

VALEO HEVAC (P38 NRR) - System Overview

Custom Manufactured by Valeo for the P38 Range Rover as an Air condition control module option on everything except the very base model, which has only 3 rotary controls on its fascia instead of this quite large LCD panel. Sadly the system seems a source of endless problems on this vehicle with Blend flaps and distribution flaps jamming sometimes burning out the motors if left too long before being repaired. This is especially common in hot countries where the dash has been subject to high temperatures and the Heater box warps slightly causing the flaps to jam.

Often these can be easily freed up and the system re calibrated.

Attention: If the BECM is unlocked, the vehicle server might not be able to communicate with this ECU. In order to bypass this, unplug the white connector (the one nearest to the front) located under the driver seat (RHD) under a removable panel in the fuse box.

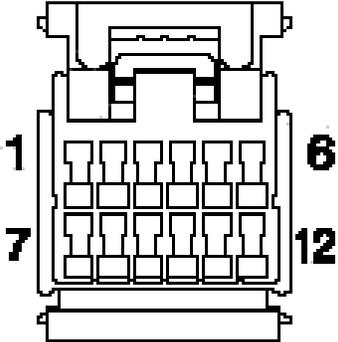


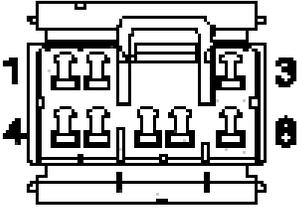
VALEO HEVAC (P38 NRR)-Known Fitments

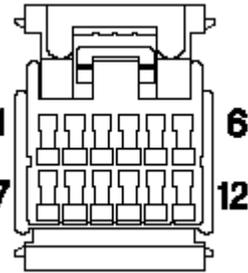
Vehicle makes models and variants known or believed to be using this vehicle system, required diagnostic lead and degree of known compatibility.

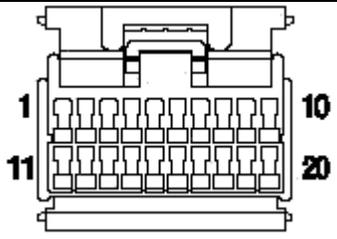
Vehicle Make	Vehicle Model	Vehicle Variant	Diagnostic Lead	Compatibility Level
Land Rover	Range Rover	Not all models have a Hevac unit	Green OBD lead	Verified

VALEO HEVAC (P38 NRR) - Pin Outs

C245 (up to 99MY) C0791(from 99MY)	 <p>12 Pin Black</p>
1	Right hand blower motor speed request
2	Right hand blower motor fault feedback
3	Right blower motor voltage control feedback
4	Left hand blower motor speed request
5	Left hand blower motor fault feedback
6	Left hand blower motor control voltage feedback
7	Ambient temperature sensor
8	Ambient temperature sensor
9	Right re-circulating motor
10	Right re-circulating motor
11	Left re-circulating motor
12	Left re-circulating motor

<p>C244 (up to 99MY)</p> <p>C0792 (from 99MY)</p>	 <p>8 Pin White</p>
1	Ignition switch position I power
2	Battery power
3	Ignition switch position II power
4	Ground
5	Left heated windshield relay control
6	Control panel illumination
7	Compressor clutch control
8	Condenser fan motor control

<p>C246A (up to 99MY)</p> <p>C1576 (from 99MY)</p>	 <p>No A/C</p>
1	Not used
2	Diagnostic K line
3	Diagnostic L line
4	Engine running (alternator charging)
5	Not used
6	Not used
7	Not used
8	Not used
9	Rear screen heater request
10	Not used
11	Left hand heater request
12	Right hand heater request

C246B (up to 99MY) C0793 (from 99MY)	 <p style="text-align: right;">With A/C</p>
1	Not used
2	Heater coolant temperature sensor
3	Not used
4	Sunlight sensor
5	Road speed
6	Diagnostic K line
7	Diagnostic L line
8	Engine running (alternator charging)
9	In car temperature sensor, thermistor supply
10	Sensor earth
11	LCD dimming
12	Evaporator temperature sensor
13	A/C request
14	A/C Grant
15	In-car temperature sensor, aspirator earth
16	In-car temperature sensor, aspirator supply
17	Rear scan heater request
18	In-car temperature sensor, thermistor earth
19	Right hand heater request
20	Left hand heater request

C261 (up to 99MY) C1597 (from 99MY)	16 pin black
1	Right hand temperature servo feedback reference voltage (-)
2	Distribution servo feedback reference voltage (-)
3	Not used
4	Distribution servo feedback reference voltage (+)
5	Right hand temperature servo feedback reference voltage (+)
6	Distribution servo voltage (+/-)
7	Right hand temperature servo feedback
8	Left hand temperature servo feedback

9	Right hand temperature servo voltage (+/-)
10	Right hand temperature servo voltage (+/-)
11	Left hand temperature servo voltage (+/-)
12	Left hand temperature servo voltage (+/-)
13	Left hand temperature servo feedback reference voltage (-)
14	Left hand temperature servo feedback reference voltage (+)
15	Distribution servo feedback
16	Distribution Servo voltage (+/-)

VALEO HEVAC (P38 NRR)-Diagnostic Capabilities (Read Fault Codes)

The Hevac Self diagnostic system can self-detect approximately 54 faults which it places in one of two banks of memory depending whether the fault is permanent or intermittent. Most of these are minor faults, not even causing the book symbol to illuminate on the LCD display panel. Very few faults can cause a full system shutdown and these will prompt the display of the book symbol.

Both parts of the memory are read explaining which part each fault was in. Often there are multiple faults stored in memory caused as a result of nothing more than battery failure or occasional glitches in the system. The faults once occurred are storing a code in the fault code log. However, besides the fault code log, the ECU is reporting all the current faults that can be detected in the system. If there are faults that look more serious, it can be useful to clear the memory and see which of the faults becomes re-logged.

VALEO HEVAC (P38 NRR) - Diagnostic Capabilities (Clear Fault Codes)

The memory cannot be cleared as long as the faults are present in the system. Rectify the faults and recycle power. This will refresh the list of faults currently found in the system, but will not clear the fault codes log. This can be cleared by clicking on Clear fault codes link on the left side of the window (after recycling the ignition). This function checks the fault code memory for resident faults and then clears the memory if the fault has been rectified. Having deleted the faults the system re-checks the fault memory to ensure that it is clear. Failure to clear the fault memory successfully is usually due to the system re-logging the fault the moment the fault memory is clear, meaning that the fault has not been rectified properly and, as far as the system is concerned, still exists. The system may also carry out a re-check of the fault code memory but then the system may re-log the fault shortly after.

VALEO HEVAC (P38 NRR)-Diagnostic Capabilities (Settings)

This is stored information which can be read from the ECU. Read settings can also be stored as a standard HTML page for reference. These pages can then later be re loaded. Please note that all values are read only due to the fact that they are supplied from the ECU's ROM or are internally calculated.

- Manufacturer: Gives the manufacturer's name for the HEVAC ECU.
- Vehicle: Gives the vehicle model where the ECU is fitted.
- ECU version: Gives the ECU version number.

VALEO HEVAC (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.

This information is split into 2 sections, SWITCHES and VALUES

SWITCHES

- Left heat down: This gives the current status of the user's button mounted on the face of the Hevac ECU, allowing its correct operation to be tested.
- Left heat up: This gives the current status of the user's button mounted on the face of the Hevac ECU, allowing its correct operation to be tested.
- Right heat down: This gives the current status of the user's button mounted on the face of the Hevac ECU, allowing its correct operation to be tested.
- Right heat up: This gives the current status of the user's button mounted on the face of the Hevac ECU, allowing its correct operation to be tested.
- Left heated seat: This gives the current status of the user's button mounted on the face of the Hevac ECU, allowing its correct operation to be tested.
- Right heated seat: This gives the current status of the user's button mounted on the face of the Hevac ECU, allowing its correct operation to be tested.
- Rear screen: This gives the current status of the user's button mounted on the face of the Hevac ECU, allowing its correct operation to be tested.
- Front screen: This gives the current status of the user's button mounted on the face of the Hevac ECU, allowing its correct operation to be tested.
- Demist program: This gives the current status of the user's button mounted on the face of the Hevac ECU, allowing its correct operation to be tested.
- Face: This gives the current status of the user's button mounted on the face of the Hevac ECU, allowing its correct operation to be tested.

- Face and feet: This gives the current status of the user's button mounted on the face of the Hevac ECU, allowing its correct operation to be tested.
- Feet: This gives the current status of the user's button mounted on the face of the Hevac ECU, allowing its correct operation to be tested.
- Feet and screen: This gives the current status of the user's button mounted on the face of the Hevac ECU, allowing its correct operation to be tested.
- Screen: This gives the current status of the user's button mounted on the face of the Hevac ECU, allowing its correct operation to be tested.
- Recirculation: This gives the current status of the user's button mounted on the face of the Hevac ECU, allowing its correct operation to be tested.
- Air con off: This gives the current status of the user's button mounted on the face of the Hevac ECU, allowing its correct operation to be tested.
- Automatic: This gives the current status of the user's button mounted on the face of the Hevac ECU, allowing its correct operation to be tested.
- Fan speed: This gives the numeric value for the currently selected fan speed which should change in even steps from 1 to 10 when the speed adjuster is rotated from one extreme to the other.

VALUES

- Ambient temperature (c): This reading gives the external air temperature or air entering the ventilation system.
- Aspirator temperature (c): This reading gives internal cabin temperature.
- Evaporator temperature (c): This reading gives the evaporator unit's temperature.
- Heater core temperature (c): This reading gives the engine coolant temperature where the coolant enters the heating system.
- Road speed (Km/h): This value is generated by the ABS ECU using information from its wheel rotation sensors.
- Road speed (mph): This value is generated by the ABS ECU using information from its wheel rotation sensors.
- Engine running:
- Solar sensor (w/sqm): This reading gives the effective strength of the sun as detected by the Solar Sensor mounted beside the Alarm LED on the top of the dashboard.
- Distribution motors (%): This gives the current feedback position of the motor that drives the flap controlling air distribution inside the vehicle. As the distribution buttons are pressed the flap should move to the position which gives air flow to the selected direction (feet, face, screen etc.).
- Left blend motor (%): This gives the current feedback position of the motor which drives the flap controlling amounts of hot and cold air to be blended together (effectively the temperature of the air coming out of the vents). As the requested temperature is changed by the user the flap should move.
- Right blend motor (%): This gives the current feedback position of the motor which drives the flap controlling amounts of hot and cold air to be blended together

(effectively the temperature of the air coming out of the vents). As the requested temperature is changed by the user the flap should move.

- **Left blower return:** This is the feedback value returned back to the Hevac ECU from the left blower motor, used by the ECU to determine the actual voltage at the motor. This reading value also allows the Hevac ECU to detect Blower motor faults.
- **Right blower return:** This is the feedback value returned back to the Hevac ECU from the right blower motor, used by the ECU to determine the actual voltage at the motor reading. This value also allows the Hevac ECU to detect Blower motor faults.
- **Air conditioning grant:** When the A/C button is pressed an active low signal is output to the engine management ECU (The Request). This then looks at factors like engine temperature, load, current acceleration etc. and according to when these conditions allow, grant Air conditioning. This involves it engaging the clutch to drive the Air Conditioning pump, altering its internal fuelling to compensate for the load imposed by the pump, managing along with the Hevac the Condenser fans, and also telling the Hevac that Air Conditioning has been granted.

VALEO HEVAC (P38 NRR) - Diagnostic Capabilities (Outputs)

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

- **Button pressed lights:** This test illuminates all of the individual buttons pressed, or selected tell-tale lights on the Hevac control panel, allowing quick detection of lamp failure.
- **LCD backlight:** This turns the back illumination to the Hevac control panels LCD display allowing the condition of the bulbs to be checked.
- **LCD test:** This test first turns on the back illumination to the Hevac control panels LCD display, allowing the display to be seen, then turns on a special test pattern that illuminates every possible segment on the display. Failing displays with faulty segments can then be more easily seen.
- **Front heated screen:** This will turn on the heated front windscreen for one minute, which is just long enough to detect a raise in temperature of the screen. However, in cold or chilly conditions the test may have to be repeated consecutively before the change can be felt. This test does impose quite a heavy drain on the vehicle's battery and a stationary vehicle with a poor battery and no supplementary supply may not stand the test.

VALEO HEVAC (P38 NRR)-Diagnostic Capabilities (UTILITY)

There are choices of functions that can be performed.

- **Calibrate blend flaps:** This function gets the ECU to automatically tune the blend flaps and distribution door servo motors to allow the correct range of operation. This operation is required after either blend flap motor or ECU replacement.
- **Force blower modules:** This allows the blowers to be turned on and off and to test them to different values.
- **Force left/right blend motor:** This allows the hot / cold blend flap motor to be driven to any position between 1 and 100, which represents its percentage of travel of the attached hot / cold blend flap. When the test sends the flap to the requested position it waits a short while to give the flap time to move and then reads back and gives the flap's current position to allow verification of the position before allowing the Hevac ECU to regain control of the flap's position. It is quite normal for the flap to move to a position a few percent away from the requested one even travelling beyond 100 percent or below 1 percent. This is because the returned value is not subject to the calibration values that the ECU stores during a self-calibrate function. If however the position reached by the flap is nowhere near the requested value and re-calibration does not correct the problem, the motor is probably faulty and will require replacing. As a late addition to this function we have added a return value during the output to confirm the flap / motor position.
- **Force distribution motor:** This allows the airflow distribution flap motor to be driven to any position between 1 and 100, which represents its percentage of travel of the attached flap. When the test sends the flap to the requested position it waits a short while to give the flap time to move and then reads back and gives the flap's current position to allow verification of the position before allowing Hevac ECU to regain control of the flap's position. It is quite normal for the flap to move to a position a few percent away from the requested one even travelling beyond 100 percent or below 1 percent. This is because the returned value is not subject to the calibration values that the ECU stores during a self-calibrate function. If however the position reached by the flap is nowhere near the requested value and re-calibration does not correct the problem the motor is probably faulty and will require replacing. As a late addition to this function we have added a return value during the output to confirm the flap / motor position.
- **Force recirculation motor:** This test causes the air recirculation flap motor to close the recirculation flap and then to re-open it.
- **RETURN TO ECU:** This causes the motors to return under ECU control.