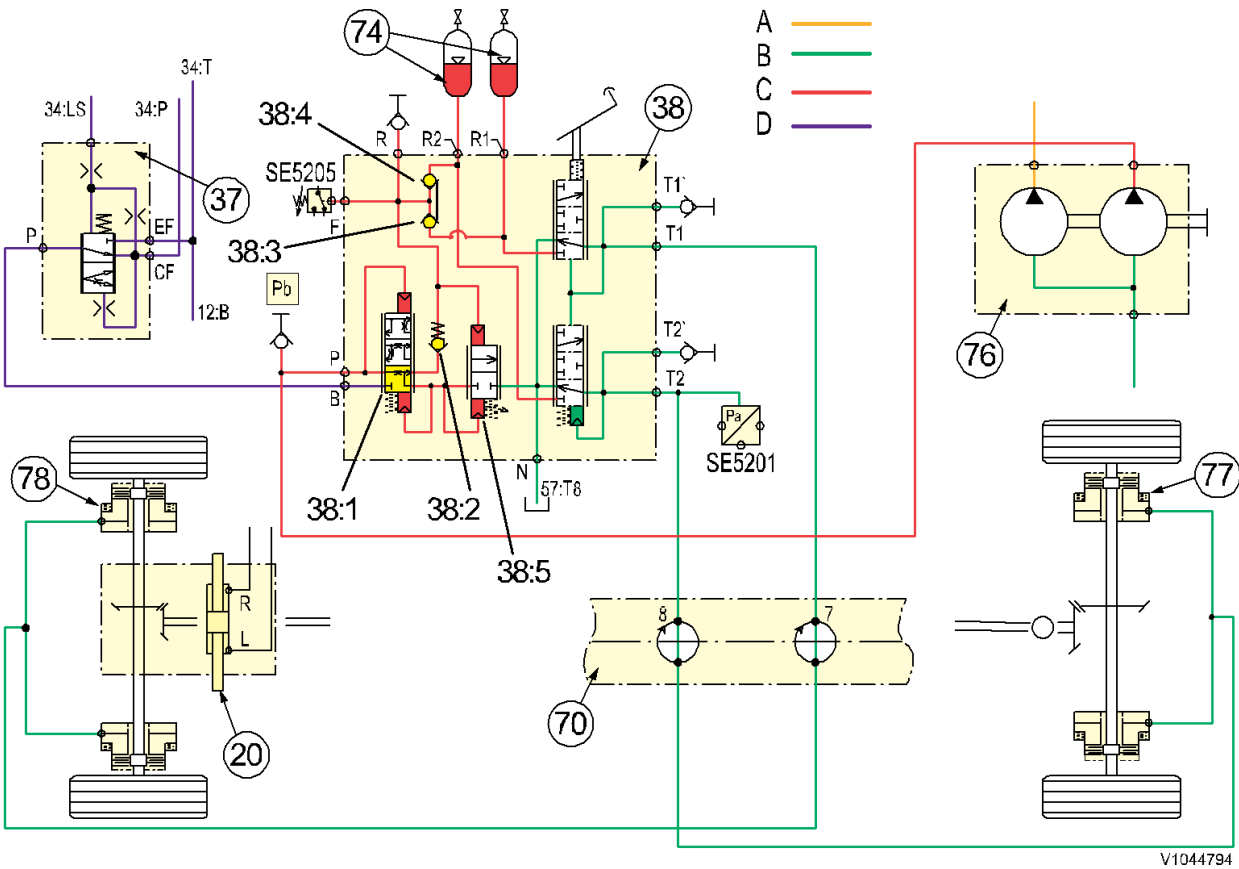
Document Title: <b>Hydraulic brake system, description</b>	Function Group: <b>520</b>	Information Type: <b>Service Information</b>	Date: <b>2014/7/4 0</b>
Profile: <b>EXC, EW140C [GB]</b>			

## Hydraulic brake system, description

### Travel brake

#### Step 1

When the diesel engine is started, pump **76** supplies oil to brake valve **38**. The oil flow passes through priority valve **38:1** and on via non-return valves **38:2**, **38:3** and **38:4** to brake accumulators **74** and to valve **38:5**, which controls the charging of the brake system. The charging is controlled via signal lines to both sides of valve **38:5**.



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**Figure 1**

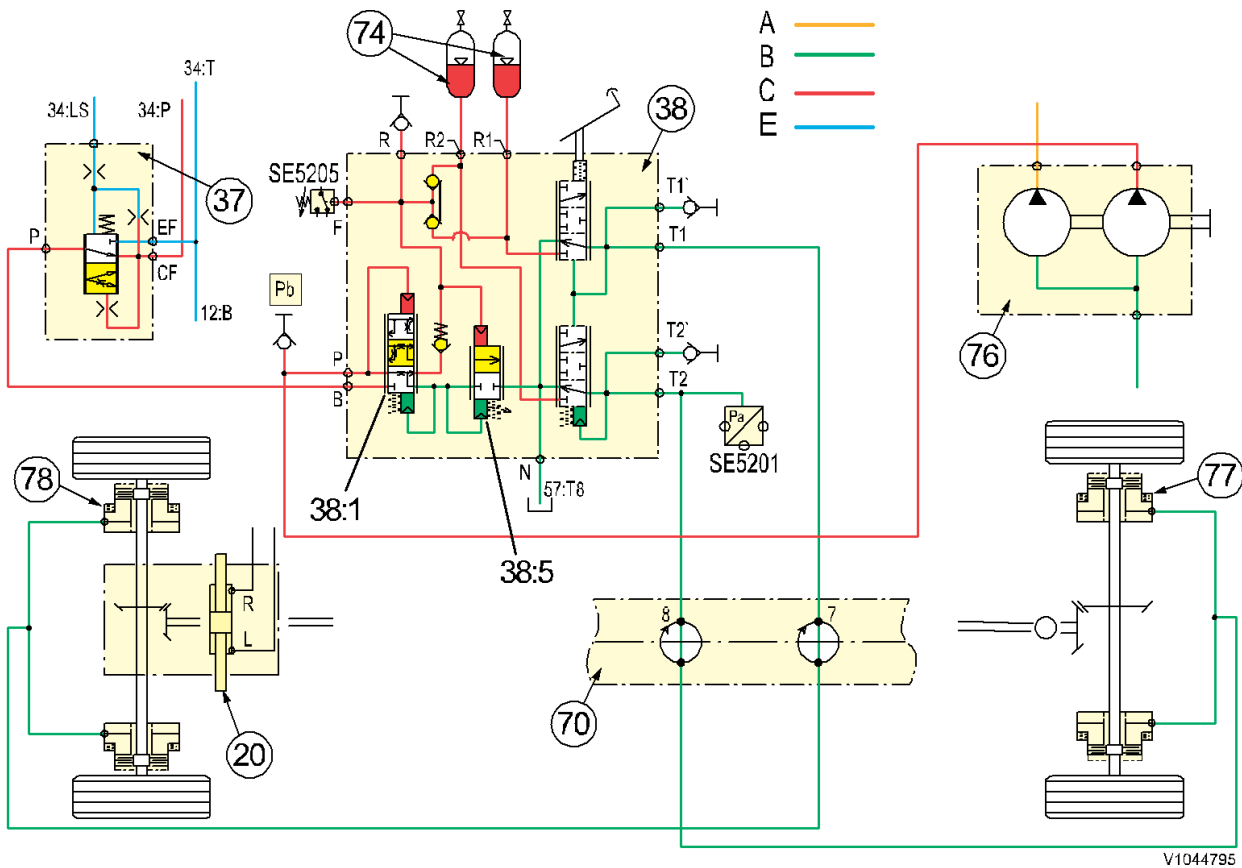
#### Step 1

20	Steering cylinder	77	Rear axle brake	38:1	Priority valve, brake
37	Priority valve, steering	78	Front axle brake	38:2	Non-return valve with spring
38	Brake valve	A	Servo pressure	38:3	Non-return valve
70	Centre passage	B	Return pressure	38:4	Non-return valve
74	Accumulator tank for brake pressure	C	Pump pressure	38:5	Valve, charging accumulators
76	Pump	D	Trapped oil		

#### Step 2

The area of the upper signal line on valve **38:5** is larger than the area of the lower signal line. Therefore valve **38:5** opens to

tank when accumulators **74** are fully charged. The pressure in the lower signal line on priority valve **38:1** drops and the priority valve changes over to the middle symbol, if the steering is not actuated (draining to tank via port EF in steering valve 37). If the steering is actuated, the pressure in the upper signal line on priority valve **38:1** increases and the upper symbol is engaged. The pump flow goes directly to the steering without passing through any restrictions.



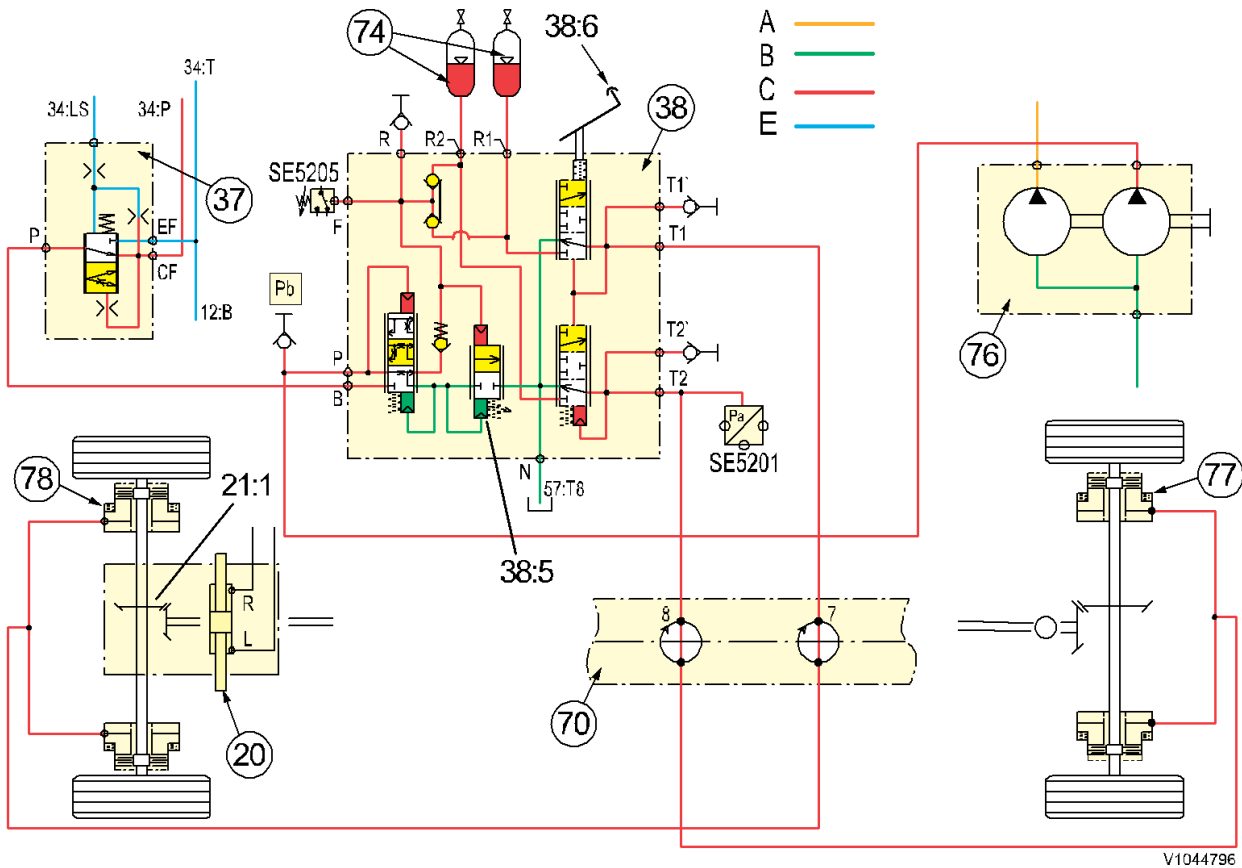
**Figure 2**  
**Step 2**

20	Steering cylinder	76	Pump	C	Pump pressure
37	Priority valve, steering	77	Rear axle brake	E	Raised return pressure
38	Brake valve	78	Front axle brake	38:1	Priority valve, brake
70	Centre passage	A	Servo pressure	38:5	Valve, charging accumulators
74	Accumulator tank for brake pressure	B	Return pressure		

**Step 3**

When the brake pedal is depressed, oil flows to both circuits T2 for the rear axle and T1 for the front axle. The pressure in accumulators **74** and on top of valve **38:5** drops. When the pressure has dropped to below 11.5 MPa (1668 psi, 115 bar), valve **38:5** changes position and the accumulators will begin to be charged again.

The signals from pressure sensor **SE5201** and pressure monitors **SE5205** pass via the machine control unit V-ECU.



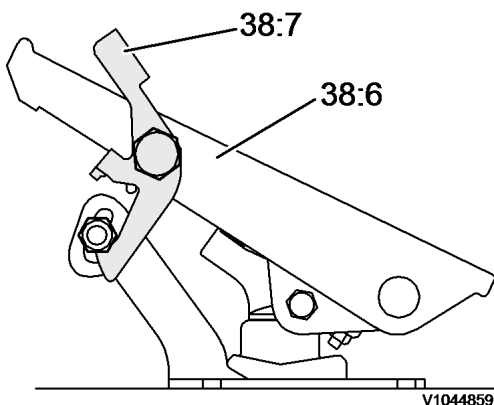
**Figure 3**  
**Step3**

20	Steering cylinder	76	Pump	C	Pump pressure
37	Priority valve, steering	77	Rear axle brake	E	Raised return pressure
38	Brake valve	78	Front axle brake	21:1	Pendulum axle
70	Centre passage	A	Servo pressure	38:5	Valve, charging accumulators
74	Accumulator tank for brake pressure	B	Return pressure	38:6	Brake pedal

### Digging brake

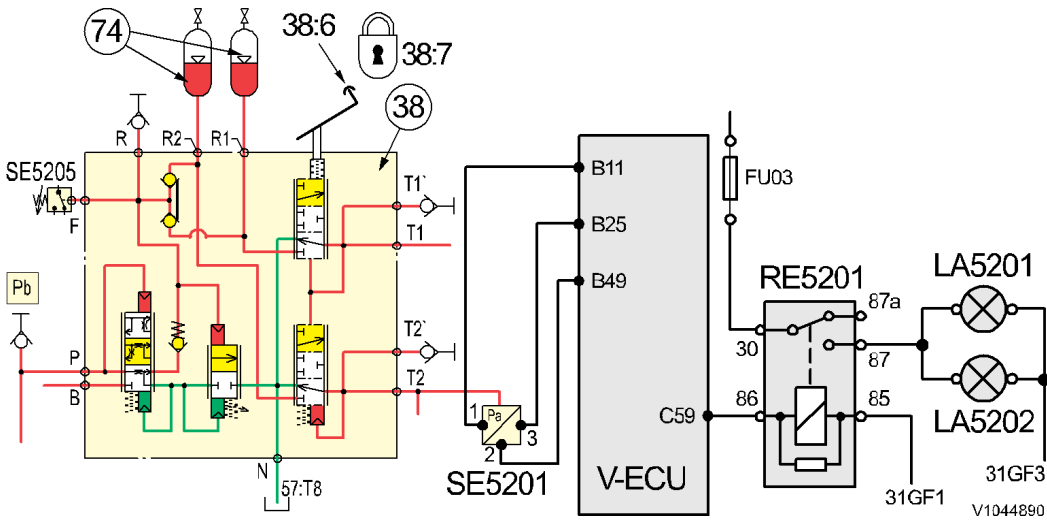
#### Mechanical locking

When the brake pedal **38:6** is depressed the pressure in the brake circuit reaches 0,5 MPa (72,5 psi, 5 bar), the brake lights light up via pressure sensor **SE5201** and brake light relay **RE5201**. When the pedal is locked with the catch **38:7** and the brake pressure increases further to 4–5 MPa (580–725 psi, 40–50 bar) a signal from sensor **SE5201** send's to the vehicle control unit V-ECU and activate a "timer". After two minutes' cut the voltage between V-ECU and the relay **RE5201** which result the brake lights **LA5201** and **LA5202** turnoffs.



**Figure 4**  
**Brake pedal with mechanical locking**

38:6	Brake pedal
38:7	Catch



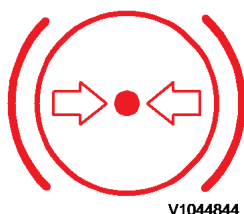
**Figure 5**  
**Hydraulic and electric sub-diagram**

38	Brake valve	38:7	Catch	RE5201	Relay brake lights
74	Accumulator tank for brake pressure	LA5201	Brake light, right	SE5201	Pressure sensor brake
38:6	Brake pedal	LA5202	Brake light, left	V-ECU	Vehicle control unit

**Safety regulations**

**LC3803**

**LC5201**



**Figure 6**  
**Symbols**

LC3803	Central warning
LC5201	Brake pressure low

Basically:

If the pressure in the accumulators drops to below 8.0 MPa (1160 psi, 80 bar), this will be indicated on the instrument control unit I-ECU via pressure monitor **SE5205**. The symbol **LC5201** show's on the main screen, the central warning lamp **LC3803** lights up and the buzzer sounds when the engine is running.

**Function check:**

- Charge accumulators then switch off engine and turn the ignition key to position ignition on.

- Depress the brake pedal until the pressure drops to the charging point of 11.5 MPa (1668 psi, 115 bar).
- After that depress the brake pedal twice at full stroke and the warning lamp on IECU must not light up.
- Remaining pressure must be > 8.0 MPa (1120 psi, 80 bar).
- Depress the brake pedal now slowly further until the warning lamp lights up. Then it must be possible to perform four (4) full brake applications. At the fifth time there must be a minimum pressure of > 5.8 MPa (841 psi, 58 bar), see [910 Hydraulic pressure specifications](#). During full brake applications, the pedal must be pressed down completely and then released. Between each application of the brake pedal there should be a regeneration time of approx. 60 seconds.

**Function check: brake lights and axle lock**

If the pressure in the brake circuit increases to 0,5 MPa (72,5 psi, 5 bar), the brake lights light up via pressure sensor **SE5201**.  
If the pressure increases further to 6.0 MPa (870 psi, 60 bar), pendulum axle **21:1** will be locked via pressure sensor **SE5201** and the solenoid for axle locking MA9152 (without voltage).

Document Title: <b>Service brakes, function check</b>	Function Group: <b>520</b>	Information Type: <b>Service Information</b>	Date: <b>2014/7/4 0</b>
Profile: <b>EXC, EW140C [GB]</b>			

## Service brakes, function check

### Op nbr 510-005

After repair work has been completed in any of the system related hydraulic circuit, a function check must be performed as described below:

#### Preconditions

- Function test must only be done within an area where it cannot cause accidents, neither to people nor to other things.
- Function test must be done on dry horizontal asphalt, dry horizontal concrete or similar horizontal surfaces.
- Machine must not be loaded.
- Door must be closed and fasten seat belt before driving and operating the function.

1. Start the engine and leave the control lock out lever down in locked position.
2. Apply the brake pedal several times and check the loading function of brake accumulators.
3. Check the brake pressure, see [520 Brake system checking and adjusting](#)
4. Operate the machine in forward direction in 1. gear and check if there is full brake application when pressing the brake pedal against the stop. Ensure that the brakes stop the machine.
5. Inspect the brake system for leaks and damaged components.
6. Check also if any error messages are shown related to this system.

#### **NOTE!**

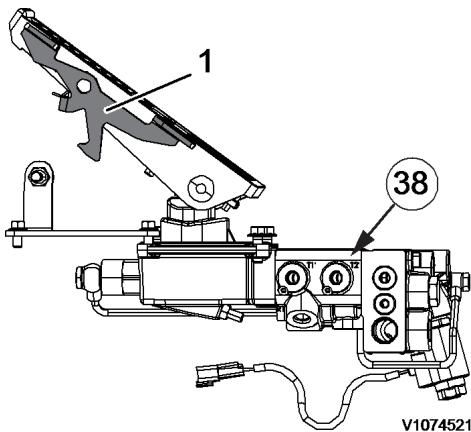
When operating the machine always observe the valid local traffic and safety regulations and, if necessary, make sure beforehand that the machine is in a condition compatible with these regulations.

Document Title: <b>Electrical digging brake, description</b>	Function Group: <b>520</b>	Information Type: <b>Service Information</b>	Date: <b>2014/7/4 0</b>
Profile: <b>EXC, EW140C [GB]</b>			

## Electrical digging brake, description

This function will lock the brake pedal electro-hydraulically.

### Function conditions:



**Figure 1**  
**Brake pedal with toggle lever**

(38) Electrical digging brake valve

1 Toggle lever

- Use the switch on the right instrument panel to select and apply the electric digging brake.
- Engine is running.
- Control lock out lever in upper position.
- Control mode switch in W- or C-mode.
- The toggle lever (1) must be locked in parallel position (as shown in the picture) to the brake pedal for the electrical digging to function, otherwise the brake pedal will be locked mechanically.
- Machine is standing still.

### NOTE!

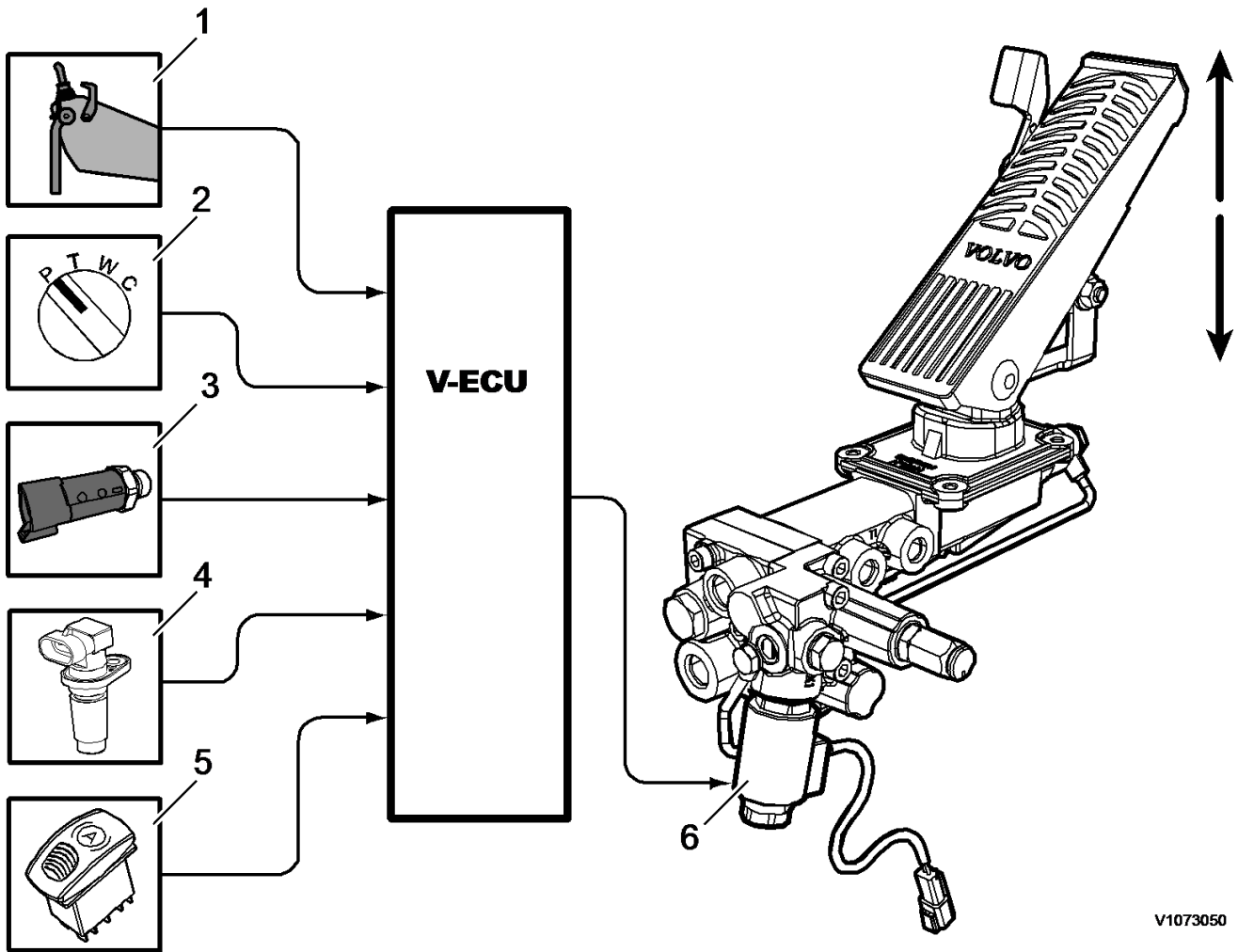
Risk of injury, be aware when the electrical digging brake function is activated, the brake pedal works automatically with a specified power.

Make sure that no parts are lying under the brake pedal what could interfere the brake function.

### NOTE!

For VCADS-Pro the following parameter should be activated:

(HXV) Connect electrical digging brake



V1073050

**Figure 2**  
**Electrical digging brake pedal with components**

1. Control lock out lever
2. Control mode switch
3. SE4217 Travel pedal sensor
4. SE4213 T/M speed sensor
5. SW5205 Switch for electrical digging brake
6. MA5205 Solenoid for electrical digging brake

**General:**

When the electrical digging brake is activated via switch SW5205, the brake pedal will lock automatically. The brake pedal gets automatically unlocked as soon as the travel pedal is applied to start driving, forward or reverse. The IECU pop up screen appears for 5 seconds after activating or deactivating the switch for electrical digging brake. The control lamp on IECU displays the current status of the electrical digging brake function:

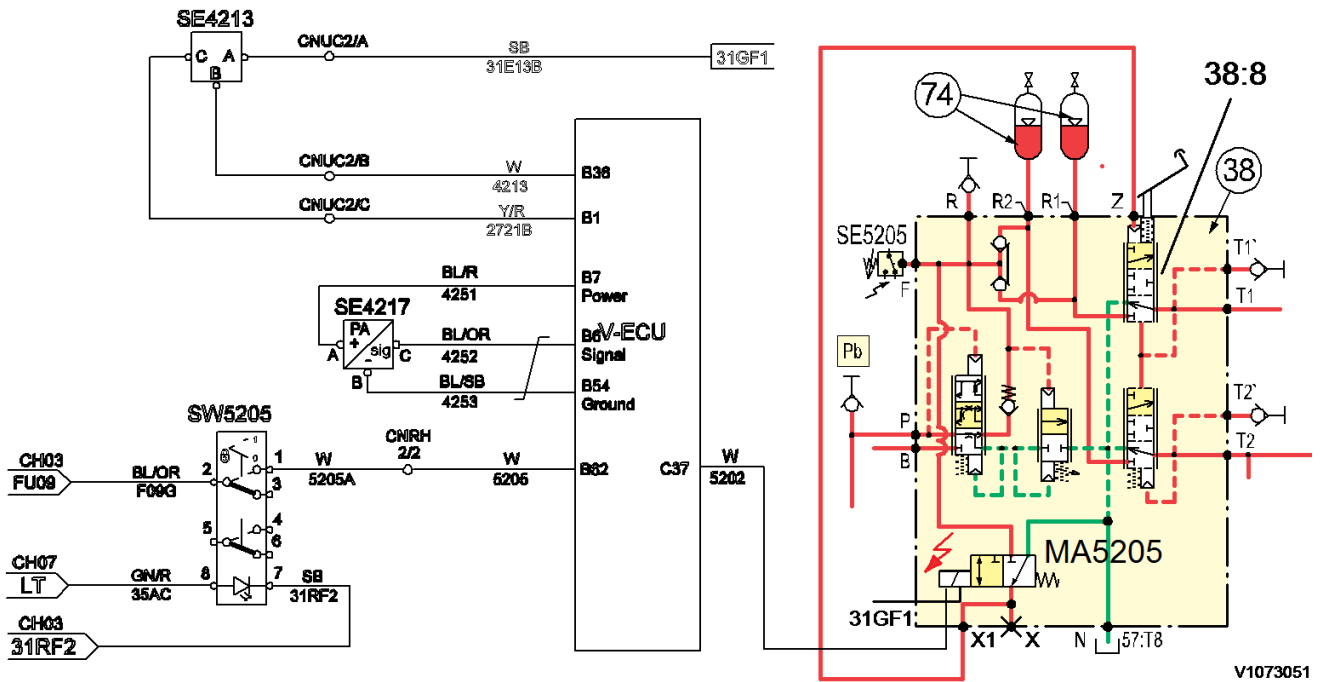
- Electrical digging brake indicator green: function selected using switch (SW5205).
- Electrical digging brake indicator yellow: solenoid (MA5205) closed and pedal locked.
- Electrical digging brake indicator red: failure.

**NOTE!**

When the electrical digging brake function is switched off while engine is running the brake pedal will not be released directly. It takes as long as the travel pedal will be applied to drive forward or reverse.

**Schematic overview**





V1073051

**Figure 3**  
**Electrical digging brake schematics**

**Function description**

When the engine is running, switch SW5205 is pressed, control lock out lever in upper position, W- or C-mode selected, the V-ECU activates solenoid MA5205.

The solenoid MA5205 opens and oil flows via an external tube to the brake valve and the pedal will be activated, brakes will be closed. Simultaneously the axle lock function will be activated. Axle lock function, see [301 Axle lock](#)

When operator starts to drive again, Sensor SE4217 gives signal via V-ECU to solenoid MA5205 and the brake pedal will be released also the axle lock function will be deactivated.

Sensor SE4213 is located on the transmission and checks if the machine is moving or not. As long as the machine is moving, electrical digging brake function can not be activated.

Sensor SE5205 (sensor also on standard brake) is checking the brake pressure in the brake system and in case of too low brake pressure, this sensor gives information for alarm indication on the display and the buzzer sounds.

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