

**SONCEBOZ**  
from mind to motion

Date: 06.02.2017

# **User manual**

## **Smart Actuator Control**

### **v1.0**

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## 1. Introduction

*Smart Actuator Control* is a tool developed by Sonceboz in order to configure and control actuators using SAE J1939 protocol.

This tool gives access to a set of parameters (Valve, Speed, Linearization...) in order to leave flexibility to the user.



This software is intended to be used with SONCEBOZ motors **only**.

## 2. Installation

### 2.1 Minimum requirements

Before installing this software, please check your configuration fulfils the following requirements:

- Operating system: Microsoft Windows 7 (32bit or 64bit)
- Screen resolution: at least 1280x960 pixels
- 1 free USB 2.0 port

### 2.2 PEAK PCAN-USB Driver installation



Setup the driver before connecting the PCAN-USB adapter to the computer for the first time.

Peak PCAN-USB setup is included in Smart Actuator Control software installation.



### 2.3 Software installation

Launch *setup.exe*

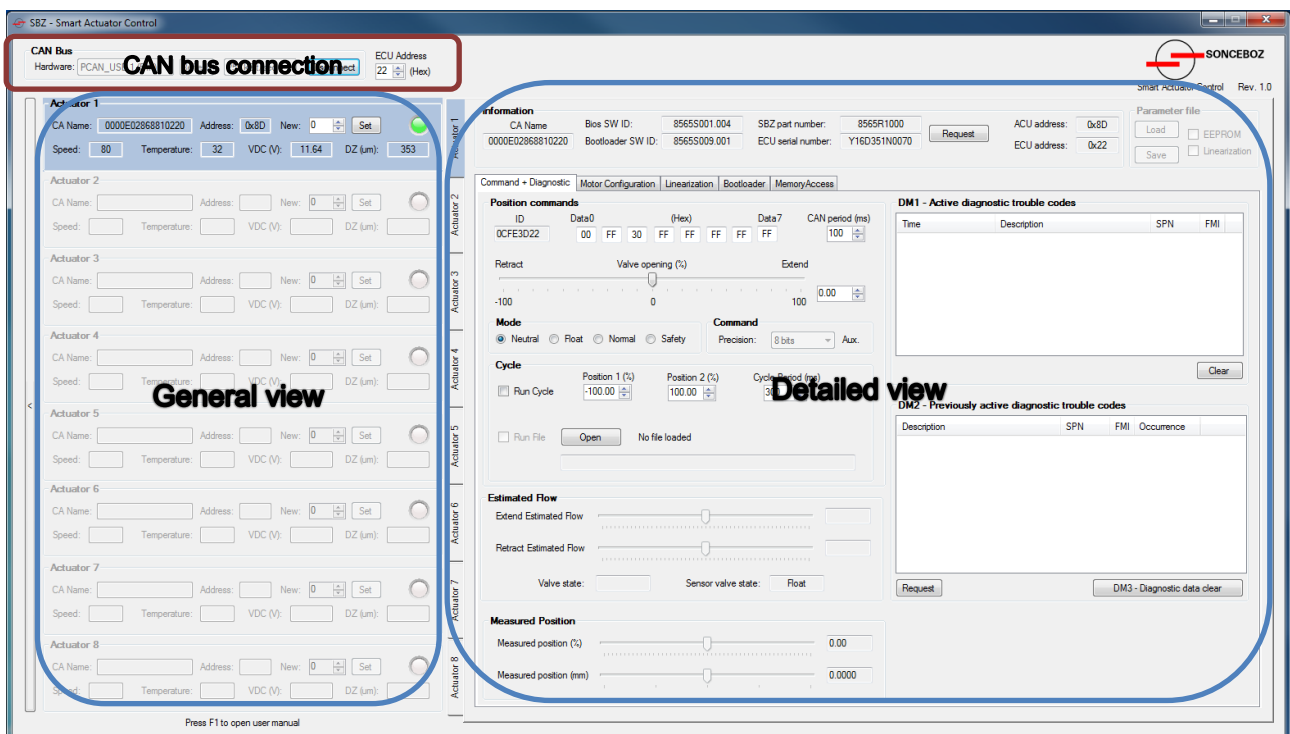
Follow the instructions.

A shortcut will be placed on the desktop.

### 3. Graphical interface

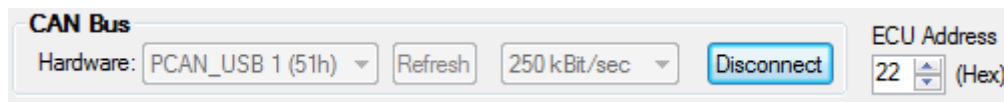
The software interface is divided in three regions:

- The CAN bus connection, to configure the PEAK interface and launch the connection.
- The General view, for an overview of up to 8 actuators.
- The Detailed view for the selected actuator, composed with several tabs:
  - The Command + diagnostic tab, to command the actuator and display its statuses.
  - The Motor configuration tab, to configure communication, valve, sensor, boost and speed parameters.
  - The Linearization tab, to modify linearization parameters.
  - The Bootloader tab, to upgrade the firmware.
  - The MemoryAccess tab, to initialize and read Eeprom memory.




## 4. Detailed function

### 4.1 CAN bus configuration



Connect the PEAK USB interface.

Select *PCAN\_USB* in the Hardware list. If the *PCAN\_USB* is not available, press  to update the list.

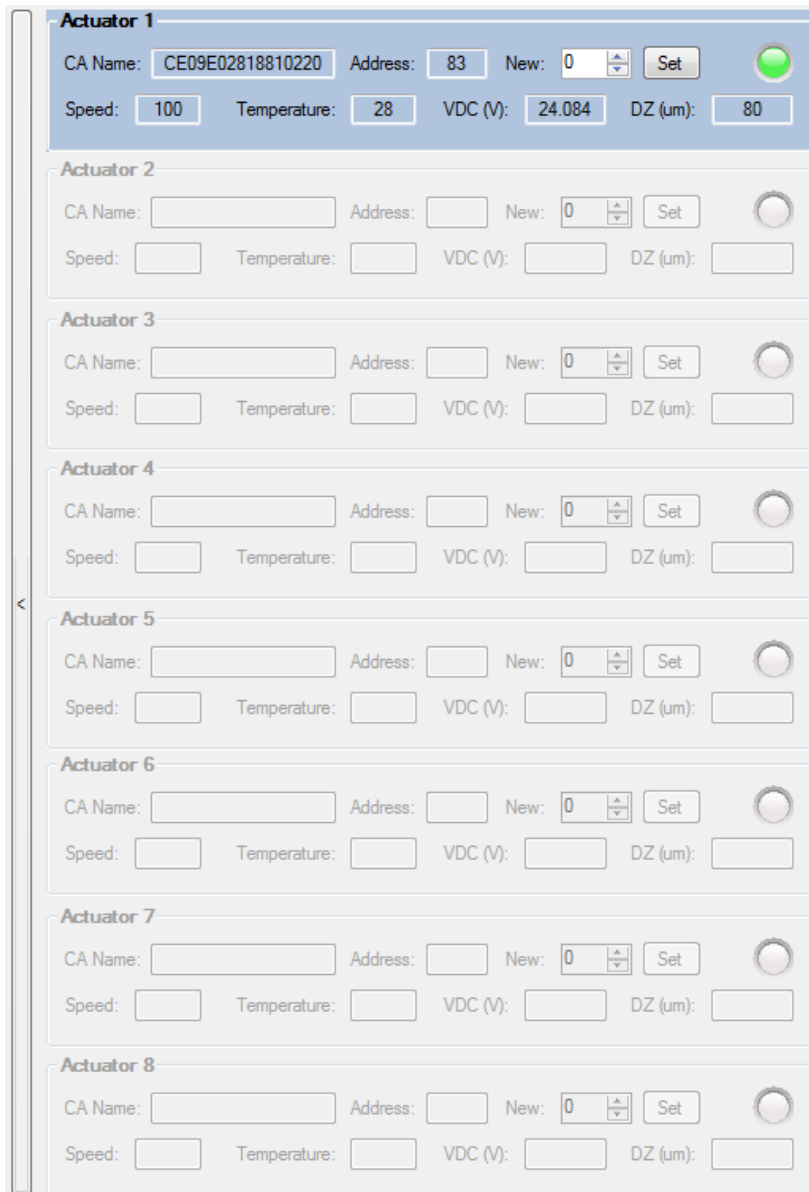
Then select the baudrate of the CAN bus on which the PEAK interface will be connected.

Press  to initialize the connection on the CAN bus.

The software is now waiting for actuator communication on the bus and automatically retrieves motor information.

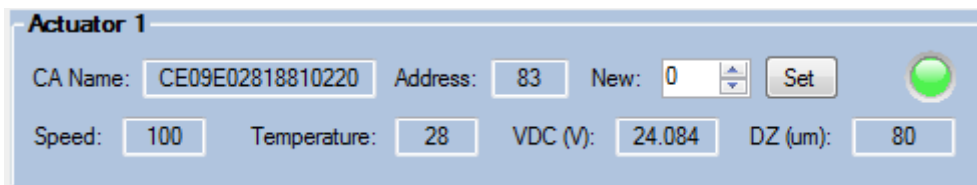
The ECU Address parameter is the address used by the tool. It can be modified at any time.

## 4.2 General view



Actuator 1	Actuator 2	Actuator 3	Actuator 4	Actuator 5	Actuator 6	Actuator 7	Actuator 8
CA Name: CE09E02818810220	CA Name:	CA Name:	CA Name:	CA Name:	CA Name:	CA Name:	CA Name:
Address: 83	Address:	Address:	Address:	Address:	Address:	Address:	Address:
New: 0	New: 0	New: 0	New: 0	New: 0	New: 0	New: 0	New: 0
Set	Set	Set	Set	Set	Set	Set	Set
Speed: 100	Speed:	Speed:	Speed:	Speed:	Speed:	Speed:	Speed:
Temperature: 28	Temperature:	Temperature:	Temperature:	Temperature:	Temperature:	Temperature:	Temperature:
VDC (V): 24.084	VDC (V):	VDC (V):	VDC (V):	VDC (V):	VDC (V):	VDC (V):	VDC (V):
DZ (um): 80	DZ (um):	DZ (um):	DZ (um):	DZ (um):	DZ (um):	DZ (um):	DZ (um):

When a motor is detected by the application, its information are automatically read and displayed in the *General view*. Up to 8 actuators can be detected and displayed.



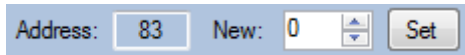
Actuator 1					
CA Name:	CE09E02818810220	Address:	83	New:	0
					Set
Speed:	100	Temperature:	28	VDC (V):	24.084
				DZ (um):	80


The following information are displayed for each detected actuator:

- CA Name: Identifier of the motor (Hexadecimal)
- Address: Address of the motor on the bus (Hexadecimal)
- Speed: Current configured speed of the motor (Decimal, in mm/s)
- Temperature: Internal temperature measured by the actuator (Decimal, in °C)
- Voltage (VDC): Supply voltage measured by the actuator (Decimal, in Volts)
- Dead-one (DZ) : Dead-zone measured by the actuator (Decimal, in  $\mu\text{m}$ )
- Motor status: Displayed with a led. A green led means no error detected. A red led means at least one error detected (see detailed view).

All these information are refreshed periodically.

The actuator address on the bus can be modified using the Set button.



First enter the new address in a valid range, and then click . The current actuator with old address will time-out, and a new actuator with the new address will be detected.

To hide the general view and display detailed view only, press the arrow button on the left side of the general view.



You can select an actuator in the vertical tabs on the left, to display it in the detailed view.

Command + Diagnostic

Motor Configuration

Linearization

Bootloader

Memory Access

Position commands

ID

0CFE3D22

Data0

00

FF

30

FF

FF

FF

FF

FF

(Hex)

Data7

FF

CAN period (ms)

100

Retract

Valve opening (%)

Extend

-100

0

100

0.00

Mode

☒ Neutral
 ☐ Float
 ☐ Normal
 ☐ Safety

Command

Precision: 8 bits

Aux.

Cycle

☐ Run Cycle
 

Position 1 (%)

-100.00

Position 2 (%)

100.00

Cycle Period (ms)

300

☐ Run File
 

Open

No file loaded

Estimated Flow

Extend Estimated Flow

Retract Estimated Flow

Valve state:

Sensor valve state:

Float

Measured Position

Measured position (%)

0.00

Measured position (mm)

0.0000

DM1 - Active diagnostic trouble codes

Time	Description	SPN	FMI

Clear

DM2 - Previously active diagnostic trouble codes

Description	SPN	FMI	Occurrence

Request

DM3 - Diagnostic data clear

### 4.3.1 Information

Information						
CA Name	Bios SW ID:	8565S101.002	SBZ part number:	8566R1006	ACU address:	83
CE09E02818810220	Bootloader SW ID:	8565S009.001	ECU serial number:	Y16D349L0001	ECU address:	01
					Request	

The following information are displayed:

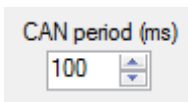
- CA Name: Complete name of the actuator
- Bios SW ID: Version of the firmware
- Bootloader SW ID: Version of the bootloader
- SBZ part number: Sonceboz part number
- ECU serial number: Actuator serial number
- ACU address: Address of the actuator on the bus (in Hexadecimal)
- ECU address: Address of the tool on the bus

### 4.3.2 Command + Diagnostic tab

In this tab, the user can send commands to the actuator and check its statuses and errors.

#### 4.3.2.1 CAN period

The CAN period parameter defines the time between 2 position command messages sent by the tool.



CAN period (ms)

100

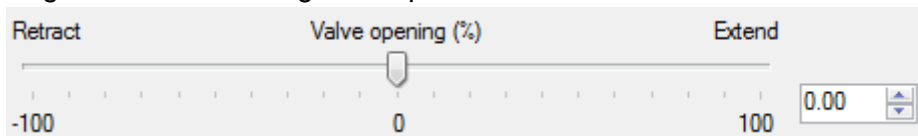
#### 4.3.2.2 Commands

The command sent periodically to the actuator is displayed as follows:

ID	Data0			(Hex)				Data7
0CC48301	41	FF	31	00	41	FF	FF	FF

You can modify the command with different methods:

- By moving the slider or writing a new position value



Retract      Valve opening (%)      Extend

-100      0      100

0.00

The new command is immediately applied (values in data fields are updated accordingly).

- Directly by writing values in Data fields

Data0			(Hex)				Data7
41	FF	32	00	45	FF	FF	FF

When a value is modified, and not yet applied, background is orange.

To apply all the new values at the same time, type Enter.

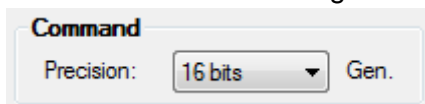
The new values applied are now in green.

Once new values are applied, sliders and position value is not take into account anymore.

Modify the slider position to send slider position again.

#### 4.3.2.3 Command precision

The command resolution can be selected with the following control:



Command

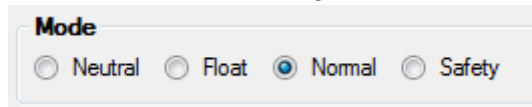
Precision: 16 bits Gen.

In General mode, 8 or 16 bits can be selected.

In Auxiliary mode, 8 bits only is available.

#### 4.3.2.4 Actuator mode

The actuator mode can be modified with the following control:



Mode

☐ Neutral ☐ Float ☒ Normal ☐ Safety

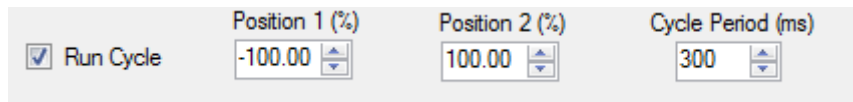
4 modes are available:

- Neutral: Actuator is in neutral position
- Float: Actuator is in float position
- Normal: Actuator position is defined by the value in the command
- Safety: Actuator is in Safety mode

#### 4.3.2.5 Cycle

Actuator position can be automated using the Cycle commands.

- Using manual commands



☒ Run Cycle

Position 1 (%) -100.00

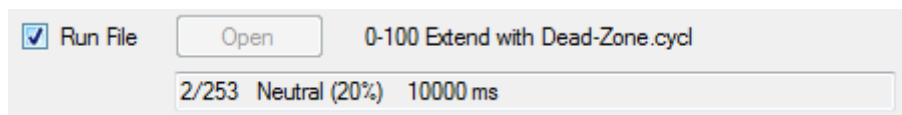
Position 2 (%) 100.00

Cycle Period (ms) 300

First, adjust the 2 positions values, and the cycle period.

Then check Run cycle to start.

- Using a Cycle file



☒ Run File

Open

0-100 Extend with Dead-Zone.cycl

2/253 Neutral (20%) 10000 ms

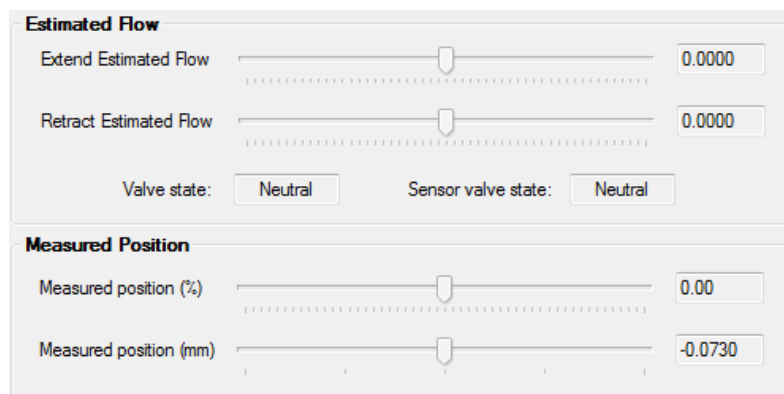
First, open a cycle file to load it in memory.

Then check Run File to start the sequence. The current instruction is displayed.

At the end of the sequence, the cycle is restarted from the beginning.

#### 4.3.2.6 Feedback

Position feedback sent by the actuator are displayed as follows:



**Estimated Flow**

Extend Estimated Flow 0.0000

Retract Estimated Flow 0.0000

Valve state: Neutral Sensor valve state: Neutral

**Measured Position**

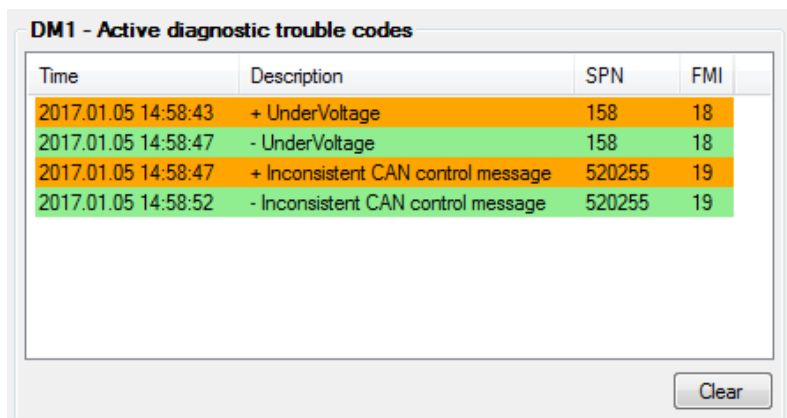
Measured position (%) 0.00

Measured position (mm) -0.0730

Measured position is available only with actuators with enabled sensors.

#### 4.3.2.7 Active diagnostic trouble code

The tool records errors reported by the actuator, and displays them in a table as follows:



DM1 - Active diagnostic trouble codes

Time	Description	SPN	FMI
2017.01.05 14:58:43	+ UnderVoltage	158	18
2017.01.05 14:58:47	- UnderVoltage	158	18
2017.01.05 14:58:47	+ Inconsistent CAN control message	520255	19
2017.01.05 14:58:52	- Inconsistent CAN control message	520255	19

Clear

Time: Time of the event (on computer)

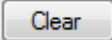
Description: Description of the error

SPN: Suspect Parameter Number

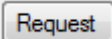
FMI: Failure Mode Identifier

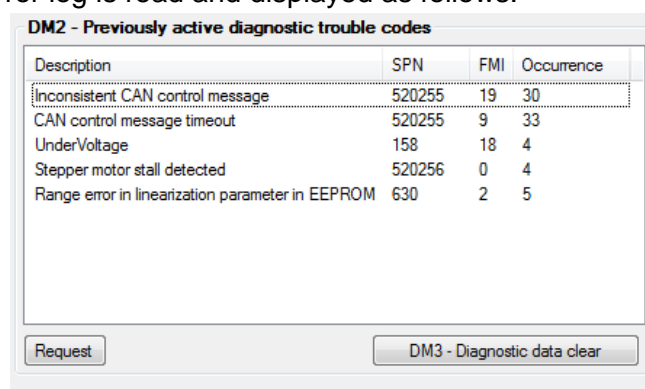
When the default appears, it is displayed in orange.

When the default disappears, it is displayed in green.

To clear the table, click .

#### 4.3.2.8 Previously active diagnostic trouble codes

By clicking , Error log is read and displayed as follows:



DM2 - Previously active diagnostic trouble codes

Description	SPN	FMI	Occurrence
Inconsistent CAN control message	520255	19	30
CAN control message timeout	520255	9	33
UnderVoltage	158	18	4
Stepper motor stall detected	520256	0	4
Range error in linearization parameter in EEPROM	630	2	5

Request

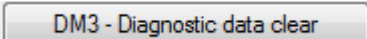
DM3 - Diagnostic data clear

Description: Description of the error

SPN: Suspect Parameter Number

FMI: Failure Mode Identifier

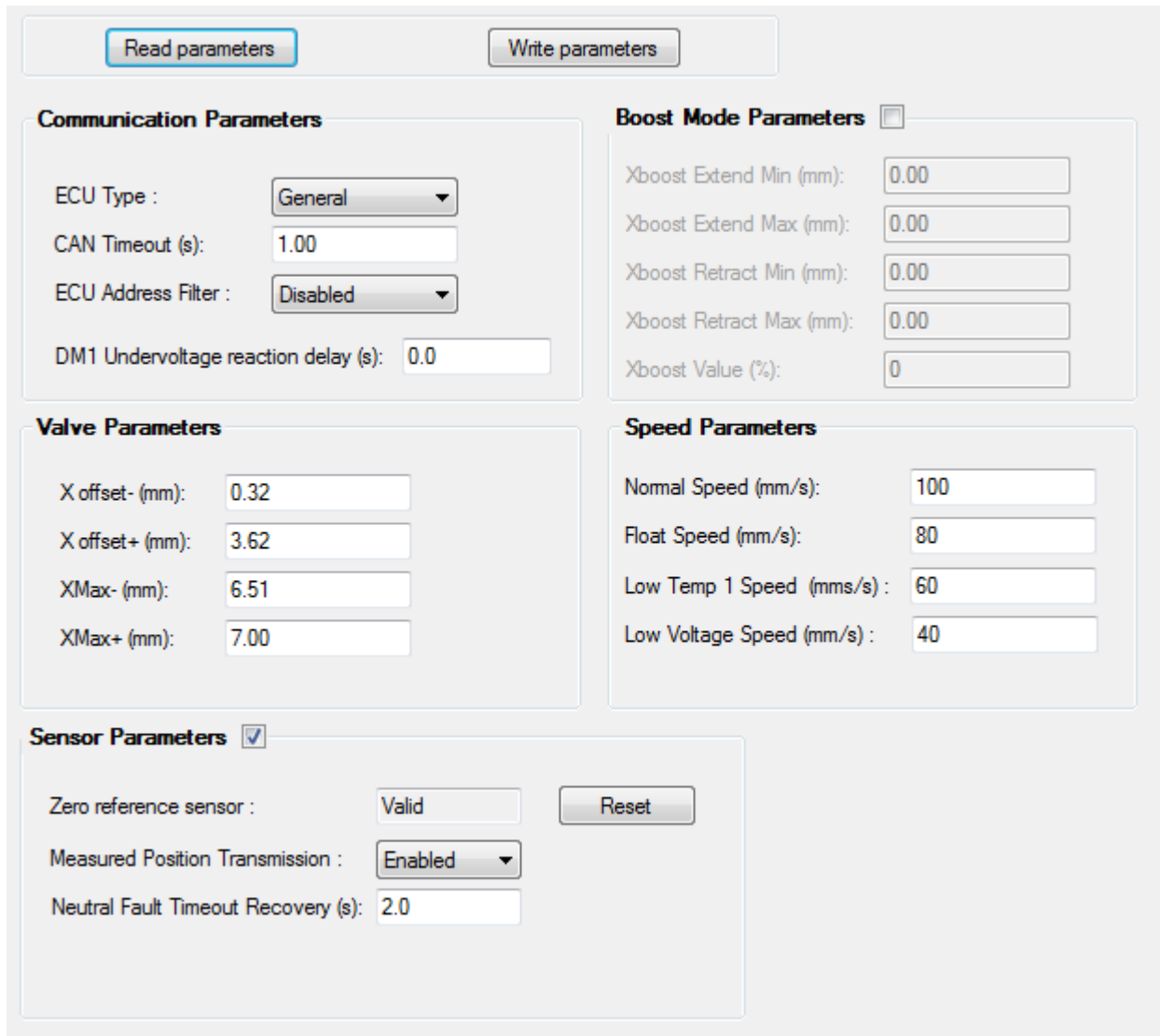
Occurrence: Number of occurrence of the default

To clear the error log in actuator, click .

A request is automatically sent after a Diagnostic data clear.

### 4.3.3 Motor configuration tab

In this tab, the user can configure the actuator.



The screenshot shows the Motor configuration tab interface. At the top, there are two buttons: "Read parameters" (highlighted with a blue border) and "Write parameters". Below these are four main parameter groups:

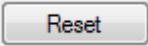
- Communication Parameters:** Includes "ECU Type" (dropdown menu set to "General"), "CAN Timeout (s)" (text input set to "1.00"), "ECU Address Filter" (dropdown menu set to "Disabled"), and "DM1 Undervoltage reaction delay (s)" (text input set to "0.0").
- Boost Mode Parameters:** Includes "Xboost Extend Min (mm)" (text input set to "0.00"), "Xboost Extend Max (mm)" (text input set to "0.00"), "Xboost Retract Min (mm)" (text input set to "0.00"), "Xboost Retract Max (mm)" (text input set to "0.00"), and "Xboost Value (%)" (text input set to "0").
- Valve Parameters:** Includes "X offset- (mm)" (text input set to "0.32"), "X offset+ (mm)" (text input set to "3.62"), "XMax- (mm)" (text input set to "6.51"), and "XMax+ (mm)" (text input set to "7.00").
- Sensor Parameters:** Includes "Zero reference sensor" (dropdown menu set to "Valid" with a "Reset" button next to it), "Measured Position Transmission" (dropdown menu set to "Enabled"), and "Neutral Fault Timeout Recovery (s)" (text input set to "2.0").

To import parameters from the actuator, click

Read parameters

The following parameters can be modified:

- Communication parameters
  - ECU Type : General or Auxiliary
  - CAN Timeout: Time before generating CAN timeout
  - ECU Address filter: Enable/Disable ECU address filter
  - DM1 Undervoltage reaction delay
- Valve Parameters
  - Xoffset –
  - Xoffset +
  - Xmax –
  - Xmax +

- **Sensor Parameters**
  - Enable sensor: Sensor can be enabled/disabled
  - Reset Zero reference: Set Zero reference as Invalid by clicking 
  - Measured position Transmission: Enable or disable Measured Position transmission
  - Neutral Fault Timeout recovery
- **Boost Mode parameters**
  - Enable Boost: Boost can be enabled or disabled.
  - Xboost Extend min / max: Extend position range to apply Boost mode
  - Xboost Retract min / max: Retract position range to apply Boost mode
  - Xboost value: Current boost value
- **Speed Parameters**
  - Normal speed: Speed in normal mode
  - Float speed: Speed in Float mode
  - Low Temp 1 Speed: Speed in under-temperature condition
  - Low voltage speed: Speed in under-voltage condition

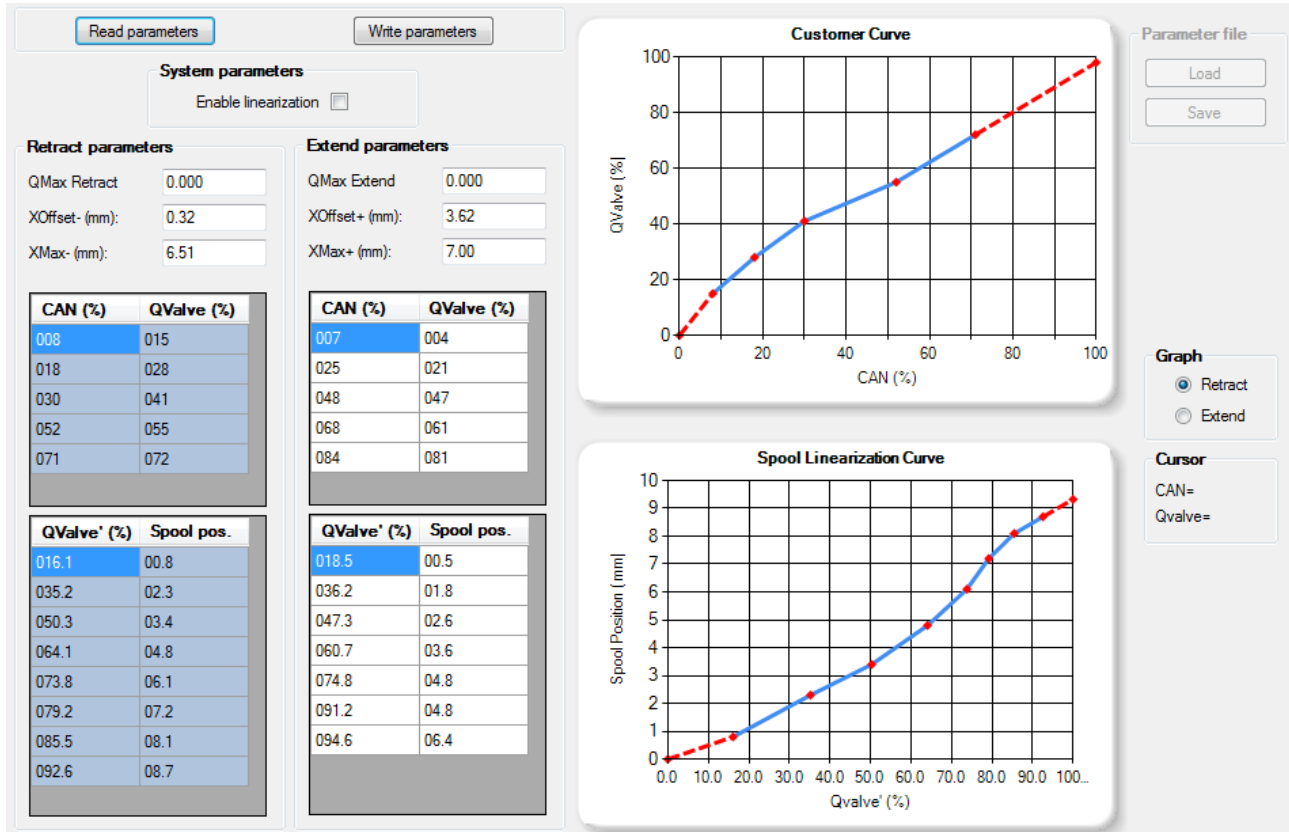
Modified values but not yet applied are in orange.

To apply modified parameters, click 

Applied values are in green.

### 4.3.4 Linearization tab

In this tab, the user can configure a linearization curve.



**System parameters**

Enable linearization ☐

**Retract parameters**

QMax Retract: 0.000  
XOffset- (mm): 0.32  
XMax- (mm): 6.51

CAN (%)	QValve (%)
008	015
018	028
030	041
052	055
071	072

**Extend parameters**

QMax Extend: 0.000  
XOffset+ (mm): 3.62  
XMax+ (mm): 7.00

CAN (%)	QValve (%)
007	004
025	021
048	047
068	061
084	081

**QValve' (%) Spool pos.**

QValve' (%)	Spool pos.
016.1	00.8
035.2	02.3
050.3	03.4
064.1	04.8
073.8	06.1
079.2	07.2
085.5	08.1
092.6	08.7

**QValve' (%) Spool pos.**

QValve' (%)	Spool pos.
018.5	00.5
036.2	01.8
047.3	02.6
060.7	03.6
074.8	04.8
091.2	04.8
094.6	06.4

**Customer Curve**

QValve (%) vs CAN (%)

**Spool Linearization Curve**

Spool Position (mm) vs QValve' (%)

**Parameter file**

Load  
Save

**Graph**

☒ Retract  
☐ Extend

**Cursor**

CAN=  
Qvalve=

**System parameters**

Enable linearization ☒

To enable linearization, check

2 curves per direction (Retract and Extend) must be configured:

- 1 Customer curve: CAN (%) vs Qvalve (%)
- 1 Spool Linearization Curve: Qvalve' (%) vs Spool position (mm)

On the left, a table per curve shows every single point.


On the right, the curves for one direction (Extend or Retract) are displayed. (The curve corresponding to the tables in blue are displayed)

To change the curve to display, click on the corresponding table to display, or on the radio button on the right.

**Graph**

☐ Retract  
☒ Extend



Click  to import the curves from the actuator.

**To add a point on a curve:**

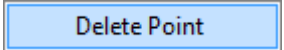
- On the graph, set the cursor on the point you want to add (values are shown on the right)
- Left click to add the point.

**To modify a point on a curve:**

- On the graph, drag and drop the point you want to modify.
- Or
- In the corresponding table, modify the point values directly.

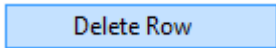
**To delete a point on a curve:**

- On the graph, Right click on the point you want to delete, and select



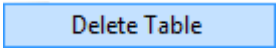
Or

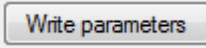
- In the corresponding table, right click on the point you want to delete, and select



**To delete all points on a curve**

- In the corresponding table, right click on the point you want to delete, and select



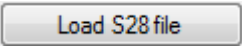
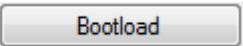
To save the modification in the actuator, click 

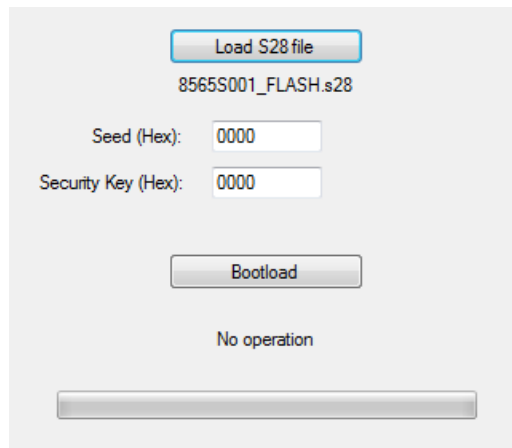
**Notes:**

- Up to 5 points can be used for Customer curve.
- Up to 8 points can be used for Spool Linearization curve.
- The first point of the curve is always (0, 0).
- The last segment of the curve is interpolated to keep the same slope as previous segment.

#### 4.3.5 Bootloader tab

To update the firmware of the actuator, proceed as follow:

- Load the S28 file of the new firmware by clicking on 
- Enter the Seed
- Enter the Security Key
- Click  to start.



The screenshot shows a software interface for the bootloader. At the top, there is a button labeled "Load S28 file". Below it, the filename "8565S001\_FLASH.s28" is displayed. There are two input fields: "Seed (Hex):" with the value "0000" and "Security Key (Hex):" with the value "0000". Below these fields is a button labeled "Bootload". At the bottom, there is a status indicator that says "No operation" and a progress bar.

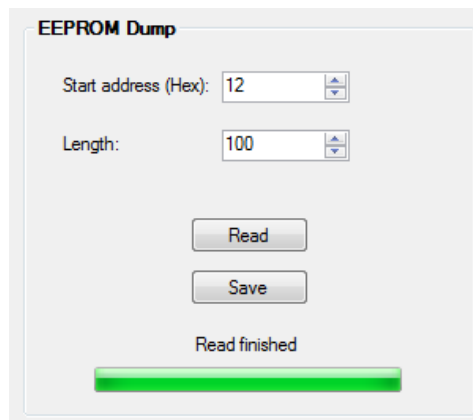
If Seed or Security key is incorrect, the update procedure is stopped.

The firmware will be updated automatically. It can take several minutes to complete. If upgrade is successful the motor automatically restarts.

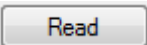
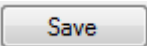
This tool can also be used if the embedded firmware is corrupted or missing.

### 4.3.6 Memory access tab

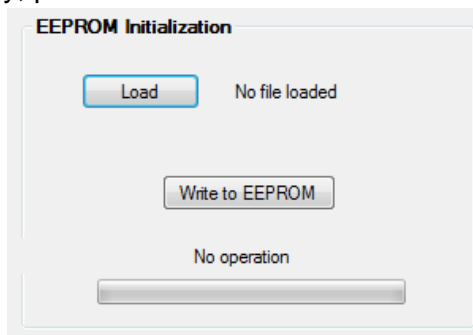
To dump Eeprom memory, proceed as follows:




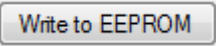
The 'EEPROM Dump' dialog box contains two input fields: 'Start address (Hex):' with the value '12' and 'Length:' with the value '100'. Below these fields are two buttons: 'Read' and 'Save'. At the bottom, there is a status label 'Read finished' and a green progress bar.

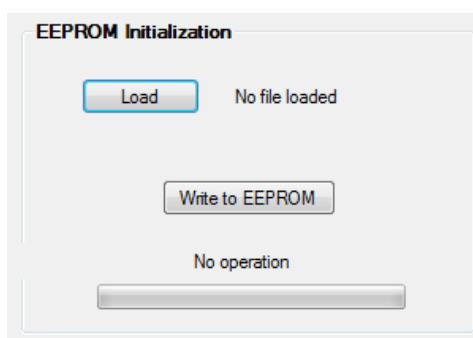
- Enter the start address of the dump
- Enter the length in byte of the dump
- Click 
- Once read is successful, click  to save data in a CSV file.

To initialize an Eeprom memory, proceed as follows:



The 'EEPROM Initialization' dialog box features a 'Load' button and the text 'No file loaded'. Below this is a 'Write to EEPROM' button and the text 'No operation'. At the bottom, there is a grey progress bar.

- Load the Eeprom data file by clicking 
- Click 



This is a duplicate of the 'EEPROM Initialization' dialog box described above, showing the 'Load' button, 'No file loaded' text, 'Write to EEPROM' button, 'No operation' text, and a grey progress bar.

**End of document**