

## WABCO D TYPE (P38 NRR)-System Overview

This is a small black ECU which replaced the Wabco C type during the 1999 update to the P38. If the vehicle has White indicators and/ or Air Bags in the seats, it will have one of these.

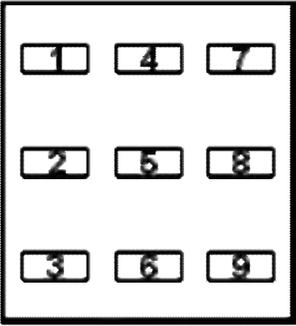


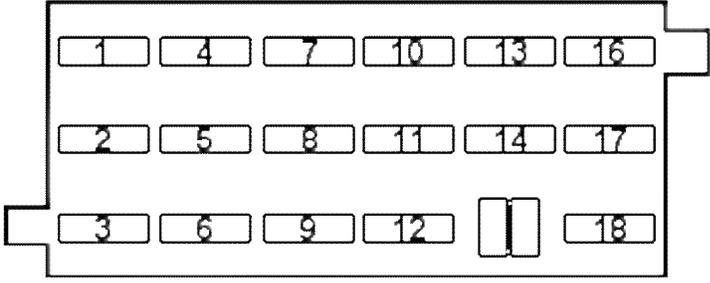
## WABCO D TYPE (P38 NRR) - Known Fitments

Vehicle makes models and variants known or believed to be using this vehicle system, required diagnostic lead and degree of known compatibility.

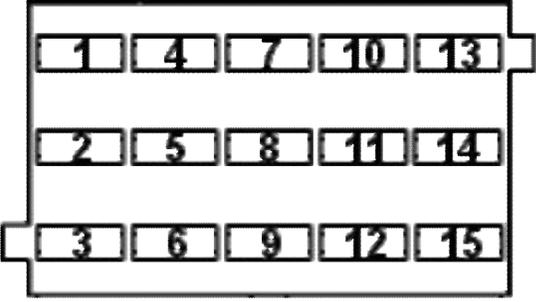
Vehicle Make	Vehicle Model	Vehicle Variant	Diagnostic Lead	Compatibility Level
Land Rover	Range Rover P38	1999 >	Green OBD lead	Verified

## WABCO D TYPE (P38 NRR)-Pin Outs

Connector 1	
1	Front LH Wheel Sensor
2	Front LH Wheel Sensor
3	Rear RH Wheel Sensor
4	Front RH Wheel Sensor
5	Front RH Wheel Sensor
6	Rear RH Wheel Sensor
7	Rear LH Wheel Sensor
8	Rear LH Wheel Sensor
9	Not Used

Connector 2	
1	Engine Compartment Fuse Box
2	Engine Compartment Fuse Box
3	BECM
4	Engine Control Module
5	Data Link Connector
6	Not Used
7	Stop Lamp Switch
8	ABS Pump and ABS Pump Relay
9	ABS Pump Relay (coil) and Pressure Switch
10	ABS Pressure Switch Unit and BECM
11	ABS Pressure Switch Unit and Brake Fluid Level Switch
12	Earth
13	Not Used
14	Stop Lamp Switch
15 - 16	Not Used

17	BECM
18	BECM

Connector 3	
1	ABS Booster Unit Left Front
2	ABS Booster Unit Left Front
3	ABS Booster Unit
4	ABS Booster Unit Right Front
5	ABS Booster Unit Right Front
6	Not Used
7	ABS Booster Unit Left Rear
8	ABS Booster Unit Left Rear
9	Not Used
10	ABS Booster Unit Right Rear
11	ABS Booster Unit Right Rear
12	ABS Booster Unit Traction Control
13	ABS Booster Unit Demanual
14	ABS Booster Unit Demanual
15	ABS Booster Unit Traction Control

#### WABCO D TYPE (P38 NRR) - Diagnostic Capabilities (Read Fault Codes)

This function reads the fault code memory. The ECU can self detect up to 84 different problems with itself, its wiring and its associated sensors, storing the respective code if it detects any malfunction or reading outside of pre defined acceptable limits. Not all stored faults may cause the fault warning lamp to illuminate.

#### WABCO D TYPE (P38 NRR) - Diagnostic Capabilities (Clear Fault Codes)

This function first reads the fault code memory to ensure that there are faults to clear and if there are completely erases and clears the fault code memory. Having deleted the faults it then re-checks the fault memory to check that it is clear, reporting success if it is. Failure to clear the fault memory successfully is usually due to the system re-logging the fault the moment the fault memory is clear. This indicates that the fault has not been rectified properly and as far as the system is concerned still exists. A re-check for successful clearing of the fault code memory may be successful but then the system may re-log the fault shortly after.

## WABCO D TYPE (P38 NRR) - Diagnostic Capabilities (Settings)

Values, configuration settings, and other stored information which can be read from the ECU, edited and then rewritten back. Read settings can also be stored as a standard HTML page for reference. These pages can then later be re loaded and re written back to the ECU. Please note that some values may be read only due to the fact that they are supplied from the ECU's ROM or are internally calculated.

- **Factory code:** This is a Wabco number by which they can identify the production line which built this ECU.
- **Bar code:** This is the bar code by which stocks of this ECU can be electronically controlled. The bar code itself and the number it represents can also be found on the outer case of the ECU.
- **Production number:** This is a Wabco assigned number which tells them which variation of the same family this ECU is.
- **Product date:** This code is used to identify how far into production of this particular variant of this ECU type it was when this individual ECU was built. This would help if a build error was detected and a recall was required.
- **ABS module:** The ABS ECU is a multi function ECU which can manage the functions of Anti-lock Braking (ABS), Electronic Brake Distribution (EBD), Electronic Traction Control (ETC) and Hill Descent Control (HDC). These different functions all share the same measurements taken from the connected sensors and often control the same valves in conjunction with one another. They also communicate diagnostically as one unit through the same shared connection. This means that each function is treated as a separate module within the ECU and it is possible for any module to be modified independently of the others. For this reason each module has its own reference code by which changes can be traced if required. This is the code for the ABS module.
- **EBD module:** This is the code for the EBD module if fitted (see ABS module for details).
- **Traction control:** This is the code for the ETC module if fitted (see ABS module for details).
- **HDC module:** This is the code for the HDC module if fitted (see ABS module for details).
- **Diagnostic module:** This is the code for the Diagnostic module if fitted (see ABS module for details).
- **Measurement module:** This is the code for the Measurement module if fitted (see ABS module for details).
- **VIN:** This is the vehicle's unique VIN number.
- **ECU condition:** Can be set to New or Used.

## WABCO D TYPE (P38 NRR)-Diagnostic Capabilities (Inputs)

Real time live display of the information the electronic control unit of the selected vehicle system is currently deriving from its input sensors. Please note that due to settings of this ECU at manufacture which cannot be overwritten, communication may be lost when the road speed exceeds a certain limit. This is not a fault on the Nanocom but a built in diagnostic feature.

- **Sensor voltage:** This shows the DC Voltage for the front and rear wheel speed sensor. Expected values are between 2.0 to 2.4 Volts. The wheel speed sensors are different to the conventional wheel speed sensors used on other Land Rover products. Conventionally, wheel speed sensors have an interference fit with the hub or back plate. This positions the sensor close to a reluctor ring. The sensors used are incorporated into the inboard wheel bearing, on both front and rear hubs. This bearing assembly is a sealed unit and has no replaceable parts. Also different is the wire from the wheel speed sensor. Land Rover has, historically used a wheel speed sensor employing a signal wire inside a shielded earth wire. The new wheel speed sensors have a twisted pair of wires. This offers some electrical advantages over two straight wires. Such as the signal being less susceptible to electrical noise or interference and it generates less electrical noise, the wires can also be balanced together (similar electrical properties) to ensure voltage losses are minimized. Like a conventional wheel speed sensor, the signal created is an AC sine wave. This wave is generated in the inductive sensor by a sixty-tooth reluctor, machined into the wheel bearing inner race. The frequency of this signal supplies the ABS ECU with the information it needs to determine the speed of the individual wheels and is used in the calculation of vehicle speed or vehicle reference speed.
- **Wheel speed (Km/h):** The wheel speed in KPH. The ABS ECU cannot detect wheel speeds less than 1.8 KPH. The wheel speed sensors are different to the conventional wheel speed sensors used on other Land Rover products. Conventionally, wheel speed sensors have an interference fit with the hub or back plate. This positions the sensor close to a reluctor ring. The sensors used are incorporated into the inboard wheel bearing, on both front and rear hubs. This bearing assembly is a sealed unit and has no replaceable parts. Also different is the wire from the wheel speed sensor. Land Rover has, historically used a wheel speed sensor employing a signal wire inside a shielded earth wire. The new wheel speed sensors have a twisted pair of wires. This offers some electrical advantages over two straight wires. Such as the signal being less susceptible to electrical noise or interference and it generates less electrical noise, the wires can also be balanced together (similar electrical properties) to ensure voltage losses are minimized. Like a conventional wheel speed sensor, the signal created is an AC sine wave. This wave is generated in the inductive sensor by a sixty-tooth reluctor, machined into the wheel bearing inner race. The frequency of this signal supplies the ABS ECU with the information it needs to determine the speed of the individual wheels and is used in the calculation of vehicle speed or vehicle reference speed.

- Inlet valve: This shows the voltage being applied to this valve by the ABS ECU. When driven the voltage should be around 2.8 to 3.6 Volts and when not being driven should be around 0 to 0.5 Volts.
- Outlet valve: This shows the voltage being applied to this valve by the ABS ECU. When driven the voltage should be around 2.8 to 3.6 Volts and when not being driven should be around 0 to 0.5 Volts.
- Brake switch 1: This shows the status of the brake switch no 1.
- Brake switch 2: This shows the status of the brake switch no 2.
- Pressure switch 1: This shows the status of the pressure switch no 1.
- Pressure switch 2: This shows the state of the pressure switch no 2.
- T.C control N/close: Status for Traction Control.
- T.C control N/open: Status for Traction Control.
- Isolation outlet: Status for isolation valves.
- Isolation Inlet: Status for isolation valves.
- Ground reference (%): Status for ground reference.
- Pump monitor (V): This shows the voltage for the pump monitor.
- Ignition supply (V): This shows the voltage for the ignition.
- Valve supply (V): This shows the voltage for the valve supply.

#### WABCO D TYPE (P38 NRR) - Diagnostic Capabilities (Outputs)

This is a choice of outputs that can be tested. Each output has an ON and OFF choice. Click on the ON link to start the test and on OFF to end.

- Front Right Inlet Valve: This turns on the output to the ABS valves
- Front Right Outlet Valve: This turns on the output to the ABS valves
- Front Left Inlet Valve: This turns on the output to the ABS valves
- Front left Outlet Valve: This turns on the output to the ABS valves
- Rear Right Inlet Valve: This turns on the output to the ABS valves
- Rear Right Outlet Valve: This turns on the output to the ABS valves
- Rear Left Inlet Valve: This turns on the output to the ABS valves
- Rear Left Outlet Valve: This turns on the output to the ABS valves
- Isolation Inlet valve: This turns on the output to the ABS valves
- Isolation Outlet Valve: This turns on the output to the ABS valves
- Valve relay: This turns on and off the ABS valve relay output.
- Pump relay: This turns on and off the ABS pump relay output.
- T.C. Normally Closed:
- T.C. Normally Open:
- Rough Road: This turns on and off the rough road feature.
- Speedo: This drives the speedometer output to simulate 100 Miles per hour.

- Traction control lamp: The ETC system employs one amber lamp, which has the letters TC in a dotted circle. The lamp will illuminate during the ignition on lamp check. The system will indicate TC operation by illuminating the amber TC lamp for a minimum of 2 seconds.
- ABS warning LED: The ABS warning lamp is an amber light with the letters ABS inside a circle. If there is a fault the ABS warning lamp will remain illuminated until the ignition is switched off.
- Brake warning LED: This turns on the brake warning lamp for 20 seconds. The brake or EBD lamp is a combined warning lamp with the low brake fluid warning and the handbrake warning lamp. The lamp is a red light with an exclamation mark inside a brake symbol. The ABS ECU will illuminate this light if it senses a fault that will affect its ability to control the braking balance of the vehicle. This lamp will be illuminated for 3 seconds when the ignition is switched on, as a bulb check function. It will then extinguish as long as no fault currently exists that may effect the operation of the EBD. The EBD warning lamp will remain illuminated if the ABS ECU is in "new-born" mode. Unlike the ABS warning lamp, the ABS ECU supplies a voltage to illuminate the light, not to turn it off.

#### Modes of operation:

- No lamp and no audible warning indicate that the ABS/EBD/TC and HDC systems are OK.
- The lamp being on could indicate that the ignition has just been turned on (Bulb check for 3 seconds), the handbrake is on, there is a low brake fluid level, the ABS ECU supplied voltage is much too high or much too low, there is a new-born ABS ECU fitted, the ABS has a sensor/pump or valve fault logged for this journey.
- Both lamp on and the audible warning indicates that the ABS has detected a sensor/pump or valve fault.

#### WABCO D TYPE (P38 NRR)-Diagnostic Capabilities (UTILITY)

- ABS power bleed: This causes the ABS system to bleed the main hydraulic circuit and may need to be repeated if there is a substantial amount of air in the circuit.
- ABS modulator bleed: This causes the ABS system to bleed the secondary hydraulic circuit and may need to be repeated if there is a substantial amount of air in the circuit.
- Front Right Test: Tests the Front Right Bleed function
- Front Left Test: Tests the Front Left Bleed function
- Rear Right Test: Tests the Rear Right Bleed function
- Rear Left Test: Tests the Rear Left Bleed function