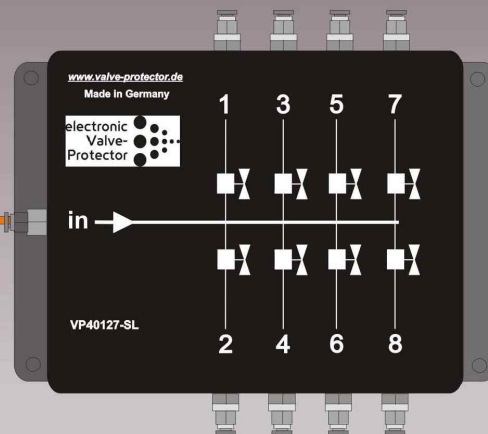


electronically controlled-Dosingsystem

electronic
Valve-
Protector

Version
Sequent-Light



Technical Manual

Installation Instructions
Safety Notices
Programming
Operation

Congratulations

We congratulate you on your purchase of this electronic additive dosing system
“electronic Valve Protector sequent light Kit”
of high quality and thank you for your trust.

Using this dosing system in combination with a suitable valve protection
additive can significantly reduce the wear of engine parts.

We recommend you read through these operating instructions carefully
before putting this device into operation. Please observe all safety notes and
all instructions on use, connection and settings.

Note

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Use only original replacement parts and accessories.

We are also not liable for any consequential damages or loss resulting
from use of this product.

<p>SI-Elektronik GmbH Max-Planck-Straße 5 D-63477 Maintal</p>
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Table of contents

Table of contents	3
Introduction	4
Intended use:	4
Use in vehicles with gas engines	4
The correct dosage	4
How does the Valve Protector sequent work?	5
1. Amount calculation by gas valve control times	5
2. Amount calculation based on revolutions	5
The additive in-feed:	6
The additive tank.....	6
The dosing unit with sequential distributor.....	7
Installation and commissioning	8
User instructions	10
The electrical connection	11
6 pin connector:	11
Connection instruction for inside LED:.....	11
More information:	11
Wiring /Connection and System overview	12
Quick start instructions – Amount setting.....	13
Display of LED built-in module.....	13
Display of LED to be installed in passenger area	13
Safety instructions.....	14
Technical Data:	15

Introduction

Intended use:

Elektronik Valve sequent light is an electronically controlled dosing unit consisting of the following components:

1. Additive tank incl. level sensor
2. Electronically controlled dosing module incl. wiring harness
3. In-feed connections
4. PA tube

Check kit for completeness when unpacking.

The intended use is the dosing of appropriate and approved additives for combustion engines.

Valve Protector sequent light has been developed on the basis of the applicable safety guidelines and built for use in European countries.

The electronic additive dosing system **Valve Protector sequential light** allows a consumption-dependent adding of additives or lubricants, which counteract wear of engine components.

Use in vehicles with gas engines

In order to protect the respective components, vehicles with non gas-tight cylinder heads and valves or valve seats require the adding of appropriate valve protection additives into the combustion chamber via a dosing device. The optimal input, as well as the distribution of the additive is particularly important here. The recommended amount of additive is usually indicated by the additive manufacturers in thousands per gas amount consumed. (Please see specifications by your additive manufacturer.) The correct additive dosage and the reliable supply to the relevant motor components in combination with an appropriate additive are crucial for the effectiveness. The time required for the particular dosage can be adjusted.

The correct dosage

Example for 1 ‰ :

If your vehicle has a gas consumption of 100 litres of gas for a distance of 1,000 km, then the optimum amount of additive is 100 ml.

Therefore, in this example, you require 500 ml of additive for a distance of 5,000 km. (10 litres of gas consumption is equal to 100 km)

This means the additive consumption is approximately linear in proportion to the gas consumption.

The calculation shown here is just an example and applies to a dosage of 1 ‰. Be sure to note the dosage instructions of your additive manufacturer.

The Valve Protector sequent light offers the following features:

1. Consumption-based additive admixture
2. Gas components are not affected by additive
3. Good regulation of dosage at correct settings
4. Good additive distribution by sequential infeed
5. Level monitoring of the additive tank inc. LED-empty warning message
6. Safety shutdown of the gas system when additive tank is empty.
7. Easy installation using plug-in system
8. Additive consumption only when needed
9. Easy refilling of the additive tank
10. Also suitable for retrofitting
11. All system seals made from high-quality FKM
12. Low cost of purchase

How does the Valve Protector sequent light work?

The system consists of an additive tank and an additive dosing unit with inbuilt electronic controller. To calculate the required amount of additive, the gas nozzle control times or the number of revolutions can be used. As standard the system is set to capture the gas valve control times.

1. Amount calculation by gas valve control times

In operation mode (injection time) the precise dosage of the additive is achieved in relation to the fuel consumed.

To calculate the required amount of additive, the gas nozzle control times are used. Via the control input (purple conductor), the control times of any gas nozzle are measured and then calculated and fed in according to quantity setting.

The longer the nozzles are open, the more additive is fed in.

As the dosing system is only provided with power once the gas system is active, no unnecessary additive is fed in during petrol operation.

Due to the selective infeed, all combustion chambers are supplied with the additive.

Changes in viscosity of the additive used due to temperature can be adjusted by adjusting the quantity level.

2. Amount calculation based on revolutions

In the operating mode (revolutions), which has been developed for engines without electronic fuel injection, this mode offers the best alternative for the calculation of additive dosages.

The revolution impulses from an ignition coil or an appropriate sensor can be measured via the control input of the Valve Protector module (purple). The higher the revolutions, the more additive is injected. As the dosing system only starts working once the gas system is active, no unnecessary additive is fed in during petrol operation.

The in-built microprocessor in the dosing module adds up the revolution impulses until the set dosage threshold is achieved. Thereafter, an additive shock is triggered and the dosage calculator is reset to zero. Through the selective infeed, all combustion chambers are supplied with the additive. Changing the dosage module to the revolution dosage mode is performed by holding down the chrome ring for longer than 30 seconds following a restart, until the yellow LED flashes twice. Changes in viscosity of the additive used due to temperature can be adjusted by adjusting the quantity level.

The additive in-feed:

The in-feed of the additive is performed sequentially for each individual cylinder. This has the great advantage that all cylinders are supplied with the correct amount of additive. The in-feed of the additive is performed via an M5 in-feed nozzle with quick plug connector into the intake manifold. (Suitable for all gas installations)



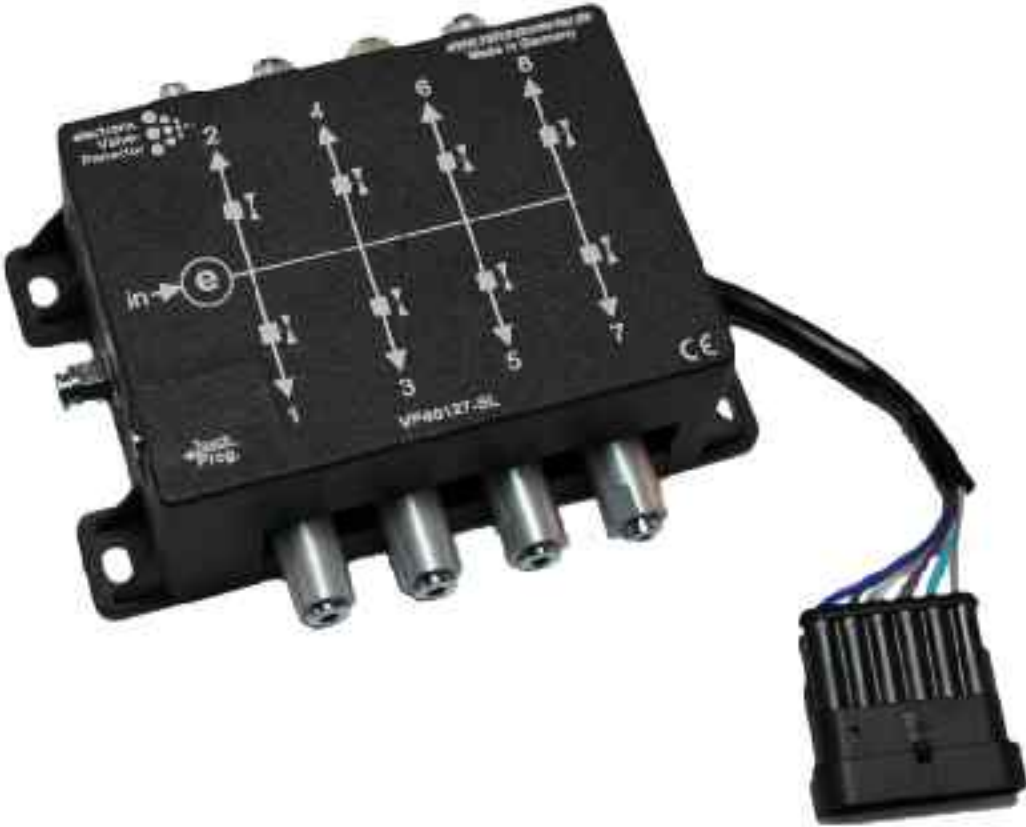
The additive tank

The additive tank holds about 600 ml of additive and is equipped with a level sensor. This warns you in time when the additive needs to be refilled. The tank design allows for easy and safe installation. The tube is connected via the rotating push-in fitting. Dosage of the additive can be checked easily by means of the print on the tank. The tank can easily be refilled without a funnel thanks to the large screw cap. Since the additive tank requires a ventilation hole, which is located above the threaded fastener, the 600 ml mark should not be overfilled to avoid spilling of additive during driving.



The dosing unit with sequential distributor

The dosing unit is available as a 4, 6 and 8-cylinder model and fully moulded in a compact PA6 housing including the controller board. There are no specifications regarding the installation position.



Installation and commissioning

1. Attach the additive tank to an accessible, cool location on the body. During installation, ensure a solid, vibration-free and horizontal mounting and that the connection on the base of the tank are accessible and not bent. As the additive tank needs to be refilled by the end customer, easy accessibility of the lid and the easy and safe filling of the additive must be ensured. **The maximum ambient temperature for the additive tank should not exceed 80 degrees. Keep a distance of at least 200 mm from the exhaust manifold and the down pipe.** When handing over the vehicle, inform the customer about the required controls such as checking of the additive level, usage control and leak testing.
2. Attach the dosage module to an accessible, cool location on the body. Installation can be in any orientation. When installing, ensure a solid, vibration-free mounting and that the connections socket and the status LED are freely accessible. **The maximum ambient temperature for the dosage should not exceed 80 degrees. Keep a distance of at least 200 mm from the exhaust manifold and the down pipe.**
3. Connect the tank and the input of the dosing module with the PA tube (4x2.7). Adjust the tube to fit from the outlet of the tank to the input of the module and plug it in. (Caution do not bend tube, avoid curves with a radius smaller than 5cm, only cut with suitable tubing cutter, max. length of one metre may not be exceeded and the PA tube may not be installed in the direct air flow). The straight cut tube must be inserted approx. 12 mm into the push-in plugs. When detaching the tube, the ring must be pressed against the quick push in plug and the tube can be pulled out.
Attention! When the PA tube is pulled out without depressed release ring, irreparable damage to the quick plug connector can occur. Leak proofness of the system is no longer guaranteed.
Attention! Additive can cause damage to rubber and plastic parts. Immediately rinse any spilled additive with lots of water.

4. Additive in-feed into the intake manifold medium M5 threaded sleeve (suitable for all gas installations)
Drill a 4.2 mm hole into the intake manifold on each side of gas injection nozzle. Cut in an M5 thread. Screw in the additive nozzle by using a thread sealant. The length of the thread can be sawed down if necessary. The end of the nozzle should not rest against the wall in the intake manifold.
Attention! No borings may enter the combustion chamber as this can cause considerable damage to the engine.

5. The maximum length of tube per cylinder should not exceed 1,000 mm.
All in-feed tubes must be cut to the same length. To ensure that all cylinders are supplied with additive check the flow through of all PA-tube connections and in-deed nozzles as follows:

Let the motor run briefly and check the end of the tube of each cylinder for underpressure before inserting the PA tube connection into the dosing module. A noticeable sucking of each cylinder at the end of the PA tube must be detected.

6. Now plug the PA tubes into the correct output on the Sequent Modul.
(Attention! Do not bend tube; avoid curves with a radius smaller than 5cm, only cut with suitable tubing cutter, max. length of one metre may not be exceeded and the PA tube may not be installed in the direct air flow).
The straight cut off tube must be inserted approx. 12 mm into the push-in plugs. When detaching the tube, the ring must be pressed against the quick push in plug and the tube can be pulled out.
Attention! When the PA tube is pulled out without depressed release ring, irreparable damage to the quick plug connector can occur. Leak proofness of the system is no longer guaranteed.

7. Now prepare all necessary electrical connections, taking all safety instructions into account. **(See „Electrical connection“)**

8. Now fill the additive tank with a suitable valve protection additive (max 600 ml).
Check the system for leaks.

9. Test run and setting:

Start the vehicle and check the LEDs on the dosing module. If the vehicle runs on petrol, the LED should not light up. After each new switch over to gas operation, the LED should light up for 30 seconds. Carry out cylinder and quantity settings as described in the Quick Start Guide.

Following the completion of the setting, the LED should flash green, which indicates that the gas nozzle control impulses or the revolution impulses are being measured.

If you have checked this function, turn off the ignition and start the engine again. Activate the test run (dosing level 16, see Quick Start Guide). The test run is always active for 1 minute and then automatically goes back to normal operation.

During the test run, all output valves open in sequence and additive should flow into the PA tube intermittently. During the test run, the LED flashes rapidly in the passenger compartment and finally the switching off output is activated. Once the test run has successfully completed and all PA tubes of each cylinder inject additive, the system is installed and ready for use.

In normal operation, when idling, additive dosing will occur approx. every 20-180 seconds, depending on vehicle type. The time until the next additive injection depends on the dosage quantity setting (1-15) and the measured gas nozzle control times or the revolution impulses. Now open the additive tank and gently push down the float level of the level sensor for approx. 10 seconds with a screwdriver. The LED in the module as well as the LED in the passenger compartment should flash red and indicate the additive reserve. When you let the float return back to the top, the message should stop after approx. 10 seconds.

Approx. 100 ml of additive remains, from the start of the additive reserve message until the additive is empty. When the additive has been depleted, the LEDs flash red rapidly. Now the switching off output (white core) also takes away ground. No air bubbles should be detected in the additive supply line between the tank and the dosing module. Air bubble formation following the distributor module towards the in-feed nozzles is normal and is not a fault.

User instructions

After approx. 1,000 kilometres in gas mode, the additive amount used should be checked. If the amount of additive dosed is too high or too low, increase or reduce the dosing level. Furthermore, drops of additive should be seen in all in-feed tubes.

The correct additive consumption and the in-feed into all cylinders must be checked at regular intervals. If you notice a too low consumption of additive, do not continue in gas operation, and have the system checked in a professional workshop.

The specified resistances and fields of application are only "guidelines", and do not release customers from the responsibility of testing for evaluation of the operational capability. Please note that elastomers have a limited service life, e.g. due to ageing. Therefore we recommend regular inspection and replacement intervals.

All information is correct according our latest knowledge. However, we do not warrant the accuracy or completeness of the information.

The electrical connection

Connecting the electronic dosing system is easy.

Set up the following cable connections:

6 pin connector:

1. gray	Additive tank level sensor input (Black conductor from the additive tank level sensor)	level sensor
2. yellow	Led signal output (Red conductor from the LED)	signal output control lamp
3. purple	Control conductor of any Gas injector ** (clocked mass of a gas nozzle)	signal any LPG injector
4. white	open collector output (Switched negative max. 3 A))	output ground by system is running
5. brown	mass	ground
6. red	12 volts for gas operation	12 V at LPG on

** If you want to use dosage calculation by revolutions, clamp this wire to the clocked mass input of an ignition coil and program the module to revolutions.

Connection instruction for inside LED:

The LED signal lamp for indicating that tank is empty is connected with the red wire to the yellow core of the 6 pin plug. The blue wire of the LED is connected to ground.

LED function:		
3x flashes after every reboot (operating indicator)	-	Power on
Slow flashing during operation (every 1 second) (Remaining quantity has reached switching point level sensor of 150 ml)	-	Additive level is low
Quick flashing during operation (every 0.2 seconds) system output switches off	-	Additive empty -

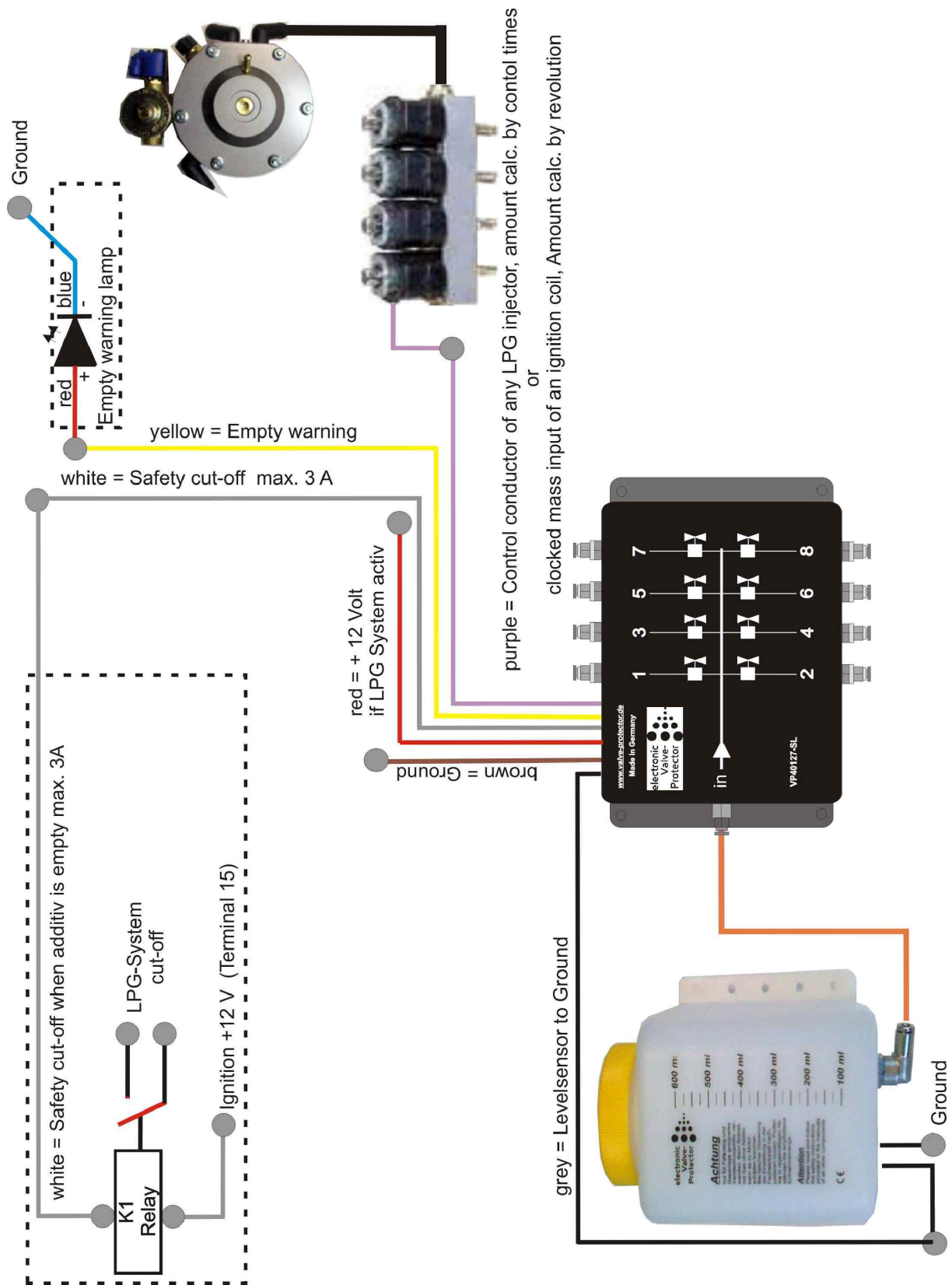
More information:

The level sensor of the additive tank is connected as follows: Core 1 (black) to ground core 2 (black) on the gray wire of the 6-pin plug.

The output for the system shutdown (white) is a switched ground output and can be loaded with up to 3 Amps. It can be used to control a relay or a solenoid coil when, tank release valve, evaporator release valve or similar are used and prevents gas operation with an empty additive tank.

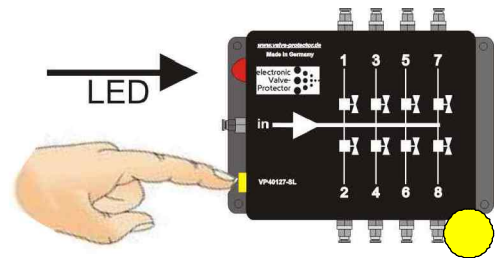
Furthermore, when installing, also adhere to the installation instructions of the respective gas system. The system installation is now complete and can be put into operation.

Wiring /Connection and System overview



Quick start instructions – Amount setting

The Electronic Valve Protector Sequent light module is equipped with a touch sensor (chrome ring). This metallic chrome ring reacts to touch by finger – just like a button. On the left side wall of the module, an LED is installed, which indicates the various functions with three colours (red-green-yellow) (see the following installation instructions).



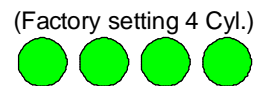
Step 1: Start the vehicle and activate gas operation. The dosing module is now provided with power and remains in Set-up ready mode (LED lights up yellow) for 30 seconds.

Step 2: While the yellow LED is on, touch the metallic chrome ring with your finger until the LED lights up green. Then remove your finger.

Step 3: The LED now flashes x times and indicates the set amount of cylinders. You can set between one and eight cylinders. If e.g. you have a 4 cylinder module and set 3 cylinders, valve no 4 will remain closed. Never set a higher amount of cylinders than your dosing module has valves, as this could result in interruptions of supply.

Step 4: To change the number of cylinders, simply tap on chrome ring with your finger until you have reached the required number or cylinders. The flash display will always show the number of cylinders set. Once level 8 has been reached, counting starts again at 1.

(Factory setting 4 cylinders)



Step 5: Once you have set the required number of cylinders, hold down your finger on the chrome ring until the LED light is red. You are now in the setting menu for dosage level setting.

Step 6: The LED now flashes x times red and displays the set dosage level. There are 15 dosage levels and one level for a quick test run.

(Attention: Do not run test run excessively as otherwise too much additive is fed-in).

Check the guide level table at the end of this page for the correct dosage level for your vehicle. **(Factory setting level 5)**



Step 7: To change the dosage level simply tap on to the chrome ring with your finger until the required dosage level is reached. The flash display always shows the set dosage level. After level 16, counting starts again at level 1.

Step 8: Once you have reached the desired dosage level, (see required number of flashes), touch the tube connection until the LED light is green. The settings are now stored and the module is in operation mode. The module remains in set-up ready mode (LED yellow) following each restart. If during this phase, the chrome ring is not touched, the module automatically changes into working mode (LED green) after 30 seconds. The setting Table is only a guide! The correct dosage must be checked after each installation and adjusted if required.



Display of LED built-in module

LED light is green:	System has operating voltage but is not receiving control impulses from the gas injector.
LED flashes green:	System has operating voltage and is receiving control impulses from the gas injector (operating mode)
LED slowly flashes red (every second):	no input from level sensor into additive tank
LED quickly flashes red (every 0.25 sec.):	additive depleted
LED flashes yellow (every 0.5 sec.):	additive is being injected

Display of LED to be installed in passenger area

LED flashes 3 times for operation control.	power on control
LED flashes slowly (every second):	remaining additive level reserve approx. 100 ml
LED flashes quickly (every 0.25 sec.):	additive depleted.

Guide level table for base amount setting

Level	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Engine capacity in	30	40	50	60	70	80	90	100	115	130	150	180	210	240	270	Test
Engine capacity in PS	41	54	68	82	95	109	122	136	156	177	204	245	286	326	367	Test

Safety instructions

Intended use:

Valve Protector sequent light is an electronically controlled dosage unit consisting of the following components:

1. Additive tank, 2. Electronic controlled dosage module, 3. Discharge connection, 4. PA tube

The intended use is the dosing of appropriate and approved additives for combustion engines.

Valve Protector sequent light has been developed and built on the basis of the applicable safety guidelines.

Only use according to the following criteria:

1. Perfect technical condition
2. After careful leak testing
3. After installation and commissioning by a specialist
4. Only use for intended use
5. Non-compliance with safety instructions can lead to injury of persons or damage to material
6. Electric wires and additive cables must always be installed in such a way that damage is excluded and no friction occurs
7. Observe additive manufacturer's safety instructions
8. Check material compatibility of additives in conjunction with perfused components
9. Check that dosage is correct at regular intervals
10. Have system checked by a specialist workshop in case of under or over dosage
11. Driving with incorrect dosage can cause damage to your engine or exhaust system
12. Rinse any spilled additive with lots of water
13. Refill additive when additive level is low
14. Do not fill above the upper filling line
15. Never mix different additives
16. Only use permitted and approved additives
17. In case of use of unapproved additives, your vehicle type approval may lapse
18. Only use original spare parts
19. The specified resistances and fields of application are only "guidelines", and do not release customers from the responsibility of testing for evaluation of the operational capability. Please note that elastomers have a limited service life, e.g. due to ageing. Therefore, we recommend regular inspection and replacement intervals. All information is correct to the best of our knowledge. However, we do not guarantee the accuracy or completeness of the information.
20. The warranty is 24 months. The warranty will become void in the case of non-compliance with intended use of the device, in the case of operation outside of the technical specification, in the case of a non permitted additive being used or in case of improper use or external intervention. No liability is accepted for damages resulting thereof. The exclusion of liability extends to any services that are made by third parties which were not commissioned by us in writing.

Technical Data:

Power supply:	12V DC (10V–15V)
Current draw:	Idle 30 mA , Injektor stroke up to 6 A
Weight:	1050 g
Dimensions L/W/H:	145 mm x 125 mm x 56 mm
Device installation orientation:	Any
Temperature range:	-20/+85°C
Protection class:	IP54
Sealing materials:	FKM (Viton) / Elastomer with high temperature and weathering resistance. Suitable for many acids, bases, fuels and oils (including synthetic).

EC Declaration of Conformity

pursuant to
Annex I to the EC Directive
on Electromagnetic Compatibility
2004/108/EC
SI-Elektronik GmbH declares that
Product name: Valve Protector Sequential
Type: VP40127-SL
Year of manufacture: 2011
conforms to the regulations of the abovementioned EC Guidelines.

10.08.2011 Ralf Euler, Ronald Malkmus - Geschäftsführer
(Datum) (Name, Stellung im Betrieb)

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