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# Installation manual

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## SmartGas 2

2990040000

BEVER CAR PRODUCTS



Innovative in adapted motoring

## 1 Installation

Ensure there is no electrical power on the vehicle while making electrical connections. Follow the instructions of the car manufacturer to avoid interference.

Create robust solder joints and insulate all connections.

Follow the instructions below.

### 1.1 Control units

Mount the control unit in a suitable place. Consider the following points:

- Place the control unit does not directly in front of the outlet opening of the heater.
- Use the mounting frame. This may be drilled in or welded on.
- When the alternative control is connected via SmartBrake, "PWM A" and "PWM B" are connected to SmartBrake. The length of the PWM cabling 0.6 (SmartGas) + 0.4 (SmartBrake) = 1.0 meters.
- The length of the wiring to the accelerator pedal is 1.5 meters.

### 1.2 Wiring harness

Put the wiring harness into the vehicle. See both the wiring diagram in this manual and the wiring diagram in the car-specific installation manual.

It is described in the car-specific wiring diagram how the connections must be made from the accelerator pedal, the brake light switch, +30 and +15.

When the gas-brake security is completely deactivated, see paragraph 2.5 of this manual, the brake light signal does not have to be connected.

The branch-offs +30 and +15 must always be fused. Use fuses of 5 A.

The ground wire may be connected directly to the chassis.

### 1.3 Lamp

Mount the warning lamp on the dashboard. Choose a position that is clearly visible for the driver.

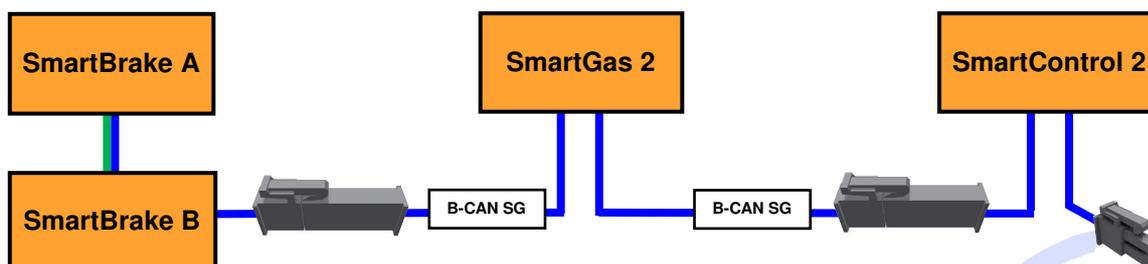
When a SmartBrake is to be installed, the user interface replaces this lamp.



### 1.4 B-Can

All systems of Bever Car Products that support B-CAN can be connected to each other. With B-CAN, it is possible to perform diagnosis on all systems via a single USB connection.

In the wiring harness there are two connections labelled 'B-CAN SG'. These can be connected to the other products. A chain can be constructed this way. SmartBrake has only one connection and is therefore always the end of the chain. The order of the products is not important. There will always be an unused plug at the other end of the chain.



## 1.5 USB

Through the USB a laptop can be connected for calibration and diagnostics. If SmartGas 2 is connected to the B-CAN network, the laptop can also make connection with other systems via the SmartGas 2. In most cases, the USB connector of SmartBrake is best reached.

To connect to the laptop through the USB connection, software must be installed. Download 'setup BCP Portal Website [www.bevercarproducts.nl/en/prog-downloads](http://www.bevercarproducts.nl/en/prog-downloads)'.

## 1.6 Selection Switch (optional)

By default, the selection method is set to "first operated" This means that the system responds to the input device that is operated first after the ignition is switched on. The remaining input devices are ignored.

When the selection method is 'selection by switch' a selection switch is needed. This allows the driver to specify which input device should respond. The remaining input devices are ignored. It is now possible to change during a drive operation. Mount the switch in such a place that the possibility of accidental switching is very low.

When 'Instructor gas' is configured as "Extra Alternative', a 3-way switch must be used. Otherwise, a 2-position switch is sufficient.

- Do not connect the purple and brown wire if 'Original' is to be selected.
- Connect the purple and brown wire if 'Alternative' is to be selected.
- Connect the purple and brown wire via a 10kOhm resistor if 'Extra Alternative' is to be selected.

When SmartGas2 (software version 1.3.0 or newer) and SmartBrake (software version 1.4.0 or newer) are connected through B-CAN, SmartGas2 automatically follows the SmartBrake state. When SmartBrake is put in the 'sleep-mode' (driving with OEM pedals), SmartGas2 only reacts to the OEM gas pedal.

## 1.7 Alternate operation

There are two types of controls:

### Combined inputs

On a combined input, gas and brakes are controlled with the same lever. For example, a gas / brake slide or a 2-way joystick. The input device is connected to the brake system. The brake system sends the desired gas input position in a PWM signal to SmartGas 2.

Insert the plugs 'PWM A' and 'PWM B' on SmartBrake or joystick. The plugs 'Alternative 1 SG' and 'Alternative 2 SG' are not used.

### Separate inputs

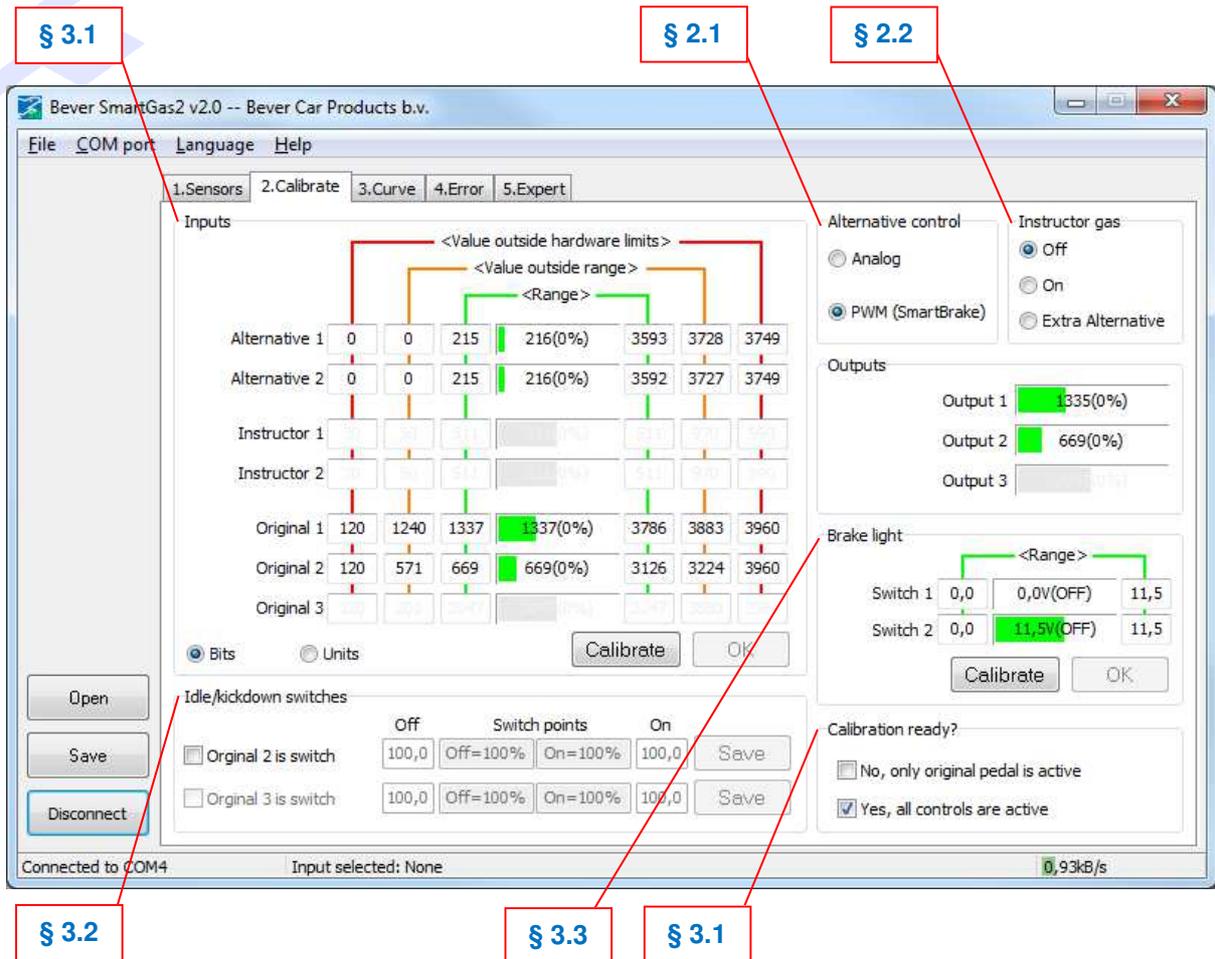
In a separate input, the gas and brake operation are separated and the throttle is connected directly to SmartGas 2. The gas input is a "Gas Sensor Unit (GSU), that allows mechanical connection to a customer-specific control. Also, a rocker pedal or handlebar-throttle can be connected.

Connect the plugs 'Alternative 1 SG' and 'Alternative 2 SG' to the GSU. The plugs 'PWM A' and 'PWM B' are not used.

## 2 Configuration

When the system is turned on for the first time, the system must be configured and calibrated. This is done with the help of a laptop.

1. Start 'BCP Portal'.
2. Choose 'SmartGas 2'.
3. Connect the USB cable.
4. Turn on the ignition.
5. Click 'Connect'.



### 2.1 Alternative control

Select which input type is used for the alternative inputs. Select 'Analog (GSU)' when separate gas and brake inputs are used. Choose 'PWM (Smart Brake)' when combined gas and brake sensors are connected to SmartBrake or joystick.

### 2.2 Instructor gas

The standard wiring harness has no connections for the instructor gas. Contact Bever Car Products for more information on the extended version of the wiring harness. Select how SmartGas should react to the input connected to instructor gas:

- 'Off': The input is ignored.
- 'On': The output follows the instructor input whenever it is operated. The selected input (original or alternative) will be ignored.
- 'Extra alternative': The input is seen as a second alternative input.

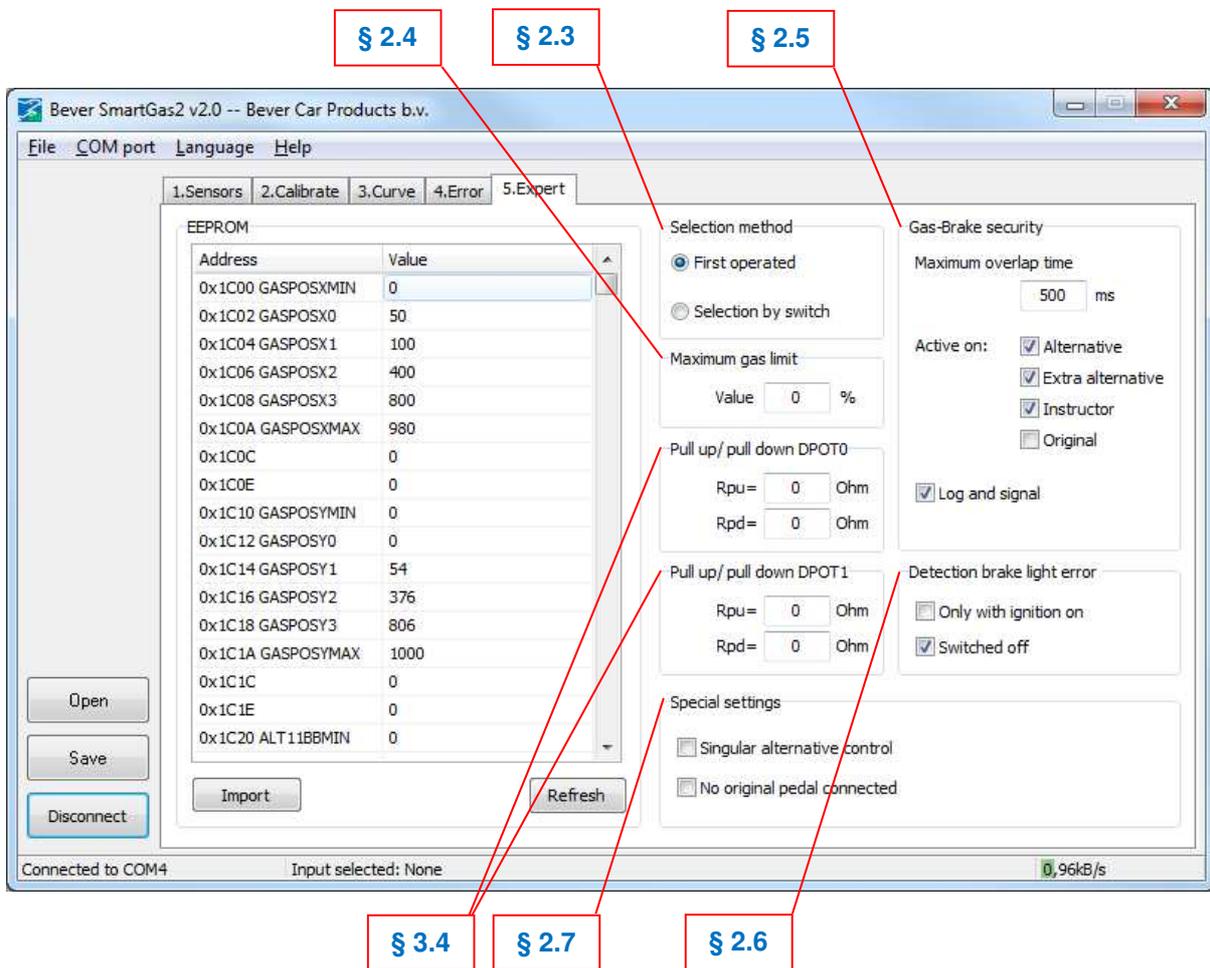
### 2.3 Selection Method

By default, the selection method is set to 'First operated'. The output reacts to the input that was used first after switching on the ignition, the other input will be ignored.

When "Selection by switch" is active, SmartGas will react to the input that is selected with the switch. If the status of the switch changes, all inputs must first return to the idle position before the new selection takes effect. This can be done while driving.

### 2.4 Maximum gas limit

When certain faults occur, the output can be limited. Use 'Value' in the box 'Maximum gas limit' to set the maximum amount of throttle that is available when a limit is active. A higher value means more throttle. When the value is set to zero, the output is not limited. By default, the limit is set to 0%. Change this if necessary.



The screenshot shows the 'Expert' tab of the Bever SmartGas2 v2.0 software. The interface includes an EEPROM table, a 'Selection method' section, a 'Maximum gas limit' section, 'Gas-Brake security' settings, and 'Special settings'.

Callouts point to the following sections:

- § 2.4: Points to the 'Maximum gas limit' section.
- § 2.3: Points to the 'Selection method' section.
- § 2.5: Points to the 'Gas-Brake security' section.
- § 3.4: Points to the 'EEPROM' table.
- § 2.7: Points to the 'Pull up/pull down DPOT0' section.
- § 2.6: Points to the 'Special settings' section.

Address	Value
0x1C00 GASPOXMIN	0
0x1C02 GASPOX0	50
0x1C04 GASPOX1	100
0x1C06 GASPOX2	400
0x1C08 GASPOX3	800
0x1C0A GASPOXMAX	980
0x1C0C	0
0x1C0E	0
0x1C10 GASPOSYMIN	0
0x1C12 GASPOSY0	0
0x1C14 GASPOSY1	54
0x1C16 GASPOSY2	376
0x1C18 GASPOSY3	806
0x1C1A GASPOSYMAX	1000
0x1C1C	0
0x1C1E	0
0x1C20 ALT11BBMIN	0

## 2.5 Gas / brake overlap

If the gas input is active while the brake light switch is also active, the gas output will drop to idle. The output will only react again when the brake light switch has become inactive and the gas input has been in the idle position.

However, if both signals were active simultaneously for a shorter time than the value of 'Maximum overlap time', the gas input does not have to go to the idle position before the output reacts again. This allows a quick change from braking to accelerating.

Select for which inputs the gas-brake security has to be active at 'Active on:'. The gas-brake security is needed when a driver can operate gas and brake simultaneously. For instance on a handlebar with a gas lever on the left-hand side and brake lever on the right-hand side. The gas-brake security is not needed with a Slide or Stick.

When no inputs are selected, the brake light test is skipped at start-up. This means that the connecting to the brake light switch does not have to be made.

If needed, unselect 'Log and signal' to stop logging and signalling when the gas-brake security is activated. By default, the function is on.

## 2.6 Detection brake light error

In some cars, the power of the brake light switch switches off when the ignition is turned off. SmartGas may detect a brake light error. Check the box 'Only active with ignition on' to ignore the brake light error when the ignition is off.

When 'Switched off' is selected, a brake light error will no longer be detected. By default this function is selected.

## 2.7 Special settings

Activate the function 'Singular alternative control' when a control is connected that only has one sensor. The system only looks at the sensor connected to 'Alternative 1 SG'. This only works for analog controls and not for the PWM (SmartBrake) inputs.

Select 'No original pedal connected' when the original pedal has to be removed. The pedal is required to do a first calibration. Make sure that the values are stored so they can be entered by hand when a new calibration has to be done later. For instance after a software update or after replacing the control box.

## 2.8 User manual

Fill in the table in chapter 5 of the user manual to tell the user how his SmartGas 2 is configured.

## 3 Calibration

Depending on the vehicle, a number of inputs must be calibrated: The sensors of the original pedal and the alternative inputs, idle and / or kick-down switches and the brake light.

### 3.1 Original pedal and alternative input(s)

**Attention!** When the PWM input (combined control) is used, it must **first** be calibrated in the brake system (Smart Brake or joysteer). Then SmartGas 2 can be calibrated.

The original pedal, the alternative input and the instructor gas can be calibrated in a single procedure. It is also possible to calibrate them separately. Follow the procedure and skip steps 3, 4 or 5, if the corresponding input is not to be calibrated.

1. Put all inputs in the idle position.
2. Click on 'Calibrate' in the box 'Inputs'.
3. Operate the original pedal completely and release it after two seconds.
4. Operate the alternative input completely and release it after two seconds.
5. If needed, operate the instructor gas completely and release it after two seconds.
6. Click 'OK'. The system will show which inputs were calibrated.
7. Select 'Yes, all controls are active' in the box 'Calibration ready?'.

### 3.2 Idle / kickdown switches

Check the car-specific instructions to see if it is necessary to calibrate idle and or kick-down switches.

The switching points are related to the value of 'Original1'. The middle columns show the switching points which were measured the last time the switch was operated. Every time the pedal is fully operated, these values will be updated. When you click 'Save' the value will be copied to the outer columns. These are the values that SmartGas uses to simulate the switch when driving with the alternative inputs.

Switching 'on' occurs at a slightly higher value than 'off'. This hysteresis ensures that the outputs will not stand to chatter.

1. Check the boxes of the signals that are switches.
2. Slowly operate the original pedal completely and slowly release it.
3. Click 'Save'.

### 3.3 Brake light

The two wires measure the voltage on the brake light switch. The voltage levels during braking and non-braking must be calibrated.

1. Do not operate the brake.
2. Click 'Calibration' in the box 'Brake light'.
3. Operate the brake pedal so that the brake lights go on and release it after two seconds.
4. Click "OK."

### 3.4 Resistors

In some cars, a correction must be made to the calculated output level. For this, SmartGas must know the value of the pull-up or pull-down resistor in the electronics of the vehicle. Look at the car specific manual which values must be entered here. Enter "0" if nothing is written about these resistors in the car specific manual.

## 4 Adjustment

The system can be adjusted to customers requirements.

### 4.1 Curve

In the graph, the relation between the position of the alternative control (horizontal axis) and the output (vertical axis) is shown. The breakpoints can be dragged as required. After dragging a breakpoint the new values are stored directly and used by the system. The curve applies to 'Alternative', 'Instructor' and 'Extra' alternative. 'Original' is always passed through one-to-one.

### 4.2 Damping

Rapid movements of the alternative input can be filtered by the software. The value of 'damping' can be varied between 0 (no damping) and 5 (high damping).

