valve cage

Installation manual

Revision: 29032012

This manual is developed by Prins Autogassystemen B.V.
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Introduction

The ValveCare dosing system consists of an additive dosing pump and a dosing unit, developed exclusively for the Prins VSI system. It is suitable for all combustion engines with alternative fuels such as LPG and CNG. ValveCare is used for the correct dosage of additives which prevent excessive valve and valve seat wear. These additives are added to petrol, but not to LPG/CNG.

General operation

The ValveCare dosing system consists of an additive dosing pump and a dosing unit. As soon as the car switches over to driving on LPG/CNG, the dosing pump will be switched on and the ValveCare fluid will be pressed to the dosing unit.

This ValveCare dosing unit makes a 100% equal spread of the ValveCare fluid possible over all cylinders (up to 10 cylinders).

ValveCare communicates directly with the Prins VSI system and will warn the customer in case of malfunctions by using beep signals from the VSI switch. In case of very critical errors, driving on LPG/CNG will no longer be possible.

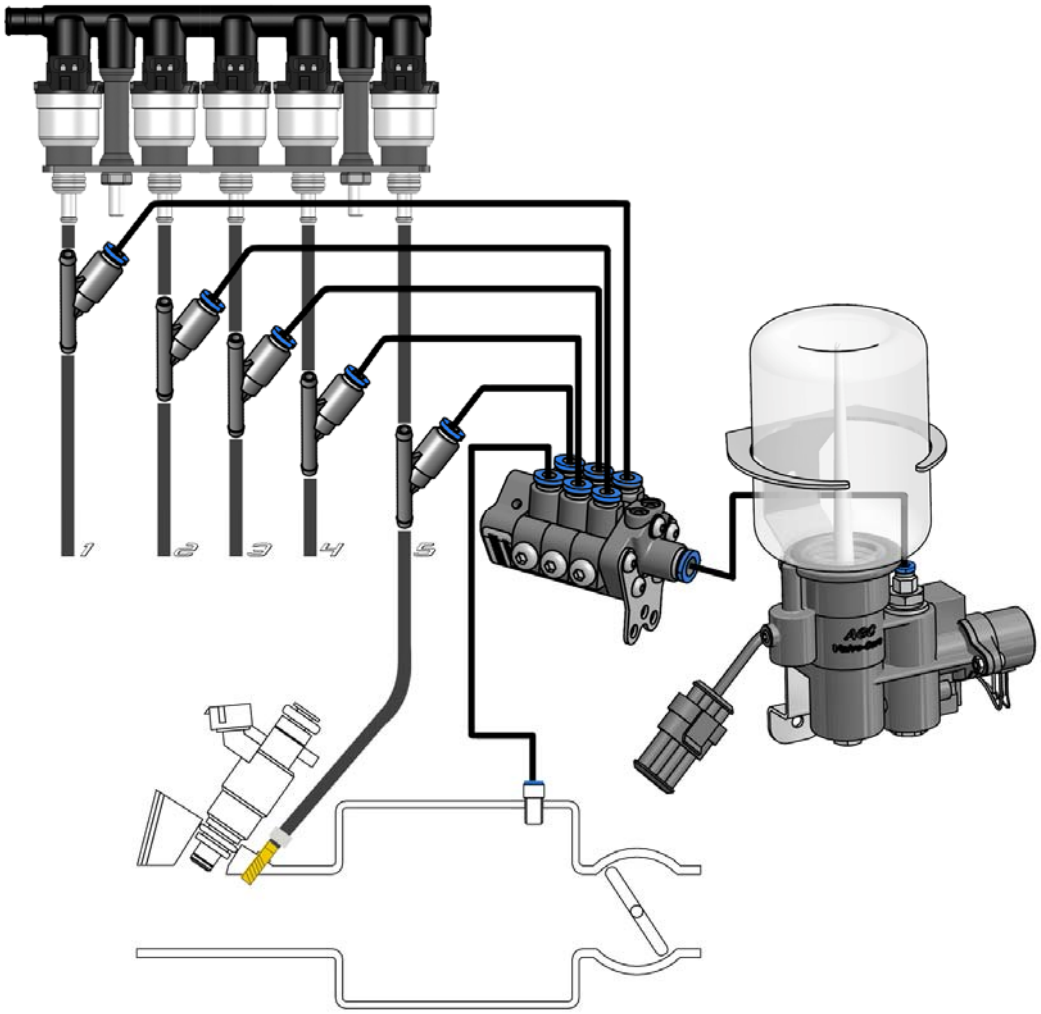
ValveCare is unique, because the fluid dosage is calculated based on engine load and the spreading of the fluid is 100% equal over all cylinders. Consequently, the engine is always protected by the right amount of additives, even in case of turbocharged engines.

Only use original ValveCare additives for the ValveCare dosing pump. If any other additives are used, Prins can no longer guarantee a proper operation and warranty shall be rendered null and void.

Before assembling or working on the ValveCare dosing system, all safety regulations must be observed.

Requirements

- ValveCare interface cable
- ValveCare software
- ValveCare bleeder pipe
- Vehicle scan tool or OBD scan tool
- Prins VSI diagnostic software
- Prins VSI serial interface
- Battery drill or pneumatic drill
- Vacuum cleaner
- Compressed air
- Air pistol
- Soldering iron and soldering tin
- Wire stripper
- Insulating tape
- Thread locking agent
- Adhesive shrink sleeves
- Basic workshop equipment/tools



Contents of the ValveCare kit

Check whether the following parts are present in the packaging:

- Mirror leaflet
- Dosing pump
- Dosing unit
- Y-piece with non return valve
- Nylon hose 4mm

Further requirements:

- Bottle of ValveCare fluid
- Air bleed tools
- Interface cable

Safety instructions

- Always avoid direct contact between additive and skin, eyes or mouth. Always wear protective clothing and safety goggles during work or maintenance on the ValveCare dosing system.
- If the additive comes in contact with the eyes, this may cause irritation. In this case rinse the eyes 10 to 15 minutes with water and seek medical attention.
- If the additive comes in contact with the skin, this may cause irritation. In this case wash the skin thoroughly with soap and rinse with plenty of water. Seek medical attention if the irritation persists.
- If the additive is swallowed, do not provoke vomiting. Rinse the mouth with water and drink 2 to 4 glasses of water. Then immediately seek medical attention.
- Observe the statutory national regulations when installing the device.
- Only competent and qualified persons are allowed to install, maintain and repair the dosing pump and peripheral equipment.
- When connecting or disconnecting electrical wiring, always switch off the power supply by disconnecting the vehicle's battery.
- Assembly of ValveCare devices with non-original parts which have not been checked and recommended by Prins, is not allowed and may cause material damages for which Prins cannot be held liable.

Installing the dosing pump into the vehicle

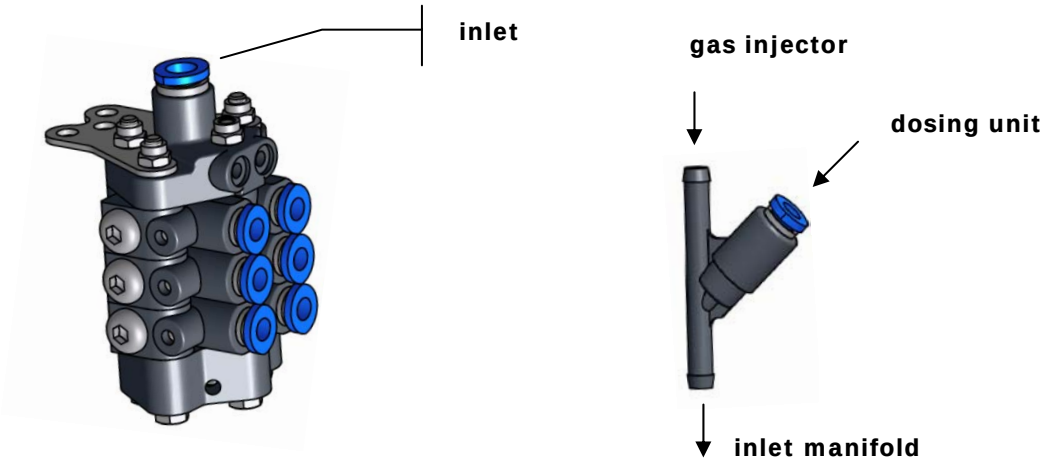
- Leave the protection cover mounted during the installation of the dosing pump (prevention of fluid leakage and the ingress of dirt into the pump).
- Install the dosing unit in a vertical position inside the engine compartment at a location where the temperature will not exceed a maximum of 80°C.
- Guide the ValveCare wiring harness to the VSI-ECU (large connector). Make sure that the diagnostic connector remains accessible.
- Connect the 4 mm nylon hose to the ValveCare pump and guide it to the dosing unit but do not connect it at this time!
- Connect the electrical wiring according the table below.

ValveCare cable.	VSI-I wiring connection	VSI-2.0 wiring connection
Green	Cable colour: **green** Cable location: **VSI ecu pos. 44** Cable code: **AD1/TPS**	Cable colour: (bleu/green*) **orange/orange-white** Cable Location: **VSI-2.0 ecu pos. 18/17/20/19** Cable code: (AD1/AD2*) **AD3/AD4**
White/yellow	Cable colour: **white/yellow** Cable location: **VSI ecu pos. 39** Cable code: **ecu side inj 1**	Cable colour : **white/yellow** Cable Location: **VSI-2.0 ecu pos. 121** Cable code : **ecu side inj 1**
Brown	Cable colour: **Brown** Cable location: **VSI ecu pos. 50** Cable code: **switch ground**	Cable colour : **Brown** Cable Location: **VSI-2.0 ecu pos. 1** Cable code: **ground battery**
Green/yellow	Cable colour: **green / yellow** Cable location: **VSI ecu pos. 53** Cable code: **power reducer valve**	Cable colour : **green /yellow** Cable Location: **VSI-2.0 ecu pos. 24** Cable code : **12V reducer lock off**
Red	Cable colour: **grey/white** Cable location: **VSI ecu pos. 13** Cable code: **ignition +**	Cable colour : **red** Cable Location: **VSI-2.0 ecu pos. 112** Cable code: **+ petrol injectors**

* not available in standard cable harness

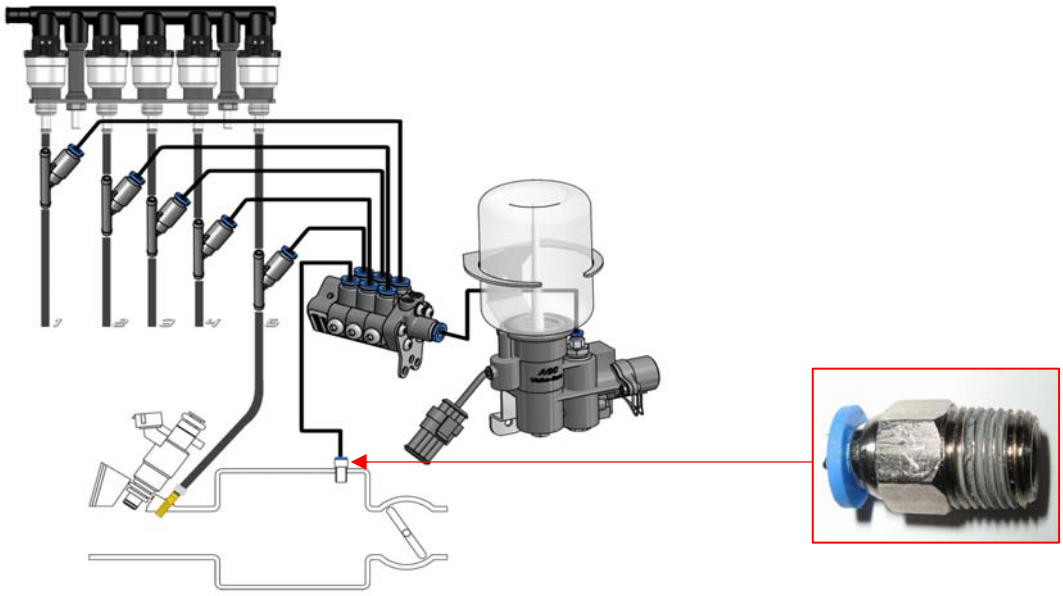
ATTENTION:
Always disconnect the battery (negative side), before making any electrical connections.
Insulate all soldered connections with adhesive shrink sleeves.

Installing the dosing unit



- Mount the unit with the inlet side pointing upwards and make sure that the hose to the dosing pump is as short as possible.
- Cut the hoses between the injectors and the inlet manifold.
  Note: not too close to the injectors!
- Install the Y-pieces between the hoses (see image). Use the right hose clamps to fix the hoses.
- Connect the 4mm nylon hose of the dosing unit to the Y-pieces.

ATTENTION:
The dosing unit will not work properly if any of its outlets is plugged or blocked! In case of a 3 - or 5 cylinder application, the 4th or 6th output must be connected to a central location on the inlet manifold. Use the quick connector that comes with the set.



Installing the ValveCare software

Special tools and the ValveCare software are required for commissioning (adjusting and bleeding) the ValveCare system.

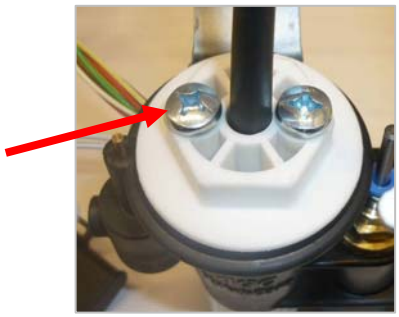
- Install the ValveCare software 1.5.3 (required for the L2 additive) which can be downloaded on the Prins website.
- ValveCare software upgrades can be downloaded on the Prins website.
- The **"ValveCare Wizard"** program will guide you to set the proper parameters.

ATTENTION:
Before proceeding first check the VSI-I ECU software for updates. The minimum required software version is S2.12r or higher. If the software must be updated use the diagnostic program and the Break Out Box.

Commissioning ValveCare

If you do not have a factory-vented ValveCare pump, refer to the venting procedure (see previous manual version).

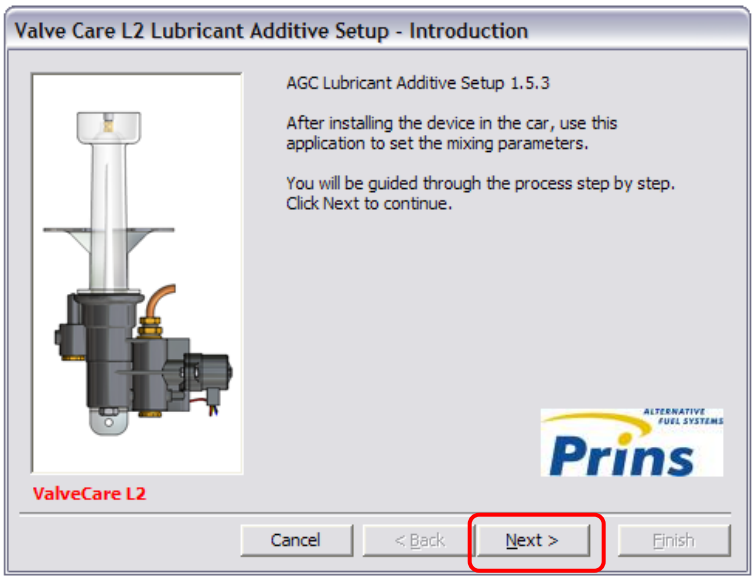
- Remove one screws on the cap.



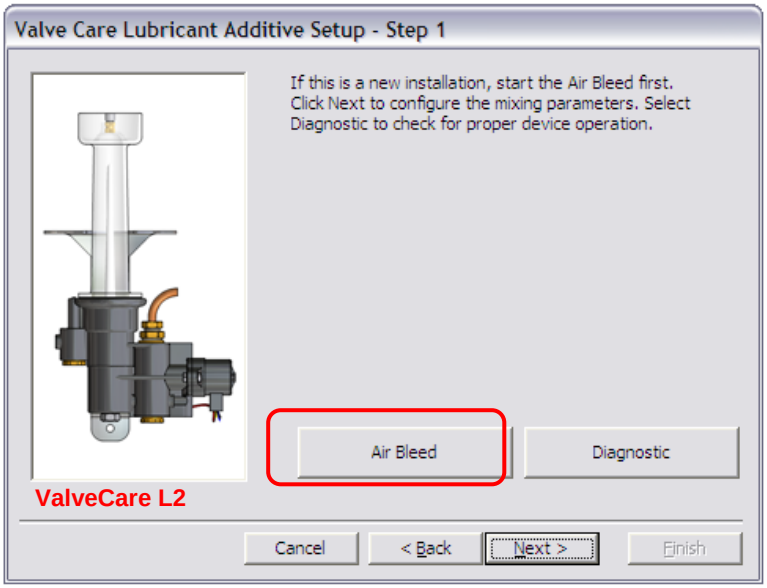
Software Wizard

The following steps of the ValveCare wizard will help you to bleed and adjust the system.

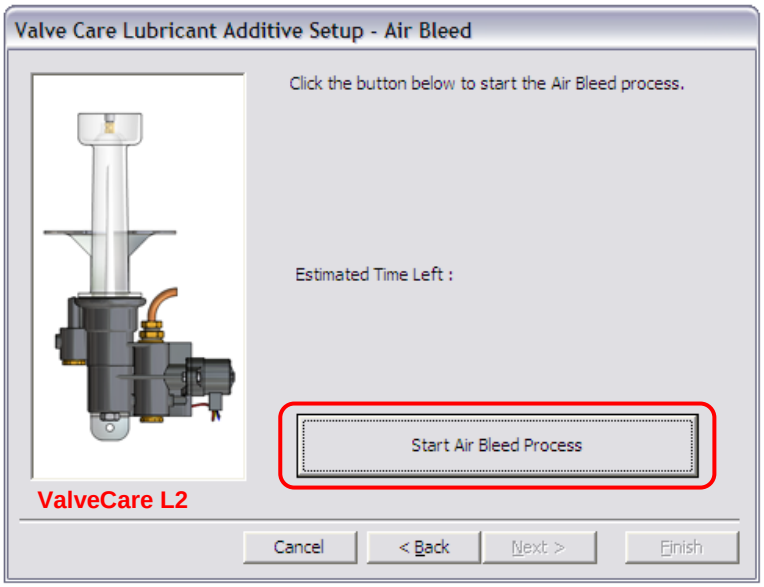
- Start the **"AGC ValveCare Wizard 1.5.3"** program.



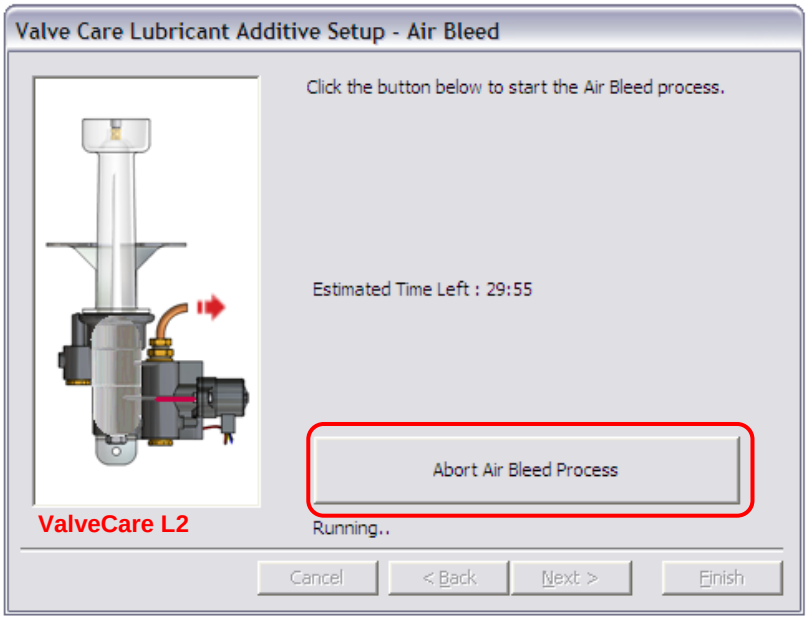
- Click **"Next"**.
- First select **"Air Bleed".**

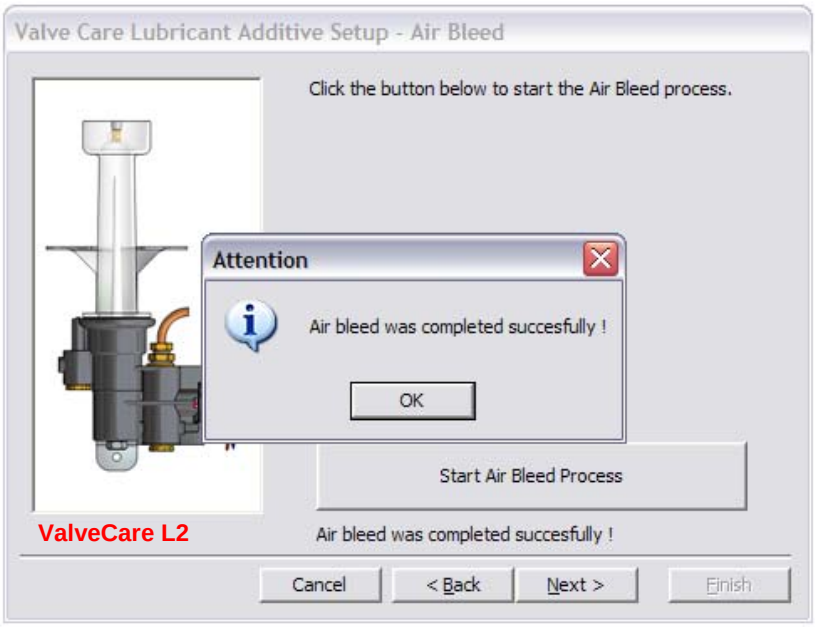


- Remove the hose at the entrance to the dosing unit.
  Tip! Catch the ValveCare liquid in a basin.
- Start the bleeding process by clicking the button: **"Start Air Bleed Process"**

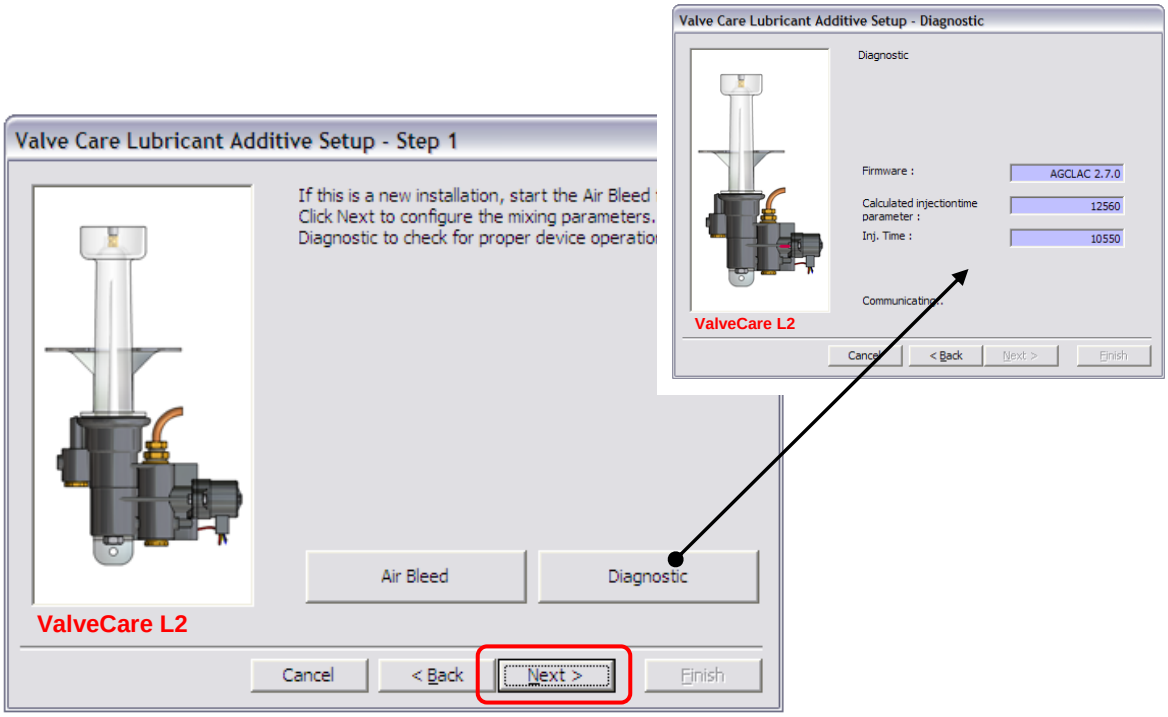


- If the ValveCare fluid reaches the basin, the system is air bleeded.
- Connect the nylon hose into the dosing unit and disconnect one of the hoses from any of the Y pieces. ValveCare fluid has to come out again. If this happens, everything works properly and the bleeding process can be terminated.
- You can stop the bleeding process by selecting the **"stop air Bleed Process"** or feed the pressure very slowly and controlled until the fluid starts to drop. Maintain doing this until the fluid is dropped to a minimum level and the program indicates that the bleeding process is finalized.



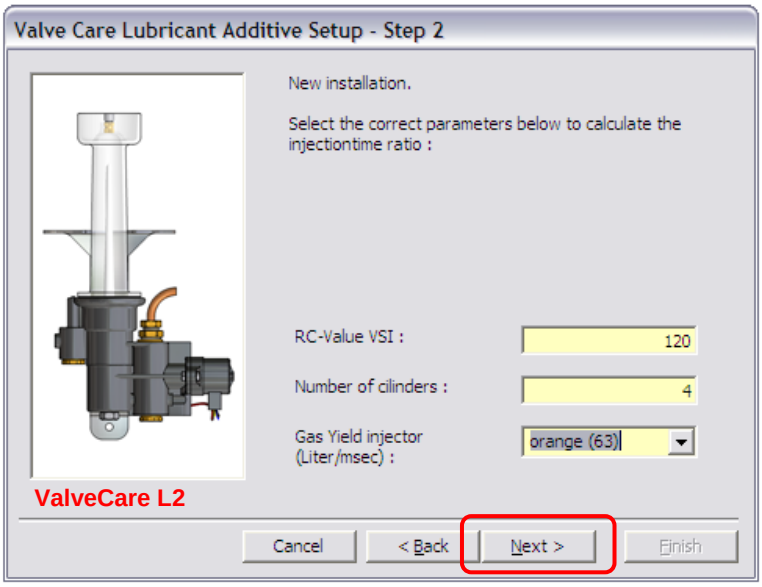


- Remove the protection cover from the factory bleeded pump.
- Place a new L2 ValveCare bottle.
- Then select the **"Next"** button for the proper settings.
- The previously programmed parameters can be read by pressing **"Diagnostic".**



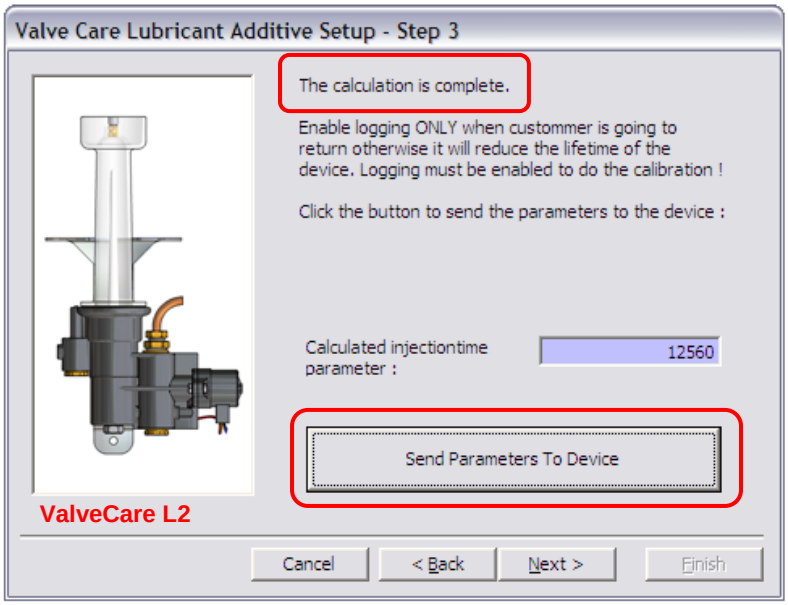
Fill in the following fields:

- **RC value**. The RC value can be read by using the VSI diagnostic software (parameter 3).
- **Number of cylinders.**
- **Injector colour.**

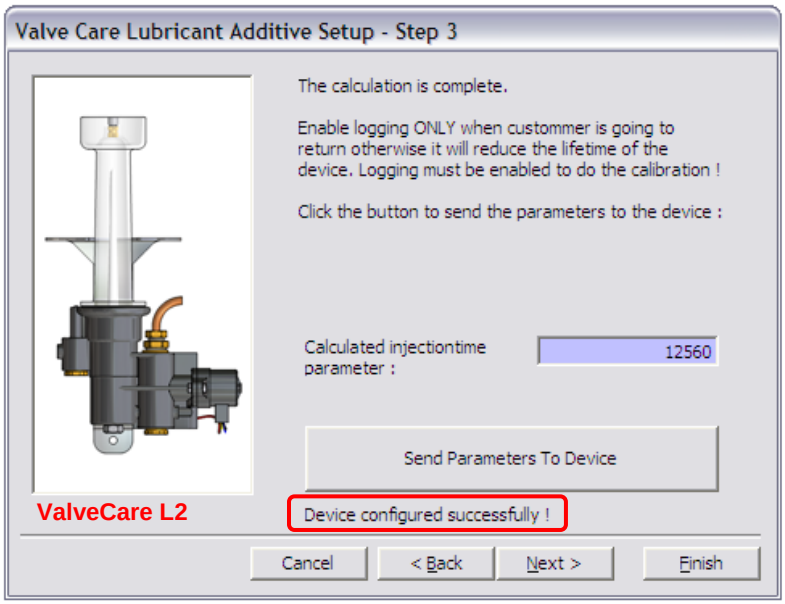


- By clicking the **"Next"** button, the ValveCare unit will calculate the correct amount of ValveCare fluid (indicated in: injection time per additive dosage).

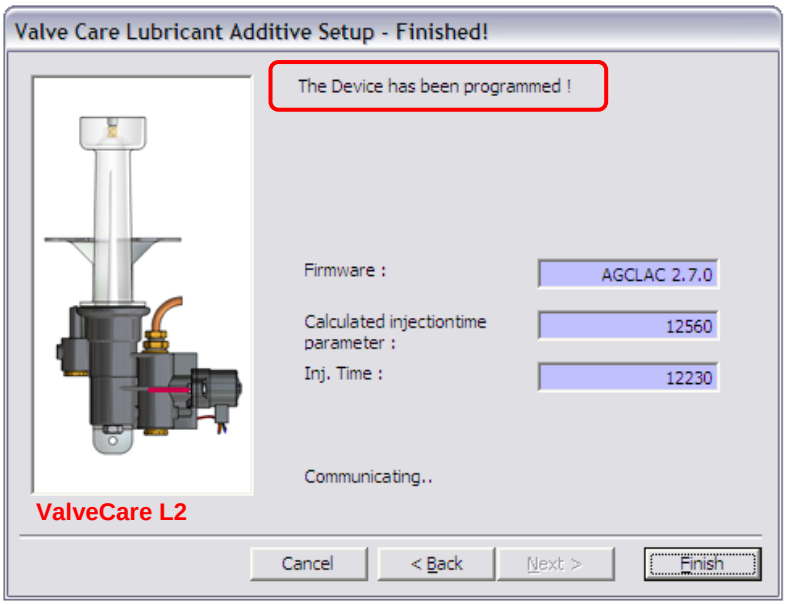
- Then click the **"Send Parameters To Device"** button to save the calibration.



- The software will show a message on screen when the process is completed successfully.



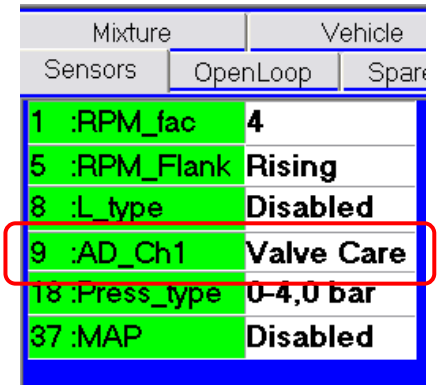
- Click **"Next"** to continue. ValveCare is now programmed.

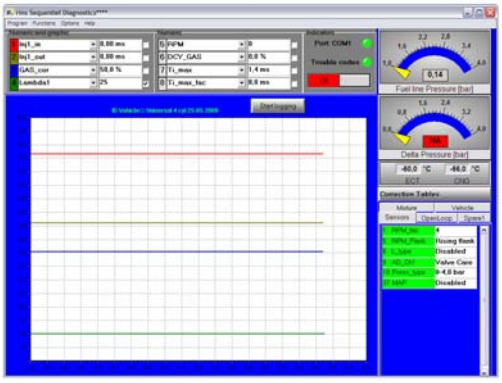


- Start the engine and switch the system over to LPG/CNG. The Inj. Time value must run up to the adjusted value and further starts recounting at 0. There also must be a drop of ValveCare fluid come out of the nylon hose now. If this happens the system operates properly.
- Reconnect the nylon hose to the dosing unit.
- Disconnect the ValveCare interface.
- Check visually the leak-tightness of the ValveCare system while running on LPG/CNG.

Changing parameter VSI-I program

- After ValveCare is installed, parameter 9 of the VSI diagnostic program has to be changed to “ValveCare (10)”.





Changing parameter VSI-2.0 program

Once ValveCare is installed the used AD input channel must be programmed for ValveCare.

Installing a new additive refill

- Only remove the ValveCare refill when it is completely empty (to avoid spillage and incorrect additive consumption trouble codes).
- Remove the cap from the new refill and place the bottle upside down with the foil side centred against the protruding pin (bottle-opener). Make sure the foil is clean. See illustration 5.
- Push the pin through the foil and push the bottle smoothly down to the screw thread. Then screw the bottle onto the screw thread (approximately 3 complete rotations). **Never move the bottle back upwards because of leaks/spillage.**

Attention:
Always work with clean parts. Dirt/contamination may damage the ValveCare pump.

Maintenance

ValveCare is a maintenance-friendly system. Only consider the following points:

- In case of malfunctions, contact an authorized ValveCare dealer immediately.
- Keep the equipment clean.
- Visually check the additive consumption. The system will monitor the additive consumption as well. In case of abnormalities, a trouble code will be generated and the client will have to contact an authorized dealer.
- Only replace the ValveCare refill when it is completely empty. Premature replacement may wrongly generate a (inactive) trouble code.

Troubleshooting

Only competent and qualified persons are allowed to maintain and repair the dosing system and peripheral equipment.

Malfunction	Possible cause	Solution
Dosing device shows no or insufficient flow rate	Air in pump housing	Bleed the pump on discharge side (see "Bleeding" section)
	Contamination in suction valve or discharge valve	
Dosing device is leaking between bottle and pump housing	Faulty sealing	Replace the O-ring
	Refill loose	Lock the refill
Dosing device is leaking on drive motor side	Faulty sealing	Replace complete dosing pump
Dosing pump is leaking on automatic bleeder side	Contamination in bleeder valve	Clean the bleeder valve

Fault codes VSI system

Code	Description	Indication	Explanation	Release
370	ValveCare bottle empty	3 beeps every 2 minutes, after 1 hour 3 beeps repeatedly and petrol mode	The ValveCare bottle is empty. The driver can drive for 1 more hour on LPG. After this, it will be no longer possible to drive on LPG and the car will switch back to petrol mode. After replacing the bottle, you can switch back to LPG mode.	>S112 >S212
371	ValveCare pump flow rate too low	Only visible in VSI diagnostic software	The ValveCare unit dosage is insufficient. This trouble code will be generated when the bottle is emptied within 100 operating hours in LPG mode. Check the pump operation of the ValveCare unit and verify if the ValveCare unit settings are correct.	>S112 >S212
380	General ValveCare error	- Petrol mode -Beeper 0.5 Hz	Check if the ValveCare system diagnostic cable is connected properly to the VSI system. Check whether the pump receives any supply voltage.	>S112 >S212
381	ValveCare pump flow rate too high	- Petrol mode -Beeper 0.5 Hz	The ValveCare bottle is emptied too fast. This trouble code will be generated when the bottle is emptied within 5 operating hours in LPG mode. Check the correct settings of the ValveCare unit and replace the ValveCare bottle.	>S112 >S212

Fault codes VSI 2.0 systeem

Code	discription	Indication	Explanation
89	ValveCare bottle empty	-LPG mode -Diagnostic LED flashes blue!	The ValveCare bottle is empty. The driver can drive for 1 more hour on LPG. After this, it will be no longer possible to drive on LPG and the car will switch back to petrol mode. After replacing the bottle, you can switch back to LPG mode.
91	ValveCare pump flow rate too low	-Petrol mode -Diagnostic LED on	The ValveCare unit dosage is insufficient. This trouble code will be generated when the bottle is not emptied within 200 operating hours in LPG mode. Check the pump operation of the ValveCare unit and verify if the ValveCare unit settings are correct.
90	ValveCare pump error	-Petrol mode -Diagnostic LED on	Check supply, ground and diagnostic wire of the pump.
92	ValveCare pump flow rate too high	-Petrol mode -Diagnostic LED on	The ValveCare bottle is emptied too fast. This trouble code will be generated when the bottle is emptied within 5 operating hours in LPG mode. Check the correct settings of the ValveCare unit and replace the ValveCare bottle.
93	ValveCare lost communication	-Petrol mode -Diagnostic LED on	Check supply, ground and diagnostic wire of the pump.