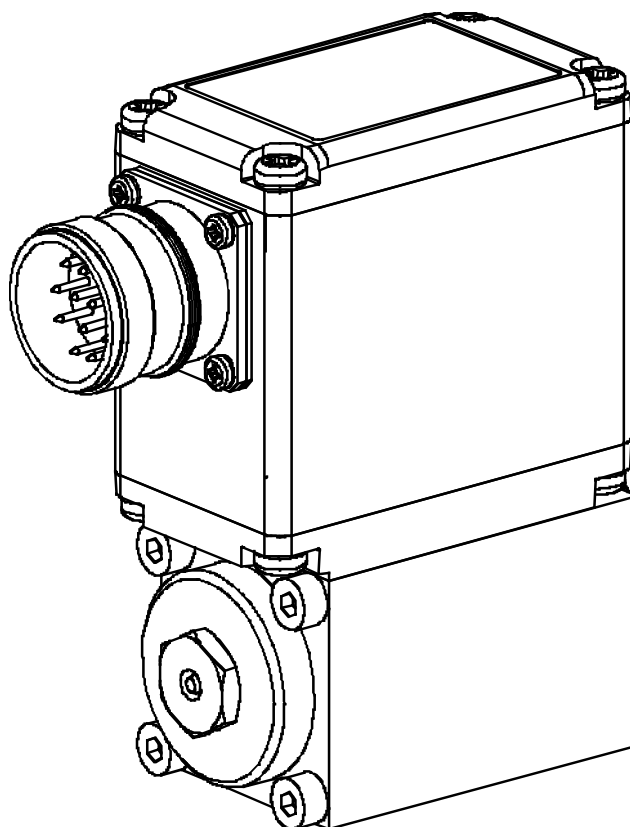


# OPERATING INSTRUCTIONS

## DSV-ELECTRONICS



<b>0</b>	<b>Contents</b>	
<b>0</b>	<b>Contents .....</b>	<b>2</b>
<b>1</b>	<b>General information.....</b>	<b>3</b>
<b>2</b>	<b>Product description.....</b>	<b>3</b>
2.1	General.....	3
2.2	Field of application .....	3
2.3	Conformity .....	3
2.4	Labelling of the product.....	3
2.5	Type code.....	3
2.6	Technical data.....	4
2.7	Block diagram.....	5
<b>3</b>	<b>Safety rules .....</b>	<b>6</b>
3.1	Installation / Commissioning / Parameterisation .....	6
<b>4</b>	<b>Construction and Function.....</b>	<b>7</b>
4.1	Introduction.....	7
4.2	Description of the Function.....	7
4.3	Temperature monitoring .....	7
4.4	Characteristic optimisation .....	9
4.5	DSV State machine .....	9
4.6	Operating mode.....	10
4.7	Analogue inputs.....	10
4.8	Cablebreak detection .....	10
4.9	Digital inputs.....	11
4.10	Outputs.....	11
4.11	Mode of operation .....	12
<b>5</b>	<b>Operating and Indicating elements.....</b>	<b>13</b>
5.1	General.....	13
5.2	Receptacle view .....	13
5.3	Serial interface RS 232 C.....	13
<b>6</b>	<b>Commissioning.....</b>	<b>14</b>
6.1	Connection instructions .....	14
6.2	Connection examples.....	16
<b>7</b>	<b>Settings.....</b>	<b>17</b>
7.1	Introduction.....	17
7.2	General.....	17
7.3	Parameter inconsistency .....	17
7.4	Tips for the first commissioning.....	18
7.5	Scaling.....	18
7.6	File - Menu .....	18
7.7	Parameters - Menu.....	21
7.8	Configuration - Menu.....	25
7.9	Commands - Menu .....	29
7.10	Fieldbus_Fieldbus Info .....	30
7.11	Analysis - Menu.....	30
7.12	Help - Menu.....	32
<b>8</b>	<b>The system does not work .....</b>	<b>33</b>
8.1	Procedure.....	33
<b>9</b>	<b>PASO DSV/SD6 Installation and Operation.....</b>	<b>34</b>
9.1	System Requirements .....	34
9.2	Installation .....	34
9.3	Connection to the Wandfluh card.....	34
9.4	Mode "Off Line" and "On Line" .....	35
9.5	Communication start up .....	35
9.6	Communication interruption .....	35
9.7	Program description .....	36
9.8	Starting of PASO DSV/SD6.....	37
9.9	Store parameter .....	39
9.10	Limiting value error.....	39
9.11	Description of Commands.....	39
<b>10</b>	<b>Disposal.....</b>	<b>40</b>
<b>11</b>	<b>Additional information .....</b>	<b>40</b>

## Operating instructions to DSV-Electronics

### 1 General information

This operating instructions makes it possible to use the in the valve integrated Electronics (DSV-Electronics) safely and according to specification. The operating instructions includes instructions which Wandfluh as the manufacturer, or its resale organisations (Wandfluh sister companies or distributors), provide to users within their duty to instruct.

For this purpose, the operating instructions mainly includes:

- information about use according to specification, installation and commissioning of the DSV-Electronics
- information about safety in dealing with control.

### 2 Product description

#### 2.1 General

The DSV-Electronics are part of the whole valve and fixed mounted on it. The connection is made via one or two receptacle depending on the control mode.

#### 2.2 Field of application

Because of the compact form of construction, the field of application of the DSV-Electronics is situated in the industrial field as well as in the mobile field.

#### 2.3 Conformity

The DSV-Electronics have been developed and tested in accordance with the latest technical standards. Applied in particular was the EU Guideline 89/336/EEC (EMC Guideline).

#### 2.4 Labelling of the product

With the PC parameterisation software PASO DSV/SD6, the following information can be directly read-off the DSV-Electronics (= electronic type code):

- Valve type
- Part number
- Serial number
- Software version
- Firmware version
- Card type
- Hardware configuration

#### 2.5 Type code

The DSV-Electronics do not have an own type code. The information about the DSV-Electronics is integrated in the type code of the DSV-valve. You will find a detailed description of it in the data sheet of the corresponding DSV-valve.

## 2.6 Technical data

### 2.6.1 General specifications

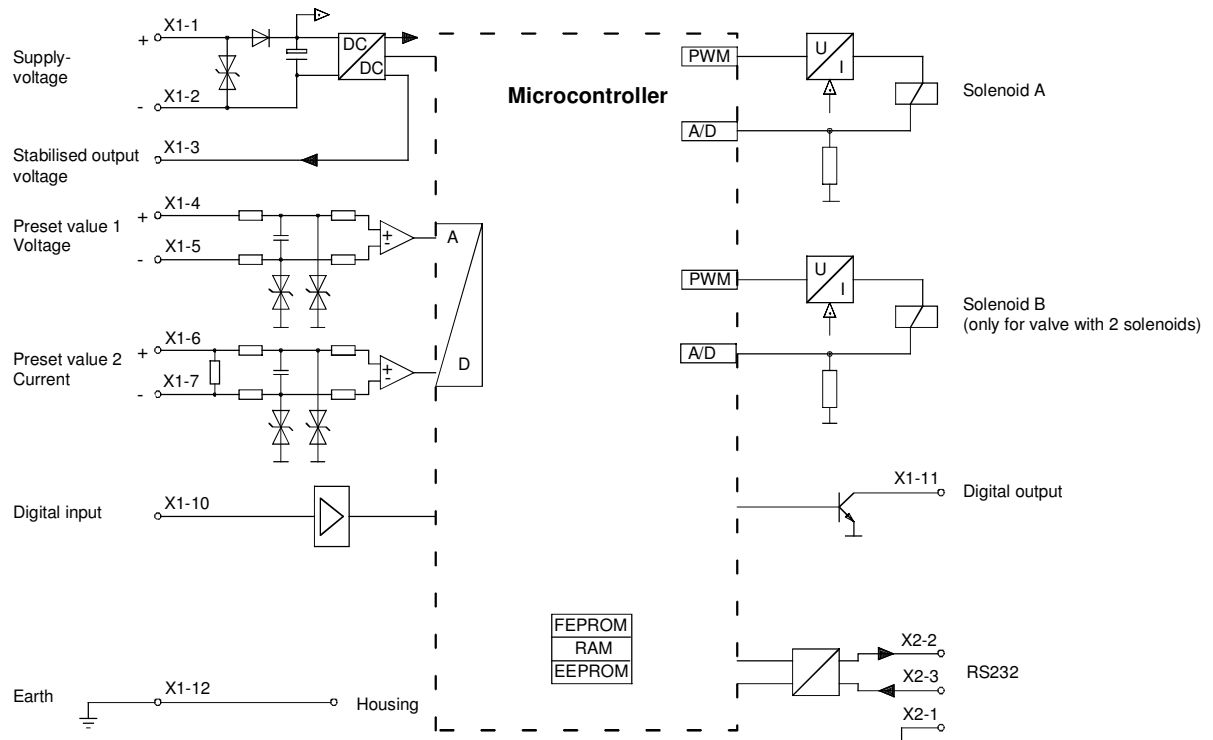
<b>Execution</b>	Integrated on the valve	
<b>Connections</b>	Receptacle 1 RS232 interface	1 x M23 12pole male (analogue interface) 2 x M12 male (CANopen interface) Connector RJ10 (under cover of electronics housing)
<b>Ambient temperature</b>	-20 ... +65 °C	under difficult circumstances the solenoid current and with it the valve performance can if necessary be reduced (see "Temperature monitoring" on page 7)
<b>Protection class</b>	IP67 to EN 60 529	with suitable connector and closed electronics housing

### 2.6.2 Electrical specifications

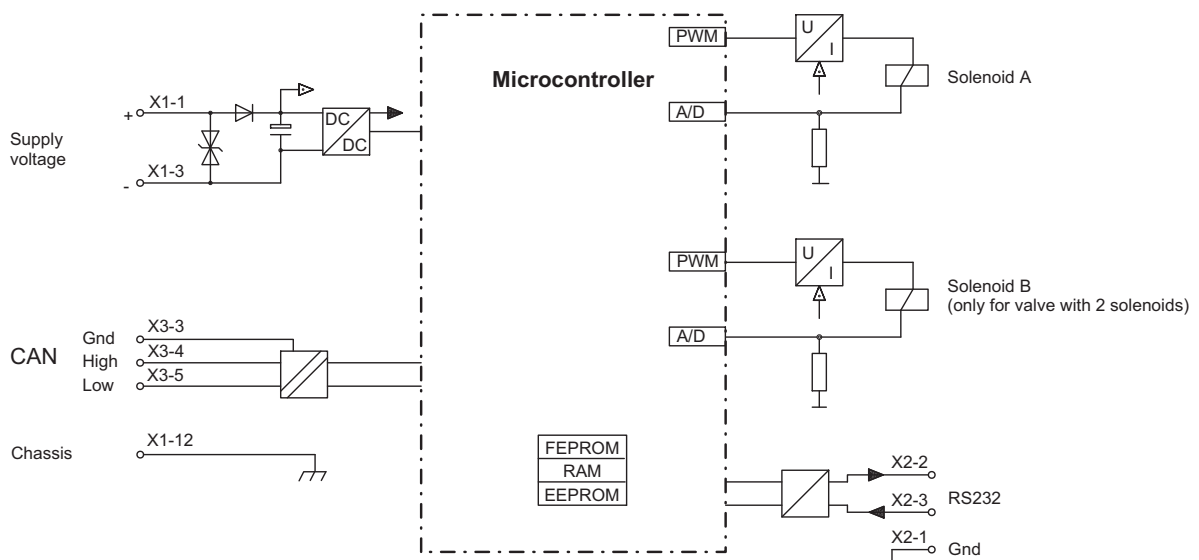
<b>Supply voltage (depending on the valve type)</b>		24 VDC or 12 VDC
<b>Voltage range</b>		21 ... 30 VDC or 10,5 ... 15 VDC
<b>Ripple on supply voltage</b>		< ±5 %
<b>Fuse</b>	Customer must integrate a slow fuse into his electrical system	
<b>Temperature drift</b>		< 1% with $\Delta T = 40^\circ C$
<b>No load current</b>		40 ... 50 mA
<b>Max. solenoid current</b>	Mounted on PI35 solenoid (24VDC) Mounted on PI45 solenoid (24VDC) Mounted on PI35 solenoid (12VDC) Mounted on PI45 solenoid (12VDC)	1.0 A 1.2 A 2.0 A 2.4 A
<b>Analogue inputs</b>	1 differential input 10-Bit 1 differential input 10-Bit Both inputs are not galvanically separated	0 ... ±10 VDC 0/4 ... 20 mA
<b>Input resistance</b>	Voltage input against ground Burden for current input	> 18 kOhm = 250 Ohm
<b>Digital inputs</b>	1 input active-high Switching threshold high Switching threshold low	6 - 30VDC 0 - 1VDC
<b>Serial interface</b>	1 interface to RS232 C standard (connector RJ10) under cover of electronics housing	
<b>Stabilised output voltage</b>	1 output	+ 10 VDC at 12V supply voltage + 8 VDC max. load 10 mA
<b>Solenoid current</b>	Minimum current $I_{min}$ adjustable Default setting Maximum current $I_{max}$ adjustable Default setting	0 ... max sol. current adapted to the valve $I_{min}$ ... max sol. current adapted to the valve
<b>Dither</b>	Frequency adjustable Default setting Level adjustable Default setting	20 ... 250 Hz adapted to the valve Hz 0 ... 200 mA adapted to the valve
<b>Digital outputs</b>	1 outputs Lowside Switch. $U_{max}$ $I_{max}$	40 VDC -0.7 A
<b>EMC Immunity Emission</b>	EN 61000-6-2 EN 61000-6-4	

## 2.7 Block diagram

### Analogue interface control:



### CANopen interface control:



## 3 Safety rules

### 3.1 Installation / Commissioning / Parameterisation

- These operating instructions have to be carefully studied beforehand and the instructions are to be complied with.
- Prior to the installation, all power supply voltages and any other energy sources have to be disconnected.
- Wrong manipulations by the personal cannot be prevented by the DSV-Electronics.
- Before the switching on of the supply voltage, the fuse protection, the correct wiring and the conformity of the power supply voltage with the permissible supply voltage range have to be verified.



- **The control monitors the working conditions within the electronics and within the installation. Uncontrolled movements caused by unforeseen errors of the DSV-Electronics cannot be prevented in any case.**
- **Danger for persons has to be avoided by installing an emergency stop device which cuts off the power to the system.**

## 4 Construction and Function

Refer to the section "Block diagram" page 5

### 4.1 Introduction

- The DSV-Electronics are integrated on the valve
- All inputs and outputs have to be contacted through the receptacle
- Under the box cover, there is a RS232 (serial) interface, through which the parameterisation and the diagnostics can be made by using the PC-Parameterisation software PASO DSV/SD6
- In the factory, the DSV-Electronics are adjusted to the valve. Normally there is no need for the customer to do any adjustment himself.

### 4.2 Description of the Function

The DSV-Electronics serve for controlling proportional valves with one or two solenoids and includes a pulse-width-modulated current control with superimposed dither signal. Dither frequency and amplitude are adjustable separately.

The DSV-Electronics are available in two different versions, with analogue interface and CANopen interface (fieldbus). Accordingly there are different control modes and different connector versions and numbers used. On the analogue interface version, the preset value can be a voltage signal 0 ... 10V resp.  $\pm 10V$  (only for the 2-solenoid version) or a current signal 0 ... 20mA resp. 4 ... 20mA. The DSV-Electronics have to be enabled through a digital input signal. A digital output signal indicates an error.

On the version with CANopen interface the preset value as well as the control- and status signals are transmitted through the CAN interface. There is a separate operating guide for a detailed CAN description available, please refer to the manual "CANopen - Protocol with Device Profile in accordance with CiA DSP 408".

Parameters are set by means of the parameterising software PASO. If the DSV-Electronics have a fieldbus, parameters can be set also by this fieldbus. Changed parameters are stored in a non-volatile memory in order to have them available after the DSV-Electronics have been switched on again.

### 4.3 Temperature monitoring

The DSV-electronics are provided with an internal, factory set temperature monitoring. Starting from a temperature threshold of 80 °C of the internal electronics temperature the preset solenoid current ( $I_{max}$ , refer to PASO Menu "Parameters\_Valves" on page 21) is limited, depending on the temperature. The temperature of the DSV electronics is visible in the PASO data window (Menu "Analysis\_Values", page 30). Since the self-heating of the solenoid, on which the DSV electronics are mounted, has a significant influence on the electronics temperature, this current limiting reduces the electronics temperature and allows electronics to be run (with reduced solenoid current) at higher ambient temperatures. In the PASO status line is displayed if this limiting, the so called 'derating', is active. With active 'derating' the valve operating range is restricted – the effect complies with that of a reduced preset value signal range (refer to the valve data sheet). In case of 2-solenoid service the derating affects both solenoids.

Under typical operating conditions (valve mounted on hydraulic block, natural convection possible, oil temperature <70°C) the derating will usually not be activated, i.e. the internal electronics temperature is staying below the threshold of 80°C. Depending on the application, the derating activation temperature, i.e. the ambient temperature at which the internal electronics temperature exceeds the threshold of 80°C, is within the range between 45°C and 80°C.

#### REMARK:

At constant operating conditions, depending on the initial state, the thermal equilibrium, and with it the stationary temperature of the DSV-electronics, will possibly be reached only after ca. 2 hours.

In order to prevent exceeding the derating threshold, the electronics temperature can, if necessary, be reduced by one or more of the following measures:

1. Heat removal by
  - heat conduction (e.g. big hydraulic block, bigger oil flow, effect positive, up to 10°C less electronics temperature)
  - natural convection (valve not mounted in a narrow, closed box, effect positive, up to 20°C less electronics temperature)
  - forced convection (e.g. by ventilator, effect positive, up to 30°C less electronics temperature)
2. Preventing of external heating by
  - radiation (shielding from direct sun radiation resp. thermal radiation of hot objects effect up to 10°C less electronics temperature)
3. Average level reduction of solenoid current
  - Shorter power-on time of the solenoid (e.g. pressure controller with controlling time 10s, pause 10s)
  - Processing with less preset value and consequently less solenoid current
  - Overdesigned valve, allowing control with less preset value (solenoid current)

If the long-time rms-value of the solenoid current is reduced from  $I_{\text{eff\_old}}$  to  $I_{\text{eff\_new}}$ , the temperature of DSV-electronics will decrease:

$$T_{\text{dsv\_new}} = \frac{I_{\text{eff\_new}}^2}{I_{\text{eff\_old}}^2} \times (T_{\text{dsv\_old}} - T_{\text{ambient}}) + T_{\text{ambient}}$$

Description of the parameters:

$T_{\text{dsv\_new}}$	: temperature of the DSV-electronics after reducing the solenoid current
$T_{\text{dsv\_old}}$	: temperature of the DSV-electronics before reducing the solenoid current
$T_{\text{ambient}}$	: ambient temperature
$I_{\text{eff\_new}}$	: reduced solenoid current rms-value
$I_{\text{eff\_old}}$	: original solenoid current rms-value

**Example:**

The temperature of DSV is 70°C and the ambient temperature is 30°C.

If the rms-value of the solenoid current is reduced by 10% ( $I_{\text{eff\_neu}} / I_{\text{eff\_alt}} = 0.90$ ), the DSV temperature after current reduction will be:

$$T_{\text{dsv}} = (0.90)^2 \times (70 - 30) + 30 = 62.4^\circ\text{C}$$

As a result of the number of influencing variables the maximum allowable ambient temperature can only be acquired by experiment in an appropriate application. In this sense the upper ambient temperature limit of 65°C, indicated in the data sheet, has to be interpreted as an approximate value.

 **REMARK:**

If the monitored temperature exceeds the boundary of 90°C, the DSV is switched into the error state. The solenoid outputs are blocked, in order to prevent permanent electronics damage. After cooling off and acknowledging the error (refer to chapter "The system does not work" on page 33) the DSV can be started up again.

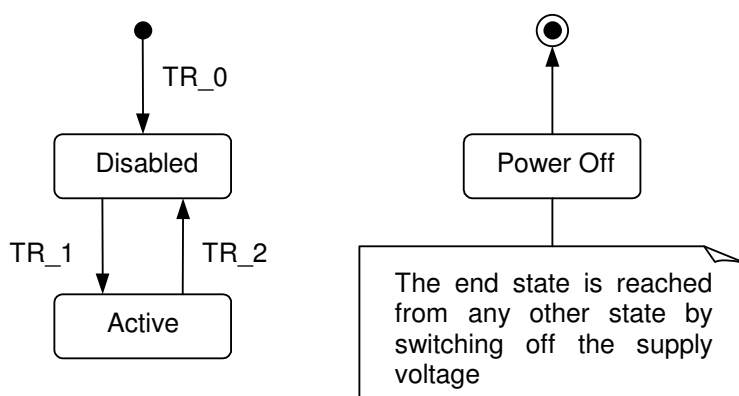


#### 4.4 Characteristic optimisation

The DSV electronics are provided with a possibility to optimise the characteristic "Preset value input – solenoid current output". The user is able to create a characteristic (e.g. a linearised characteristic) which matches his own application. The characteristic optimisation can be turned on or off (refer to "Parameters\_Valves" on page 21). This menu item is supported as from DSV version 1.2.2.8 and PASO version 1.3.0.3.

#### 4.5 DSV State machine

In the following, with the help of a status diagram it is described, how the start-up of the DSV-Electronics takes place and which statuses are reached when and how.



For a description of the start-up procedure for DSV-Electronics with fieldbus please refer to the document "Operating Instructions DSV CANopen - Protocol with Device Profile in accordance with CiA DSP 408".

The following table describes the possible statuses and what is done in these statuses:

Status	Description
Disabled	<ul style="list-style-type: none"> <li>The DSV-Electronics are disabled, no solenoid current will be active</li> <li>In this status, with the command "Local operation" resp. "PASO operation" (refer to the section "Commands_Local Operating / PASO " page 29) the operating mode can be set.</li> </ul>
Active	<ul style="list-style-type: none"> <li>The DSV-Electronics are enabled</li> <li>The DSV-Electronics can be operated with the selected operating mode</li> <li>Changing the operating mode is not possible</li> </ul>

The following table describes the transitions from one status to the next one:

Transition	Description
TR_0	Switching-on the supply voltage
TR_1	Enable This is made in the operating mode "Local" through the digital input "Enable control" (refer to the section "Digital inputs" page 11) and in the operating mode "Remote PASO" through the command "Enable" (refer to the section "Commands_Disable / Enable" page 29).
TR_2	Disable This is made in the operating mode "Local" through the digital input "Enable control" (refer to the section "Digital inputs" page 11) and in the operating mode "Remote PASO" through the command "Enable" (refer to the section "Commands_Disable / Enable" page 29).

## 4.6 Operating mode

The DSV-Electronics have 3 operating modes. The following table describes, what can be done in the different operating modes and how they can be activated:

Operating mode	Activating with	Description
Local	Menu point "Commands_Local Operating" or via fieldbus-object "Device local"	Operating via analogue and digital inputs on the DSV-Electronics
Remote PASO	Menu point "Commands_PASO Operating"	Operating direct with the PASO
Remote	Via fieldbus-object "Device local"	Operating via the fieldbus

The current operating mode is displayed in the status line (refer to the section "Starting of PASO DSV/SD6" page 37).

For more information about the operating mode "Local" and "Remote", please refer to the section "Commands\_Local Operating / PASO" page 29.

For more information about the possibilities for the DSV-Electronics with fieldbus, please refer to the document "Operating Instructions DSV CANopen - Protocol with Device Profile in accordance with CiA DSP 408".

## 4.7 Analogue inputs

- The applied analogue signal is digitalised in the 10-Bit A/D converter  
**Attention:** By the input range 4 ... 20mA, the resolution is < 10-Bit!
- Differential inputs**  
 All analogue inputs are differential inputs. Differential inputs are used if the ground potential of the external preset value generator does not agree with the ground on the DSV-Electronics card.  
 If the differential input is intended to use like an analogue input against ground, the - (minus) connection of the differential input must be connected to the ground of the DSV-Electronics.
- Analogue input 1** (for differential voltage signal)  
 Input voltage range: 0 ... +10V  
 0 ... ±10V (only for 2-solenoid version)
- Analogue input 2** (for differential current signal)  
 Input current range: 0 ... +20mA / 4 ... +20mA

## 4.8 Cablebreak detection

The analogue inputs can be detected for a cablebreak, as far as it concerns current inputs (depending on the DSV type). If a cablebreak is present, the corresponding solenoid outputs will be disabled or supplied with a fixed current value (refer to section "Analysis\_Diagnostics" on page 31), and the output "Error" will be activated. For the monitoring to be effective, the following conditions have to be fulfilled:

- The input signal must be a current value 4 ... 20mA
- The parameter "Cablebreak" must be on "On"  
 (refer to section "Configuration\_Scaling preset value" Page 25)



**Attention:** Until a cablebreak will be detected, a time from about 100ms will passed. During this time, the cylinder can make unintentional movements.

## 4.9 Digital inputs

- **Digital input " Enable control"**

The digital input is active-high (refer to section "Electrical specifications" page 4) and not galvanically separated.

If this input is set, the DSV-Electronics are enabled. Without this enable, no solenoid current will be output. This digital input can be set also through the parameterisation software PASO DSV/SD6 (refer to section "Configuration\_Digital I/O" page 28).

## 4.10 Outputs

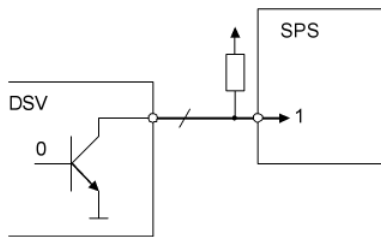
- **Proportional solenoid outputs A and B**

The max. 2 solenoid outputs have a current output **pulse-width-modulated** at 1000Hz with superimposed dither. Because the DSV-Electronics are integrated on the valve, the solenoid outputs are fixed connected and can not be disconnected from outside.

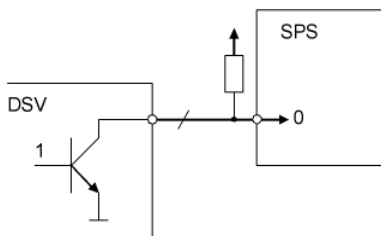
- **Digital output "Error"/"Ready"**

The digital output can be configured by the PASO DSV Software as "Error"/"Ready"-output or the output can be set fixed on 0 or 1 (refer to section "Configuration\_Digital I/O" on page 28). An once detected error is active until the DSV-Electronics will be disabled and enabled through the digital input "Enable control" or by PASO (refer to section "Configuration\_Digital I/O" on page 28).

Functioning of a cable break at the digital output with the setting "Error":  
**(Default setting)**

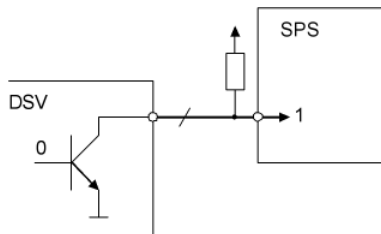


- if no error is active, the DSV supplies a 0 (no connection to GND)
- in the PLC, this gives a 1
- PLC must be programmed in the way that a 1 will be detected as "No error"
- if the cable breaks between DSV and PLC, the PLC is still getting a 1

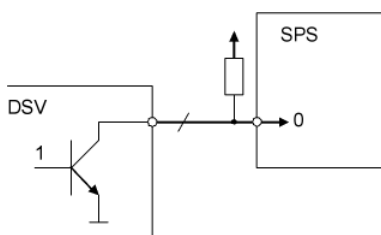


- if an error is active, the DSV supplies a 1 (connection to GND)
- in the PLC, this gives a 0
- PLC must be programmed in the way that a 0 will be detected as "Error"
- if the cable breaks between DSV and PLC, the PLC is getting a 1 again (= No error)

Functioning of a cable break at the digital output with the setting "Ready":



- if an error is active, the DSV supplies a 0 (no connection to GND)
- in the PLC, this gives a 1
- PLC must be programmed in the way that a 1 will be detected as "Error"
- if the cable breaks between DSV and PLC, the PLC is still getting a 1



- if no error is active, the DSV supplies a 1 (connection to GND)
- in the PLC, this gives a 0
- PLC must be programmed in the way that a 0 will be detected as "No error"
- if the cable breaks between DSV and PLC, the PLC is getting a 1 again (= Error)

## 4.11 Mode of operation

The following 4 modes of operation are possible:

- **Mode of operation "Preset unipolar (1-sol)"**  
This mode of operation is only possible with the 1-solenoid version  
With one analogue input (voltage or current), solenoid A from a 1-solenoid valve will be controlled.  
0% ... 100% preset value = I<sub>min</sub> ... I<sub>max</sub> solenoid A
- **Mode of operation "Preset unipolar (2-sol)"**  
This mode of operation is only possible with the 2-solenoid version  
With one analogue input (voltage or current), solenoid A and solenoid B from a directional valve will be controlled.  
0% ... 50% preset value = I<sub>max</sub> ... I<sub>min</sub> solenoid B  
50% ... 100% preset value = I<sub>min</sub> ... I<sub>max</sub> solenoid A
- **Mode of operation "Preset bipolar (2-sol)"**  
This mode of operation is only possible with the 2-solenoid version  
With one voltage preset value from 0 ... ±100%, solenoid A (positive voltage) and solenoid B (negative voltage) from a directional valve will be controlled.  
-100%... 0% preset value = I<sub>max</sub> ... I<sub>min</sub> solenoid B  
0%... +100% preset value = I<sub>min</sub> ... I<sub>max</sub> solenoid A
- **Mode of operation "Preset unipolar (2-sol single)"**  
This mode of operation is only possible with the 2-solenoid version.  
The 2-solenoids are driven independent to each other. To drive the two solenoids, two separate preset values are needed.  
With one analogue input (voltage or current) solenoid A will be controlled, with a second analogue input (voltage or current) solenoid B will be controlled.  
0% ... 100% preset value 1 = I<sub>min</sub> ... I<sub>max</sub> solenoid A  
0% ... 100% preset value 2 = I<sub>min</sub> ... I<sub>max</sub> solenoid B

**This mode of operation is not available on the standard DSV-Electronics.**

## 5 Operating and Indicating elements

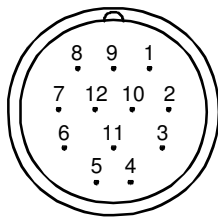
### 5.1 General

The DSV-Electronics have no operating and indicating elements. All inputs and outputs have to be contacted through the receptacle. Under the cover of the electronics housing, there is a RS232 (serial) interface, through which the parameterisation and the diagnostics can be made by using the PC-Parameterisation software PASO DSV/SD6

**In the factory, the DSV-Electronics are adjusted to the valve. Normally there is no need for the customer to do any adjustment himself.**

### 5.2 Receptacle view

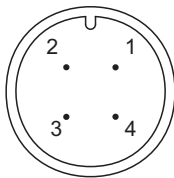
**Analogue interface:**



Receptacle M23, 12-pole (male)

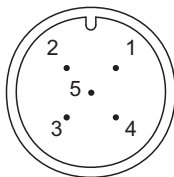
- 1 = Power supply +
- 2 = Power supply 0 VDC
- 3 = Stabilised output voltage (+10VDC)
- 4 = Preset value voltage +
- 5 = Preset value voltage -
- 6 = Preset value current +
- 7 = Preset value current -
- 8 = Reserved for options
- 9 = Reserved for options
- 10 = Enable control (digital input)
- 11 = Error or Ready signal (digital output)
- 12 = Chassis

**CANopen interface:**



Receptacle M12, 4-pole (male)

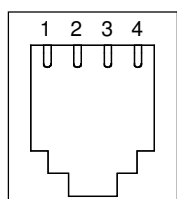
- 1 = Supply voltage +
- 2 = Reserved for extensions
- 3 = Supply voltage 0 VDC
- 4 = Chassis



Receptacle M12, 5-pole (male)

- 1 = not connected
- 2 = not connected
- 3 = CAN Gnd
- 4 = CAN High
- 5 = CAN Low

### 5.3 Serial interface RS 232 C



Connector RJ10

- 1 = GND
- 2 = TXD
- 3 = RXD
- 4 = not used

## 6 Commissioning

Please refer to the section "Safety rules" on page 6.

### 6.1 Connection instructions

The contact assignment of the following description refers to the section "Operating and Indicating elements" page 13 and to the section "Connection examples" page 16.

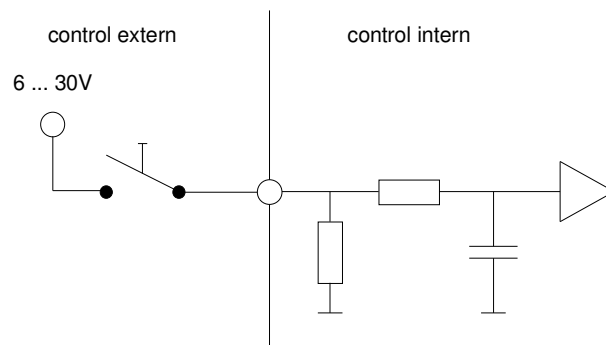
Note: Within this document there are different Device-interfaces described (refer to section "Description of the Function" page 7). Accordingly not every device uses all of the below described connections.

#### 6.1.1 Supply voltage

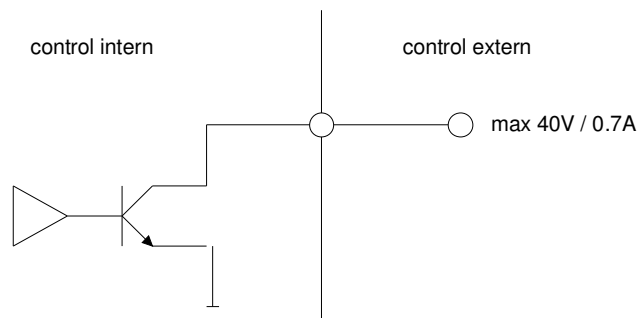
- For the dimensioning of the power supply, the maximum current demand of the solenoids (in case of directional control valves only the maximum current demand of 1 solenoid) has to be increased by the no load current from the DSV-Electronics (refer to the section "Electrical specifications" page 4).
- The limit values of the supply voltage and its residual ripple indispensably have to be complied with (refer to the section "Electrical specifications" page 4).
- The DSV-Electronics have to be protected with a slow acting fuse

#### 6.1.2 Digital inputs and outputs

- The digital input is active-high and not galvanically separated
- For activation, it has to be connected to a voltage between 6 ... 30VDC (e.g. power supply)

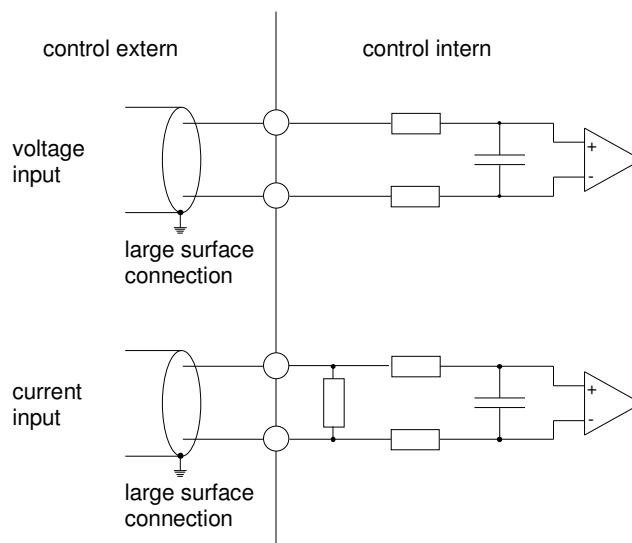


- The digital output is a "Lowside Switch" output (open collector)



### 6.1.3 Analogue inputs 10-Bit

- There is one voltage and one current input available.
- Both inputs are differential inputs.



### 6.1.4 Configuration of the analogue inputs 10-Bit

The analogue inputs 10-Bit can be configured as follows:

Input signal	Connector strip assignment	Input range
Voltage input against ground	+ to X1-4 / ground to X1-5	0 ... +10V 0 ... ±10V
Voltage differential input	+ to X1-4 / - to X1-5	0 ... +10V 0 ... ±10V
Current input against ground	+ to X1-6 / ground to X1-7	0 ... +20mA 4 ... +20mA
Current differential input	+ to X1-6 / - to X1-7	0 ... +20mA 4 ... +20mA

## 6.2 Connection examples

The contact assignment of the following description refers to the section "Operating and Indicating elements" page 13.

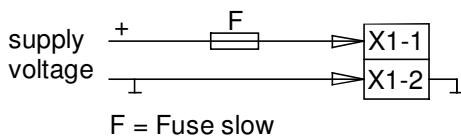


### REMARK:

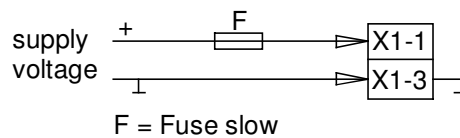
Within this document there are different Device-interfaces described (refer to section "Description of the Function" page 7). Accordingly the terminal assignments could be different.

### 6.2.1 Power supply

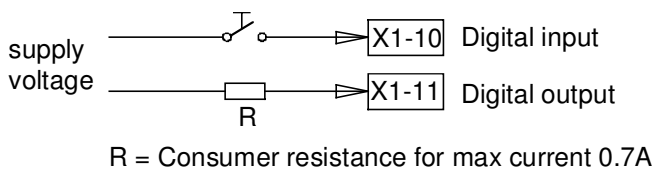
With analogue interface:



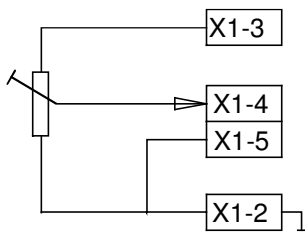
With CANopen interface:



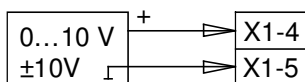
### 6.2.2 Digital inputs and outputs



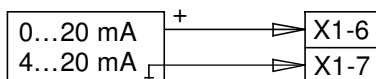
### 6.2.3 Preset value with potentiometer (not differential)



### 6.2.4 Preset value with an external voltage signal (differential)



### 6.2.5 Preset value with an external current signal (differential)





## 7 Settings

Please refer to the section "General information" on page 6.

### 7.1 Introduction

- The system- and parameter settings can be made via the RS232 interface with the PC-Parameterisation software PASO DSV/SD6 or via the fieldbus (only, if the DSV-Electronics have a fieldbus).
- For information about the operation via the PC-Parameterisation software PASO DSV/SD6 please refer to section "PASO DSV/SD6 Installation and Operation" page 34.
- For information about the possibilities for the DSV-Electronics with fieldbus, please refer to the document "Operating Instructions DSV CANopen - Protocol with Device Profile in accordance with CiA DSP 408".
- Depending on the connected DSV-Electronics, certain settings may be blocked.

### 7.2 General

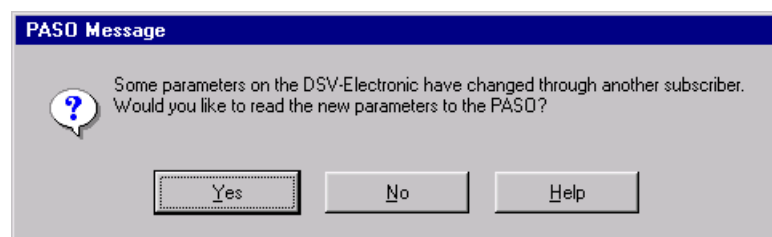
In order for some of the menus resp. sub-menus listed below to be able to be selected, first a parameter set must be present in the memory or else a new one has to be established. To do this, one of the following commands has to be executed:

- File\_New
- File\_Open
- Start PASO DSV/SD6 with the connection to the DSV-Electronics (in this case, the data are loaded from the DSV-Electronics)

### 7.3 Parameter inconsistency

The parameter settings can be made via the PC-Parameterisation software PASO DSV/SD6 or via the fieldbus (only, if the DSV-Electronics have a fieldbus). In any case, the current parameter values will be displayed in the PASO

If a parameter value will be changed through the fieldbus, this new value does not correspond with the displayed value in the PASO. In this case, the following message appears:



If the answer is "Yes", then the parameters will be read-in from the DSV-Electronics. Possible open parameter windows in the PASO will be closed automatically. If a parameter value will be changed through the fieldbus after the read-in of the new parameters, this message will appear again.

If the answer is "No", then the displayed parameter values in the PASO do not correspond to the current parameter value on the DSV-Electronics. This will be displayed in the status line in the field "parameter Inconsistency" (refer to the section "Starting of PASO DSV/SD6" page 37). If a parameter value will be changed through the fieldbus again, no further message will be appear in the PASO. But it's always possible to change also parameter values through the PASO.

## 7.4 Tips for the first commissioning

1. Connect the power supply, leave the DSV-Electronics still switched off
2. Switch off the hydraulic system (Hydraulics switched off)
3. Carefully check the connections
4. Switch on the power supply
5. Switch on the hydraulic system (Hydraulics switched on)
6. Because the DSV-Electronics are parameterised in the factory, there are no more adjustments necessary for the basic function
7. If the extend function will be used (e.g. ramps), establish the communication with PASO DSV/SD6 (connect the PC and the DSV-Electronics with an RS232 cable and start PASO DSV/SD6)
8. Adjust the parameters in the corresponding menus

## 7.5 Scaling

In the factory, the DSV-Electronics will be set to the following default scaling values:

Parameter	1-solenoid version	2-solenoid version
Mode of operation	acc. to type code	acc. to type code
Signal type	acc. to type code	acc. to type code
Used input	acc. to type code	acc. to type code
Inversion	no	no
Cablebreak detection	no	no
Scaling	10.000 %/V	10.000 %/V
Offset	0.0 %	0.0 %

In the section "Configuration\_Scaling preset value" page 25 you will find a detailed description of each of these parameters.

## 7.6 File - Menu

Contained in the File menu are the menu points, which concern the file handling and the printing of the parameters. In the "On Line"-mode, some of these menu points are blocked.

### 7.6.1 File\_New

This menu point is active only in the "Off Line"-mode.

With this command, a new file can be opened. Near it, all parameters are set to default values. A question will be displayed, if the current configuration will be retain or not.

If "Yes" will be selected, the current configuration will not be changed.

If "No" will be selected, a selection window will be displayed. In this window, the following configuration can be selected.

- Device type:  
The device type of the connected Wandfluh-Electronics
- Selection of the function (only with device type "DSV"):  
The function of the selected device type
- Number of solenoids:  
The number of solenoids from the selected device type

### 7.6.2 File\_Open...

This menu point is only active in the "Off Line"-mode.

With this command, an existing file from a storage medium is opened. First the file selection window appears. In this window the required file can now be selected and opened with "OK". If the configuration of the selected file does not correspond to the current configuration of the PASO DSV/SD6, a message will be displayed and the current configuration from the PASO DSV/SD6 will change automatically over to the new configuration of the selected file. The read parameter values will be checked in the case of a limiting value excess. If one or more parameter values are outside the tolerance, a message will be displayed and the parameter value will be set to the default value (refer to section "Limiting value error" page 39). The parameter values can now be edited and changed as required under the corresponding menu points.

### 7.6.3 File\_Save

With this command, the parameters are saved on a data storage medium. All parameter values of all input windows are saved under the current file name. If no file name has been defined yet, then first the file selection window appears (refer to "File\_Save as..." page 19).

### 7.6.4 File\_Save as...

With this command, the parameters are saved on a data storage medium. All parameter values of all input windows are saved under the file name entered.

First the file selection window appears. In this window the desired file name can now be entered. If the file name is entered without an extension, then the extension ".par" is automatically assigned to it. After actuating the key "Save", the file information window appears (see "File-Info" page 19). In this window the required entries can now be made. With the key "Save", the file is then finally saved under the selected file name. With the key "Cancel", one changes back to the file window.

### 7.6.5 File\_Print...

With this command, the current parameters are printed in ASCII text format. The File\_Print window is opened. In this window one can now select, whether the printing process is to be to a printer or to a file.

If the output is to be to a printer, then the Windows printer selection window is opened. **In this window, please do not select "Print to File"**. If you do, a new program start might possibly be required and you could lose any data not yet saved.

If the output is to be to a file, then the file selection window appears. In this window the desired file name can now be entered. If the file name is entered without an extension, then automatically the extension ".txt" is assigned to it.

### 7.6.6 File-Info

With this command, the file information of an existing file is displayed. The file information consists of the following parts:

Date, time	Date, time of saving.
File name:	The file name, under which the file has been saved.
Valve type:	The valve type of the connected DSV-Electronics at the moment of saving. If no DSV-Electronics are connected, then this indication remains empty. In case of saving during "On Line Operation", this indication is updated.
Operator:	The name of the originating person.
Remarks:	Possibility to enter remarks concerning the file.

When the File\_Info window appears during the execution of the command "File\_Save", then the corresponding entries can be made in the various fields (with the exception of "Date", "Time", "File name" and "Card type", which cannot be edited). When the File\_Info window appears during the execution of the command "File\_File-Info", then the various fields cannot be edited.

### **7.6.7 File\_Activate Off Line / Activate On Line**

#### **Off Line**

With this command, the connection with the DSV-Electronics is interrupted. All menu points, which call for a communication with the DSV-Electronics, are blocked. The PASO DSV/SD6 software now runs in the "Off Line mode". The loading, saving and the editing of parameter files is possible in this mode.

#### **On Line**

With this command, the connection with the DSV-Electronics is established. The communication with the DSV-Electronics is briefly tested. If the connection works, then the user has the option of taking over the parameters from the DSV-Electronics or of transferring the parameters to the DSV-Electronics. During the transfer of the parameters, the user has the possibility of aborting the operation.

Before parameters are transferred to the DSV-Electronics, a verification is carried out as to whether the configuration of the DSV-Electronics supports the parameter values. The configuration corresponds here to the number of the solenoid. If the configuration of the connected DSV-Electronics doesn't correspond to the current configuration of the PASO DSV/SD6, a message will be displayed and the current configuration from the PASO DSV/SD6 will change automatically over to the new configuration.

If the parameters have been taken over by the DSV-Electronics, then they will be checked in the case of a limiting value excess. If one or more parameter values are outside the tolerance, a message will be displayed and the parameter value will be set to the default value (refer to section "Limiting value error" page 39). The PASO DSV/SD6 will stay in the "Off Line"-mode. For going On Line in this case, the parameter must be transferred to the DSV-Electronics. If the transfer was successful and the limiting value check was also successful, then the software subsequently runs in the "On Line"-mode. The loading of parameter files is not possible in this mode.

The current mode will be displayed in the status line.

### **7.6.8 File\_Send parameters**

This menu point is only active in the "Off Line"-mode (as from PASO version 1.3.0.3).

Under this menu individual groups of parameters can be transmitted and saved from PASO onto the DSV-Electronics. A selection window appears from which a group can be selected. If necessary the configuration of PASO-DSV is adapted to that of the DSV electronics.

### **7.6.9 File\_DSV datarecord info**

This menu point is only active in the "On Line"-mode.

Under this menu the current data set information of the connected DSV-Electronics appears. The data correspond to the last change to the DSV-Electronics data carried out.

### **7.6.10 File\_SW-Download**

If the axis controller is equipped with a flash EPROM, then by choosing this command a new axis controller software can be loaded into the axis controller. This menu item is mainly used for customer specific solutions and it is protected by password. The menu is only active in "Off Line Mode". The download file with axis controller software together with the password will be provided by Wandfluh AG. After password input the File Selection Window appears. The download file can be selected and downloaded on the axis controller. Please notify the Paso instructions.

**ATTENTION: Any failed download will make the axis controller ineffective!**

### **7.6.11 File\_Exit**

With this command, the PASO DSV/SD6 is terminated. If parameter data have been changed and have not yet been saved, then the question appears, as to whether these data should be saved. This is referring only to the save in file. On the DSV-Electronics, the parameter will be saved automatically by clicking on the button "OK" in the corresponding windows (refer to section "Store parameter" page 39).

## 7.7 Parameters - Menu

In this menu, all parameter values of the DSV-Electronics will be adjusted.

### 7.7.1 Parameters\_Valves

In this menu, all settings specific to the valves will be made, i.e.:

- Solenoid current adjustments  
Minimal and maximal solenoid current, dither and deadband
- Characteristic optimisation solenoid A
- Characteristic optimisation solenoid B (in 2-solenoid systems)

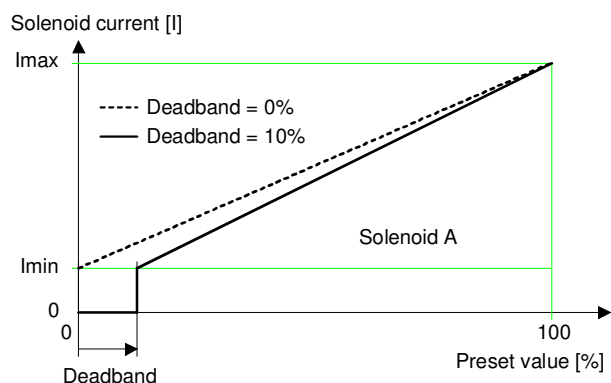
**By changing the valves parameters, the valve characteristic will also be changed. This has an influence on the system response.** With the menu item "Configuration\_Default setting", the values set in the factory can be reloaded at any time. As a standard the Characteristic optimisation is switched off.

#### 7.7.1.1 Solenoid current adjustments

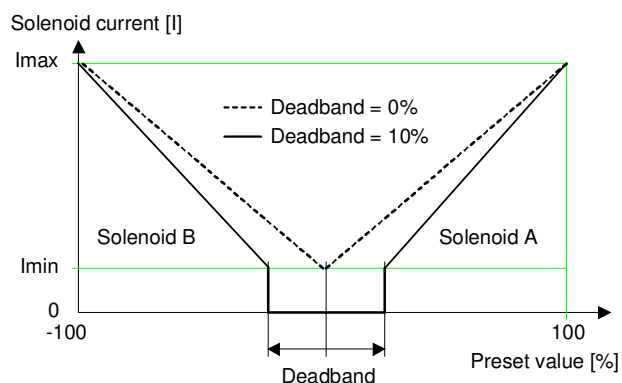
In the factory, the DSV-Electronics will be adjusted to the valve. In this window the main settings of the valve current can, if necessary, be changed.

Field	Parameter description	Range / Step
Direct solenoid operation	If this switch is selected, an internal preset value from 0% resp. 100% will be active during the setting of the Imin resp. Imax. If this switch is not selected, the external preset value will be active.  <b>This command is only active in the "On Line"-mode and if the operating mode is set to "Remote PASO".</b>	
Solenoid current	The minimum and the maximum solenoid current can be set separately for each solenoid output, corresponding to 0% resp. 100% preset value. In the "Off Line"-mode, the displayed current value is the theoretical preset current. This makes it possible to set the Imin/Imax values without a solenoid or a valve is connected to the DSV-Electronics. In the "On Line"-mode, if the Imin setting is active, a preset value of 0% resp. if the Imax setting is active, a preset value of 100% is automatically applied internally (only if the switch "Direct solenoid operation" is selected). As a result of the digitalisation, the numbers entered max be modified to less "rounded-off" number.	
Imin A	Set minimum solenoid current A. (= solenoid current by 0% preset value)	0 ... max. current 1.5mA
Imax A	Set maximum solenoid current A. (= solenoid current by 100% preset value) For the max. current refer to the section "Electrical specifications" page 4.	0 ... max. current 1.5mA
Imin B (only 2-solenoid version)	Set minimum solenoid current B. (= solenoid current by 0% preset value)	0 ... max. current 1.5mA
Imax B (only 2-solenoid version)	Set maximum solenoid current B. (= solenoid current by 100% preset value) For the max. current refer to the section "Electrical specifications" page 4.	0 ... max. current 1.5mA
Frequency	The dither frequency can be set in steps.	20, 25, 30, 35, 40, 45, 50, 55, 60, 70, 80, 100, 125, 165, 250, 500Hz
Level	Level of the superimposed AC signal	0 ... 199mA 1.5mA

Field	Parameter description	Range / Step
Deadband A	Preset value < Deadband = 0 mA solenoid current A Preset value >= Deadband = Imin .. Imax solenoid current A	0 ... 100% 0.1%
Deadband B (only with Mode of operation "Preset unipolar (2-sol. single)", at the other operation modes the deadband of solenoid A applies to both solenoids A and B)	Preset value < Deadband = 0 mA solenoid current B Preset value >= Deadband = Imin .. Imax solenoid current B	0 ... 100% 0.1%
Characteristic optimisation (as from DSV version 1.2.2.8 and PASO version 1.3.0.3)	Turns on or off the user specified characteristic optimisation	on/off



1-solenoid version



2-solenoid version

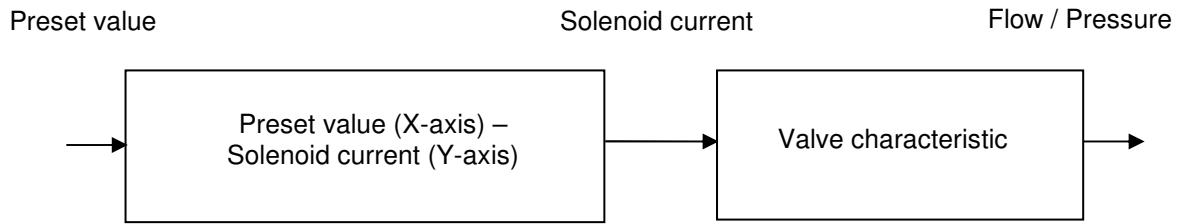
*Influence of Deadband adjustment on Solenoid characteristics  
 In the second example the Deadband range is: -10%...+10%*

### 7.7.1.2 Characteristic optimisation Solenoid A (as from DSV version 1.2.2.8 and PASO 1.3.0.3)

This menu enables the optimisation of the solenoid current adjustment of DSV-Electronics. A graphic is shown which represents the characteristic "Preset value (X-axis) – Solenoid current (Y-axis)". The graphic consists of 11 points, the first and the last point (100%) are preset. The first point depends on the preadjusted deadband A:

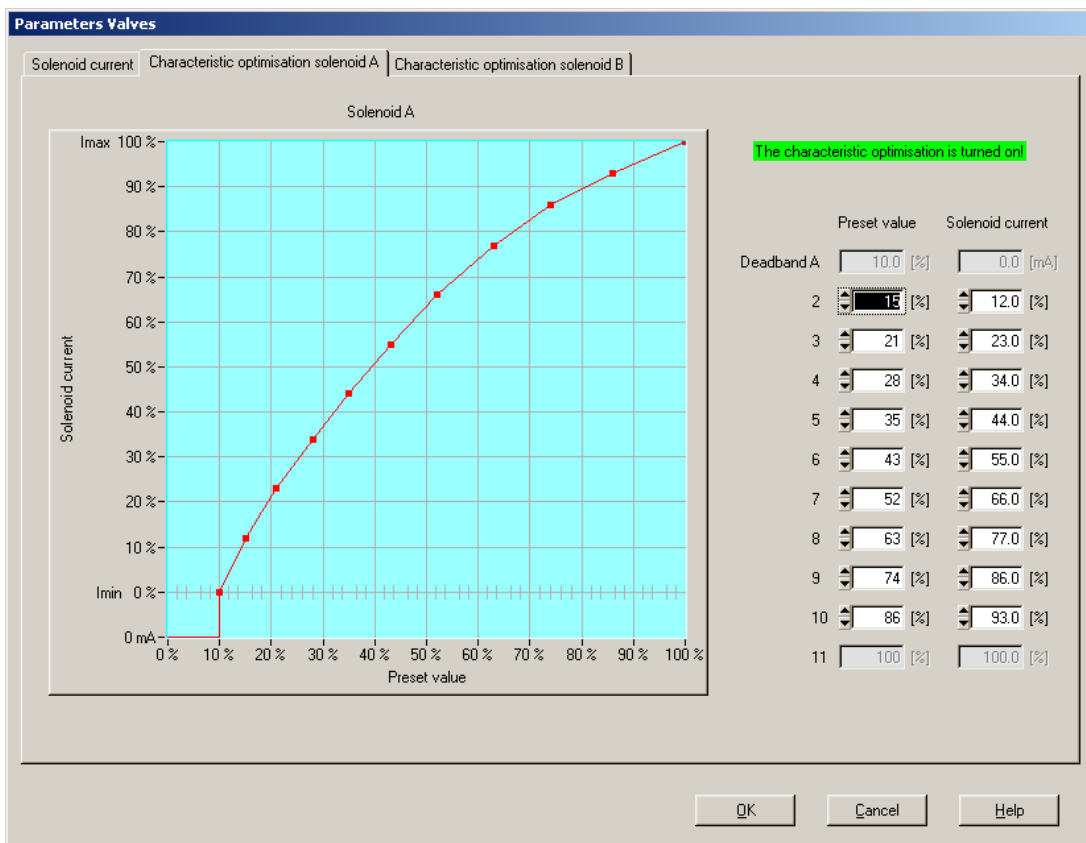
Index	X-Axis value	Y-Axis value
0	Deadband A	0
10	100	100

The other graphic points can be adjusted either by tracking with the mouse or by entering the value at the numeric inputs. The resolution of the X-values is in %, those of the Y-values in 0.1 %. The X-values cannot be falling.



At shipping ex work (default settings) the preset value, apart from the deadband, is transmitted proportionally to the solenoid current (default characteristic). In this case the characteristic “Preset value (X-axis) – Solenoid current (Y-axis)” is linear. The same behaviour occurs at any time when the characteristic optimisation is turned off.

By modifying the default linear characteristic “Preset value (X-axis) – Solenoid current (Y-axis)” e.g. a progressive valve characteristic “Current - Flow/Pressure” can be compensated in such a way that a linear relation between preset value and Flow / Pressure is realised. The characteristic “Preset value (X-axis) – Solenoid current (Y-axis)” in this case should be adjusted in the “opposite progressive” direction (refer to the example characteristic below). Additionally the characteristic optimisation must be turned on.



On the X-axis the preadjusted deadband is visible. Up to this value the solenoid current at the output is zero. The other solenoid current values are in the range Imin (0%) up to Imax (100%). Imin and Imax are adjusted in the menu “Solenoid current”. At an input value which is between two graphic points, the solenoid current is interpolated. If two or more preset values overlap, at the corresponding Preset value the highest current value is calculated.

In the case of an error in the characteristic values, the characteristic optimisation is automatically turned off (shown in the PASO-Status line, refer to „Starting of PASO DSV/SD6“ on page 37).

### 7.7.1.3 Characteristic optimisation Solenoid B (as from DSV version 1.2.2.8 and PASO 1.3.0.3)

This menu point is only selectable in a 2 solenoid operating mode. In the operating mode "Preset unipolar (2-solenoids single)" the deadband of solenoid B applies (the deadband is set separately for both solenoids). In the rest of the operating modes (refer to "Mode of operation" on page 12) the deadband of the solenoid A applies.

The setting of the characteristic points is the same as at the solenoid A.

### 7.7.2 Parameter\_Ramps

In this window, all adjustments according to the ramp function will be made.

Field	Parameter description	Range / Step
Ramps	After a preset value jump, the new preset value is approached via a linear ramp (with the set ramp time). A ramp time up and ramp time down can be set separately for each solenoid.	
Ramp A up	The set ramp time refer to a preset value jump from 0% to 100%	0 ... 51s 0.05s
Ramp A down	The set ramp time refer to a preset value jump from 100% to 0%	0 ... 51s 0.05s
Ramp B up (only 2-solenoid version)	The set ramp time refer to a preset value jump from 0% to 100%	0 ... 51s 0.05s
Ramp B down (only 2-solenoid version)	The set ramp time refer to a preset value jump from 100% to 0%	0 ... 51s 0.05s



## 7.8 Configuration - Menu

In this window, the settings of the function of the DSV-Electronics will be made.

### 7.8.1 Configuration\_Mode of operation

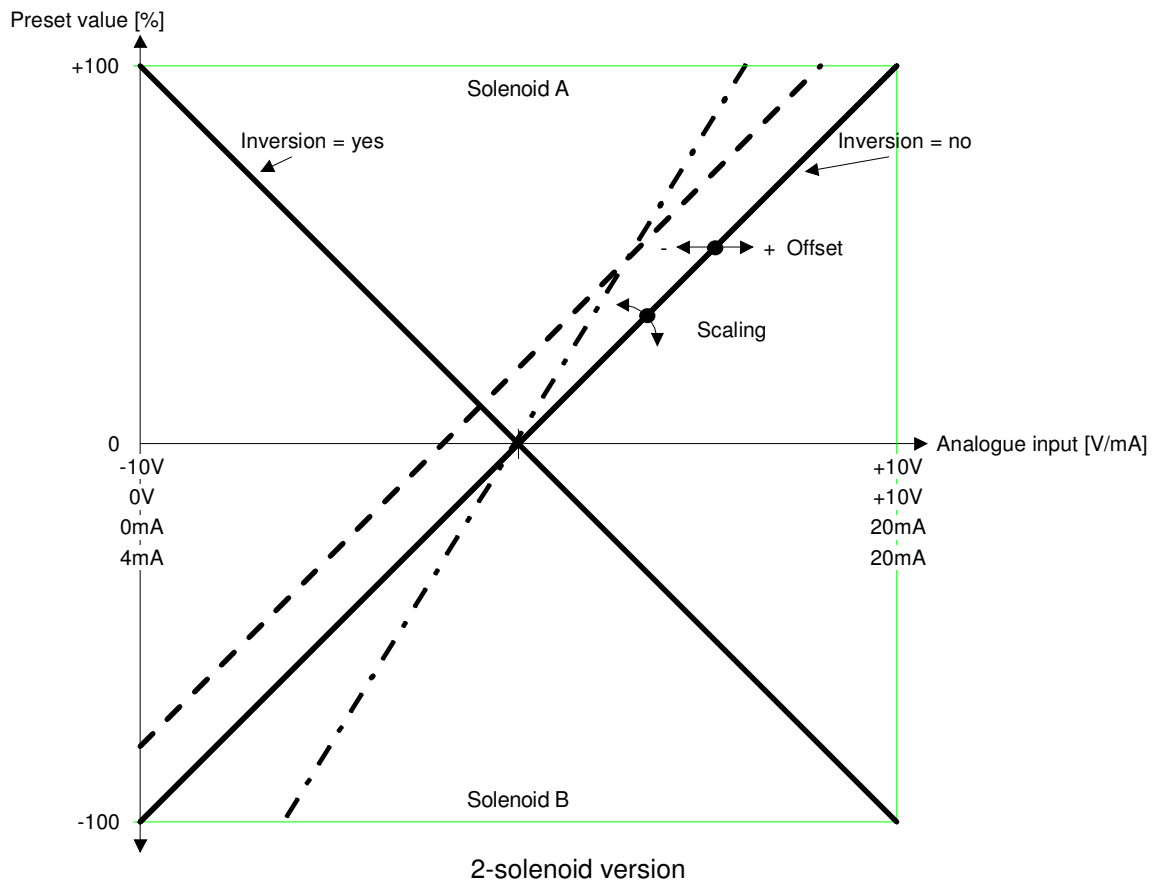
In this window, the mode of operation of the DSV-Electronics will be adjusted.

Field	Parameter description	Range / Step
Mode of operation	Select the desired mode of operation (refer to section "Operating mode" page 12). The signal type can be changed automatically depending on the selected mode of operation.	Preset unipolar (1-sol) Preset unipolar (2-sol) Preset bipolar (2-sol) Preset unipolar (2-sol. single)
Error handling	Select the DSV state in case of an error: Solenoid activating with 0mA (off) or with two-thirds of the current range Imin...Imax (on), refer to section "Analysis_Diagnostics" on page 31.	Solenoid A+B off Solenoid A on Solenoid B on Solenoid A+B on

### 7.8.2 Configuration\_Scaling preset value

In this window, the adjustments and scaling values of the preset value signal will be adjusted.

Field	Parameter description	Range / Step
Input Signal (only with Mode of operation "Preset unipolar (2-sol. single)")	In the mode of operation "Preset unipolar (2-sol. single)", one can select, whether the following settings of the analogue input apply to the solenoid A or B.	Preset value A Preset value B
Signal type	Select the desired signal type. Depending on the selected mode of operation, not all signal types are available.	0...10 VDC +/-10 VDC 0...20 mA 4 ..20 mA
Used input	There is one voltage and one current input available. It will be adjusted automatically the correct input corresponding to the selected signal type.	Analnp [V] Analnp [mA]
Inversion	The value of the analogue input can be inverted (refer to the below picture).	no yes
Cablebreak detection	Switch on/off the cablebreak detection of the analogue inputs (refer to section "Cablebreak detection" page 10).	no yes
Scaling	The adjustment of how many per cent the preset value will change by an alteration of 1V resp. 1mA on the analogue input (= gain) can be made here (refer to the below picture). If the signal type will be changed, the parameter Scaling will be set automatically to the default value (refer to below table). <b>Attention:</b> If the parameter Scaling does not correspond to the default value, the resolution is < 10-Bit!	0.001 ... 100.000% 0.001%
Offset	With this parameter the zero point of the analogue input signal is set (refer to the figure below). Depending on the signal type, the setting is in V or mA.  Voltage:  Current:	0 ... ±10V 0.01V 0 ... ±20mA 0.02mA

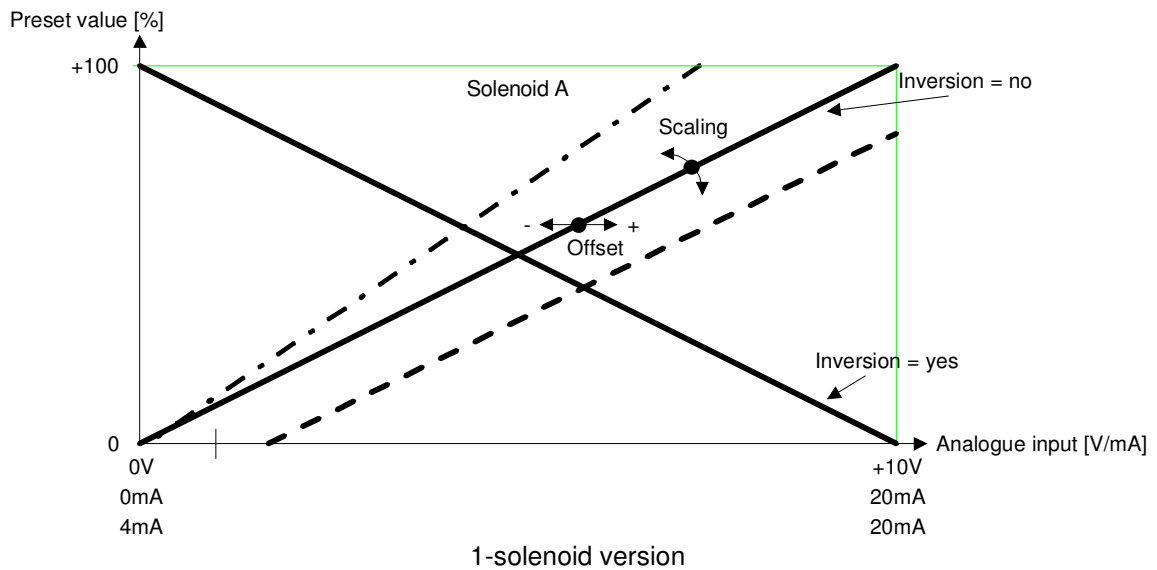


Examples:

Used analogue signal: 4 ... 20 mA  
 Selected signal type: 4 ... 20 mA  
 Signal working range: 20 mA - 4 mA = 16 mA  
 Signalrange per solenoid: 16 mA / 2 = 8 mA  
 Middle of signal: 4 mA + 8 mA = 12 mA  
 Adjustment Offset: 12 mA - (4 mA + 8 mA) = **0 mA**  
 Adjustment Scaling: 100 % / 8 mA = **12.5 %/mA**

Used analogue signal: 1.0 ... 8.0 V  
 Selected signal type: 0 ... 10 V  
 Signal working range: 8.0 V - 1.0 V = 7 V  
 Signalrange per solenoid: 7.0 V / 2 = 3.5 V  
 Middle of signal: 1.0 V + 3.5 V = 4.5 V  
 Adjustment Offset: 4.5 V - (10 V / 2) = **-0.5 V**  
 Adjustment Scaling: 100 % / 3.5 V = **28.57 %/V**

Used analogue signal: -9.0 ... +9.0 V  
 Selected signal type: +/-10 V  
 Signal working range: 9.0 V - (-9.0 V) = 18.0 V  
 Signalrange per solenoid: 18.0 V / 2 = 9.0 V  
 Middle of signal: -9.0 V + 9.0 V = 0.0 V  
 Adjustment Offset: 0.0 V - (20 V / 2) = **0.0 V**  
 Adjustment Scaling: 100 % / 9.0 V = **11.11 %/V**


**Examples:**

Used analogue signal: 4 ... 20 mA  
 Selected signal type: 4 ... 20 mA  
 Signal working range: 20 mA - 4 mA = 16 mA  
 Signalrange per solenoid: 16 mA (= Signal working range)  
 Adjustment Offset: 4 mA - 4 mA = **0 mA**  
 Adjustment Scaling: 100 % / 16 mA = **6.25 %/mA**

Used analogue signal: 2.0 ... 9.0 V  
 Selected signal type: 0 ... 10 V  
 Signal working range: 9.0 V - 2.0 V = 7 V  
 Signalrange per solenoid: 7.0 V (= Signal working range)  
 Adjustment Offset: 0.0 V - 2.0 V = **-2.0 V**  
 Adjustment Scaling: 100 % / 7.0 V = **14.28 %/V**

**Default-values of the parameter "Scaling"**

Mode of operation	Signal type			
	0 ... 10 VDC	+/-10 VDC	0 ... 20 mA	4 ... 20 mA
Preset unipolar (1-Sol)	10 %/V	--	5 %/mA	6.25 %/mA
Preset unipolar (2-sol)	20 %/V	--	10 %/mA	12.5 %/mA
Preset bipolar (2-Sol)	--	10 %/V	--	--
Preset unipolar (2-Sol single)	10 %/V	--	5 %/mA	6.25 %/mA

### 7.8.3 Configuration\_Digital I/O

With this command, the digital inputs of the connected DSV-Electronics can be set to active, not active or released.

Field	Parameter description	Range / step size
Digital inputs	Set digital input by software	1
	Reset digital input by software	0
	Activate external digital input	X
Digital outputs	Set digital output with software	1
	Reset digital output with software	0
	The digital output shows error	X Error
	The digital output shows ready	X Ready
	(refer to section "The system does not work" on page 33).	

### 7.8.4 Configuration\_Default setting

This menu point is only active in the "On Line" - mode and in the DSV state "Disabled" (refer to section "DSV State machine" page 9).

With this command, the default settings made in the factory will be loaded on the connected DSV-Electronics and saved into the memory. After saving, the default settings are read to the PC in order to refresh the parameter values in PASO.

### 7.8.5 Configuration\_Interface

With this command, the serial output port for the communication with the connected control card can be selected. This setting is automatically saved in the file "konfig.kon" and taken over with a new start.

If the software is in the "On Line"-mode, then the communication is broken off when the "OK" key is pushed. If the software is in the "Off Line"-mode, then a confirmation window appears with the question, as to whether the communication with the DSV-Electronics is to be tested. If the communication works, a corresponding message is issued and a connection with the DSV-Electronics can be established via the menu point File\_Activate On Line.

If no communication can be established (transmission interference or no DSV-Electronics connected), then an error message appears. All menu points and keys, which contain an action in connection with the communication, are then blocked.

Field	Parameter description	Range / Step
Output port	The serial port of the PC can be selected.	COM1 - COM9

### 7.8.6 Configuration\_Language

In this window, the language can be selected, with which the PASO DSV/SD6 will be inscribed. This setting is automatically saved in the file "konfig.kon" and taken over with a new start.

Field	Parameter description	Range / Step
Language	Field, from which the desired language can be selected.	deutsch english français

## 7.9 Commands - Menu

In the Commands menu, direct control commands can be transmitted to the DSV-Electronics.

### 7.9.1 Commands\_Valve operation

This menu point is only active in the "On Line"-mode and if the operating mode is set to "Remote PASO" (refer to the section "Mode of operation" on page 12).

In this window, the valve can be directly actuated via the elements available in the window.

Field	Parameter description	Range / Step
Current	The solenoid current can be preset either with the slide control or in the numerical field.	0...100% (Imin...Imax)
Operation	Through this key, the current set can be switched to the solenoid or else the solenoid can be switched to be without current.	Start / Stop
Solenoid change	If a two solenoid valve is available, then with this switch one can changeover between solenoid A and - B.	A / B

### 7.9.2 Commands\_Local Operating / PASO Operating

This menu point is only active in the "On Line"-mode and if the DSV-state is set to "Disabled" (refer to the section "DSV State machine" on page 9).

If the command "PASO operating" will be activated (only possible if the operating mode is set to "Local" or "Remote"), the DSV-Electronics can be operated direct through the PASO with the commands "Valve operation" and "Enable / Disable". There is no operation through the analogue and digital inputs or through the fieldbus possible. The operating mode will be changed to "Remote PASO".

If the command "Local operating" will be activated (only possible if the operating mode is set to "Remote PASO"), the DSV-Electronics can be operated either through the analogue and digital inputs or through the fieldbus. A direct valve operation (refer to section "Commands\_Valve operation" page 29) is not possible. The operating mode will be changed to "Local".

### 7.9.3 Commands\_Disable / Enable

This menu point is only active in the "On Line"-mode and if the operating mode is set to "Remote PASO" (refer to the section "Mode of operation" on page 12).

With the command "Enable", the DSV-Electronics will be set to the state "Active" (refer to the section "DSV State machine" on page 9) and it is generally enabled.

With the command "Disable", the DSV-Electronics will be set to the state "Disabled" (refer to the section "DSV State machine" on page 9) and it is generally disabled.

## 7.10 Fieldbus\_Fieldbus Info

If the DSV-Electronics have an fieldbus, with this menu point the necessary bus node adjustments can be made. Also bus states will be displayed here.

If the DSV-Electronics have no fieldbus, the message "The connected DSV-Electronics don't provide an external bus port" will appear.

For more information about the possibilities for the DSV-Electronics with fieldbus, please refer to the document "Operating Instructions DSV CANopen - Protocol with Device Profile in accordance with CiA DSP 408".

## 7.11 Analysis - Menu

In the Analysis menu, measured values and possible errors on the DSV-Electronics can be displayed on-line.

### 7.11.1 Analysis\_Values

This menu point is active only in the "On Line"-mode.

With this command, all relevant data of the connected DSV-Electronics are read-in and displayed. The values are continually updated (on-line).

Field	Description	Unit
Fieldbus preset value A (only for DSV with fieldbus)	Command signal A from the fieldbus	Inc
Analogue input A	Voltage- resp. current value of the analogue input A	V mA
Preset value A	Scaled preset value A	%
Fieldbus preset value B (only for DSV with fieldbus and only with Mode of operation "Preset unipolar (2-sol. single)")	Command signal B from the fieldbus	Inc
Analogue input B (only with Mode of operation "Preset unipolar (2-sol. single)")	Voltage- resp. Current value of the analogue input B	V mA
Preset value B (only with Mode of operation "Preset unipolar (2-sol. single)")	Scaled preset value B	%
Preset solenoid current A	Control signal before solenoid output A If applicable this control signal is derated by temperature monitoring.	mA
Solenoid current A	Solenoid current of solenoid A	mA
Preset solenoid current B	Control signal before solenoid output B If applicable this control signal is derated by temperature monitoring.	mA
Solenoid current B	Solenoid current of solenoid B	mA
Supply voltage	Power supply voltage of the card	V
DSV Temperature	Current temperature of DSV-Electronics	°C
Digital inputs	Logical conditions of the digital inputs: • When the inputs are set • When the inputs are not set	1 0
Digital outputs	Logical conditions of the digital outputs: • When the outputs are set • When the outputs are not set	1 0

### 7.11.2 Analysis\_Diagnostics

With this command, possibly present errors on the connected DSV-Electronics are indicated. The error is read in once. A complete description of the error will be displayed.

If an error is detected, the solenoid current outputs will either be disabled or supplied with a fixed current value (two-thirds of the corresponding current range  $I_{min}...I_{max}$ ). Which of these two states the DSV electronics will reach in case of error, is determined by the parameter "Error handling" (refer to section "Configuration\_Mode of operation" on page 25).

In the following cases however, the solenoid current outputs are always disabled (0mA), regardless of the parameter "Error handling":

- Short-circuit at the solenoid current output
- Temperature error
- Digital input (Enabling) on '0' with operating mode "Local" (refer to section "Operating mode" on page 10)
- Error event with operating mode "Remote PASO" (refer to section "Operating mode" on page 10)

**In the status line of the main window it will be displayed if an error is present (State: Error) or not (State: Ready).**

Diagnosics:	Error	Error remedy
Power supply fault	If the supplied voltage < 18VDC.	Disable and reenale the control
Cable break (setpoint current input)	This error is only detected, if the parameter "cablebreak" is set to "yes" and the signal type of the corresponding input is set to "4...20 mA".	Disable and reenale the control
Short circuit solenoid output	There is a short circuit on the solenoid output	Switch off and on the control or resave the parameters
Temperature error	The DSV temperature has exceeded the error limit	– Disable the control – Cool the DSV – Reenable the control again

### 7.11.3 Analysis\_Temperature statistics

With this command the temperature history of the DSV controller is displayed.

All statistic values are saved once per hour in the DSV non-volatile memory. If the DSV is operated for less than one hour, the values of the last operation period are not saved.

At the opening of the window, the current statistic values are read from the memory and displayed. While the window is open, the displayed values are not continuously updated.

Field	Description	Unit
Min. temperature value	Shows the deepest ever measured internal DSV temperature. Is updated continuously in the background, however only once per hour saved in memory.	°C
Max. temperature value	Shows the highest ever measured internal DSV temperature. Is updated continuously in the background, however only once per hour saved in memory.	°C
Temperature classes	Shows the frequency of the measured internal DSV temperatures, distributed over 6 temperature classes. Every hour the current temperature is measured and the corresponding temperature counter is increased with one step and subsequently saved in memory, together with the minimal and maximal temperature. If one of the counters reached the highest value of 65535, the counters will not be updated furthermore.	

## **7.12 Help - Menu**

The PASO DSV/SD6-Help based on the standard Windows-Help construction.

**With the button "Help" in each window, the corresponding help text will be displayed.**

### **7.12.1 Help\_Description of the function**

A general information about the function of the DSV-Electronics will be displayed.

### **7.12.2 Help\_Contents**

The list of contents of the PASO DSV/SD6-Help will be displayed. By clicking on the desired subject, the corresponding help text will be displayed.

### **7.12.3 Help\_Index**

The list of index of the PASO DSV/SD6-Help will be displayed. With entering a search item, all subject corresponding to the search item will be listed.

### **7.12.4 Help\_DSV Identification**

This menu point is only active in the "On Line"-mode.

Here the current version of the hardware and the software from the connected DSV-Electronics will be read and displayed.

### **7.12.5 Help\_WANDFLUH on the Web**

A link to the WANDFLUH home page.

### **7.12.6 Help\_Info**

Information about PASO DSV/SD6 and its version.



## 8 The system does not work

In this section, the generally possible errors and the procedures for eliminating them are listed and explained.

### 8.1 Procedure

The following check list can be used to help, if a problem is arised.

The state on the DSV-electronics in case of an error can be selected with the parameter "Error handling" (refer to section "Configuration\_Mode of operation" page 25)

Question:	Action:	Possible errors and causes
State: Error	Analysis_Diagnostics Power supply error	<ul style="list-style-type: none"> <li>The supplied voltage is under 18VDC. The error is also displayed if a supplied voltage interruption occurred (<math>t &gt; 250\text{ms}</math>).</li> <li>Is the power of the power supply sufficient?</li> <li>Is the AC voltage too high (refer to section "Electrical specifications" page 4)</li> <li>When the error is cleared, disable the controller for a short period and re-enable (Digital Input)</li> </ul>
	Analysis_Diagnostics Cable break input 2	<ul style="list-style-type: none"> <li>The cable break detection functions only with 4 ... 20mA preset value.</li> <li>The preset value signal is absent or is smaller than 4mA.</li> <li>Check the preset value signal connections between the preset value encoder and DSV-Electronics.</li> <li>If the cablebreak detection is not desired, switch off the cablebreak function in the menu "Configuration".</li> <li>When the error is cleared, disable the controller for a short period and re-enable.</li> </ul>
	Analysis_Diagnostics Short circuit solenoid output	<ul style="list-style-type: none"> <li>There is a short circuit on the solenoid output</li> <li>Switched off and on the DSV-Electronics.</li> </ul>
	Analysis_Diagnostics Temperature error	<ul style="list-style-type: none"> <li>The DSV temperature has exceeded the error limit</li> <li>Disable the control (Digital Input low)</li> <li>Cool the DSV</li> <li>Reenable the control again</li> </ul>

## 9 PASO DSV/SD6 Installation and Operation

The parameterisation software PASO DSV/SD6 serves for the parameterising and diagnosing of all electronic cards DSV and SD6 of WANDFLUH AG company. The software provides an user interface, through which by means of a keyboard or a mouse all adjustments and settings can easily be carried out. The communication with the digital card takes place either through a USB-interface (SD6) or through a serial RS 232 interface (DSV).

**The parameterisation software PASO DSV/SD6 can only be utilised in connection with DSV- or SD6-Electronics of the WANDFLUH AG company.**

A description of the different PASO versions is located in the file "history.pdf". This file is located in the directory where the PASO will be installed.

### 9.1 System Requirements

In order to be able to correctly utilise the PASO DSV/SD6 with the DSV Electronics, an IBM-compatible PC with the following requirements has to be available:

- Processor 486 or higher, min. 33MHz, min. 8MB RAM  
Recommended: 80586 66MHz or higher, 16 MB RAM or more
- Free harddisk storage space of minimum 4MB, plus storage space for program files
- Operating system MS-WINDOWS 2000 or XP
- Standard VGA or higher graphics card, recommended resolution 800x600
- At least one serial RS232 interface  
Notebooks without a RS232 interface, need an additional hardware like a PCMCIA-card → RS232 converter or a USB → RS232 converter to get the proper RS232 interface.

**Note:**

Not all USB → RS232 converters work properly, if necessary we assist you with the choice of the right one.

- Serial RS232 cable 1:1 (RxD and TxD not crossed)

### 9.2 Installation

The PASO software can be downloaded via the Internet free of charge ([www.wandfluh.com/Download](http://www.wandfluh.com/Download) => PASO DSV/SD6 => Download Program files) or on request delivered on an installation-CD.

The installation of the PASO is then carried out by executing the file "setupPasoDSVvxxxx.exe", where "xxxx" means the current version (e.g. setupPasoDSVv1000.exe, see also version index). An installation program takes over the complete installation of PASO. To them, the Windows Installer must be installed. This is normally a part of the Windows Environment. If not, please download it from the Microsoft Website.

If there is already a version of the PASO software installed on the PC, one can select whether the existing version should be overwritten or removed.

The helpfiles are included in the setup and are installed automatically.

### 9.3 Connection to the Wandfluh card

The connection between the PC, on which the parameterisation software PASO DSV/SD6 is installed, and the DSV-Electronics takes place through the serial RS 232 interface. To do this, a 1:1 cable (RxD and TxD not crossed) has to be connected with the desired output port on the PC and with the RS 232 socket on the DSV-Electronics.

## 9.4 Mode "Off Line" and "On Line"

The parameterisation software PASO DSV/SD6 runs in one of two modes:

- In the **"Off Line"-mode**, the processing of the parameter files is possible. This has no influence in a possible connected Wandfluh-Electronics device. The communication with the Wandfluh-Electronics is not active. A connection is allowed, but not necessary.

All menu points and keys, which involve an action in connection with the communication, are then blocked.

- In the **"On Line"-mode**, there is active communication with the Wandfluh-Electronics. Every change becomes immediately effective in the Wandfluh-Electronics. In this mode, the loading and processing of files is not possible. Only the saving of the currently active parameters to a file is possible.

There is permanent communication between the PASO DSV/SD6 and the connected Wandfluh-Electronics. **Because of that, it is not allowed to disconnect the connection to the Wandfluh-Electronics or to switch off the Wandfluh-Electronics in the "On Line"-mode.**

The change between the two modes takes place through the menu point "File\_Activate On Line / Activate Off Line". Near it, it's possible to select whether the data should take over from the Wandfluh-Electronics (data flow Wandfluh-Electronics => PASO) or whether the Wandfluh-Electronics should be reprogrammed with the new actual data (data flow PASO => Wandfluh-Electronics).

With data flow PASO => Wandfluh-Electronics it can be selected, if all parameters or only the not valve specific parameters should be overwritten. The valve specific parameters (Imin, Imax, Dither frequency, Dither level, Deadband) will be optimised to work off the valve in the factory. When override these parameters, the valve characteristic will change. The valve characteristic (hydraulic size - signal-characteristics) according to data sheet can be changed.

In case of an interference in the communication, the controlling of the Wandfluh-Electronics is not assured anymore. An error message follows and the PASO DSV/SD6 software automatically changes over to the "Off Line"-mode (refer to "Communication interruption" page 35).

## 9.5 Communication start up

When the parameterisation software PASO DSV/SD6 is started up, a check takes place, as to whether a communication with the Wandfluh-Electronics is possible. If no communication can be established, an error message appears (refer to "Communication interruption" page 35). If a communication with the connected card is possible, a check will be made, whether the current configuration of the PASO DSV/SD6 corresponds to the configuration of the connected Wandfluh-Electronics. If yes, the parameters will be transferred from the Wandfluh-Electronics to the PASO DSV/SD6. If no, a message will be displayed and the current configuration from the PASO DSV/SD6 will change automatically over to the new configuration and the parameters will be transferred from the Wandfluh-Electronics to the PASO DSV/SD6.

## 9.6 Communication interruption

If no communication is possible during the start up or the interruption of the communication occurs during the operation of the parameterisation software PASO DSV/SD6, then an error message appears and the PASO DSV/SD6 software is set to the "Off Line"-mode. All menu points and keys, which involve an action in connection with the communication, are now blocked. In order to re-establish a communication, the menu point "File\_Activate On Line" has to be selected.

Possible reasons for a communication interruption are:

- No Wandfluh-Electronics are connected
- The connected Wandfluh-Electronics are not switched on
- The selected RS232 COM port is wrong (refer to section "Configuration\_Interface" page 28)
- The connection cable is defect or not plugged in

## 9.7 Program description

### 9.7.1 Description of the keys

TAB	Transfer to the next input element
SHIFT-TAB	Transfer to the previous input element
ENTER	Execution of the active input element or conclusion of an input.
ESC	Abort, undoing of an action. In many cases corresponds to the key "Cancel".
F1	Activate the key "Help"

### 9.7.2 Input elements

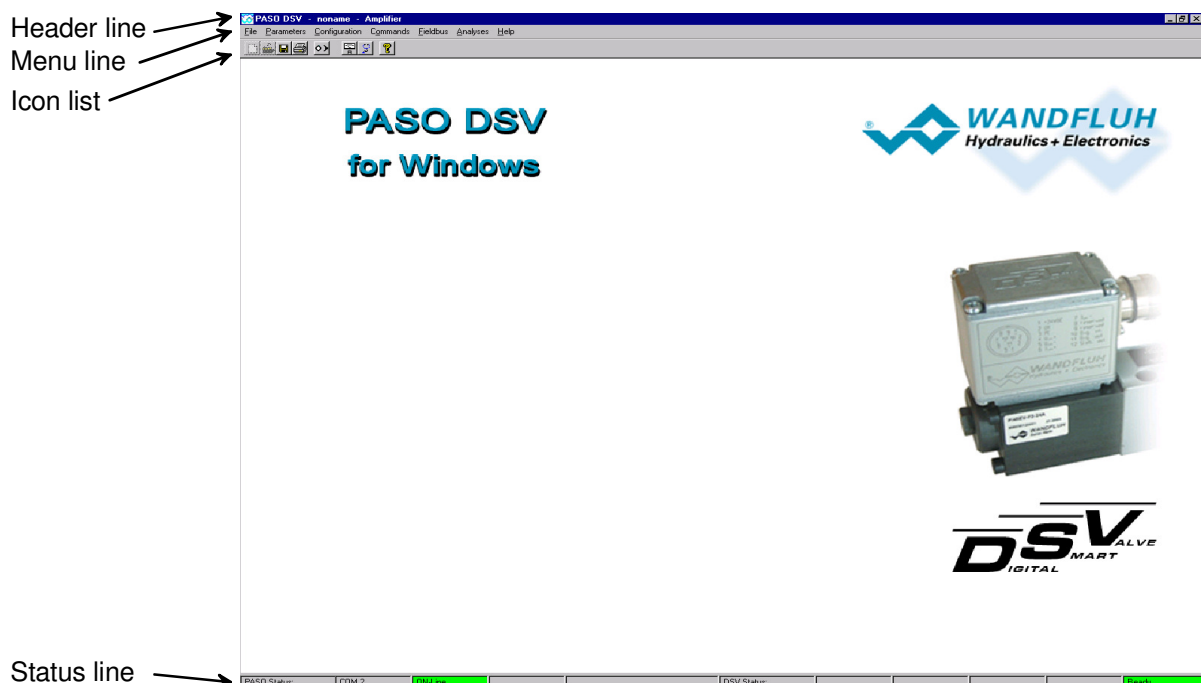
Key	<p>A key executes the action, with which it is inscribed.</p> <p>Actuation of a key through the keyboard:</p> <ul style="list-style-type: none"> <li>• Push the key TAB, until the key becomes active.</li> <li>• Push the key ENTER. The action is now carried out.</li> <li>• Push the key ALT and the underlined letter of the key inscription: The action is carried out immediately.</li> </ul> <p>Actuation of a key with the mouse:</p> <ul style="list-style-type: none"> <li>• Click on the corresponding key. The action is now carried out.</li> </ul>
Switch	<p>By means of a switch, a selection between two possibilities is possible. A switch is either switched on or - off.</p> <p>Actuation of a switch through the keyboard:</p> <ul style="list-style-type: none"> <li>• Push the keys UP or HOME to switch on the switch.</li> <li>• Push the keys DOWN or END to switch off the switch.</li> <li>• Push the SPACE key for changing over (switching over).</li> </ul> <p>Actuation of a switch with the mouse:</p> <ul style="list-style-type: none"> <li>• Click on the switch for changing over (switching over).</li> </ul>
Input field	<p>The input fields enable the entering of numbers or text. All applicable keys of the keyboard are allowed, including the keys HOME, END, LEFT, RIGHT. In certain cases when taking it over, the input is checked and if necessary an error message is issued.</p> <p>Actuation of an input field through the keyboard:</p> <ul style="list-style-type: none"> <li>• Push the key ENTER or TAB to finish with the input field.</li> <li>• In the case of input fields with ARROW keys UP and DOWN: Actuation of the UP-/DOWN - keys for the step by step changing of the values.</li> </ul> <p>Actuation of an input field with the mouse:</p> <ul style="list-style-type: none"> <li>• Click within the input field, in order to position the cursor in it.</li> <li>• In the case of input fields with ARROW keys UP and DOWN: Click on the corresponding arrow for the step by step changing of the values.</li> </ul>

<p>Selection field</p>	<p>The selection fields enable the selection from various possibilities.</p> <p>Actuation of a selection field through the keyboard:</p> <ul style="list-style-type: none"> <li>• Push the SPACE key to open all selection possibilities. With the help of the keys UP, DOWN, HOME, END, make the required selection. Subsequently push the ENTER key to confirm the required selection, or else the ESC key to undo the selection.</li> <li>• Push the key UP to cyclically select the previous selection.</li> <li>• Push the key DOWN to cyclically select the next selection.</li> <li>• Push the key HOME to select the first item of the selection list.</li> <li>• Push the key END to select the last item of the selection list.</li> </ul> <p>Actuation of a selection field with the mouse:</p> <ul style="list-style-type: none"> <li>• Click inside the selection field so that all selection possibilities are displayed and then click on the required selection.</li> </ul>
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## 9.8 Starting of PASO DSV/SD6

Following the successful installation, the parameterisation software PASO DSV/SD6 can be started by double-clicking on the PASO DSV/SD6 - icon. Certain settings of the PASO DSV/SD6 software, e.g. the selected interface port, are saved in the file "konfig.kon". When PASO DSV/SD6 is started for the first time, the configuration values in this file are set to standard values. During the course of running the program, these values can be corrected.

After the start-up, the Start window appears:



During the start-up, the parameterisation software PASO DSV/SD6 checks, whether a Wandfluh-Electronics device is connected. If no communication can be established, an error message appears (refer to "Communication interruption" page 35) and the "Off Line"-mode will become active. All menu points and keys, which involve an action in connection with the communication, are then blocked. All other functions of the parameterisation software PASO DSV/SD6 can be utilised without any limitation.

If the communication works without any interference, the software PASO DSV/SD6 checks, whether the current configuration of the PASO DSV/SD6 corresponds with the configuration of the connected digital controller card. If no, a message will be displayed and the current configuration from the PASO DSV/SD6 will change automatically over to the new configuration

Subsequently the parameters are loaded from the card and subsequently a verification of the Wandfluh-Electronics values takes place. If one or several parameters are outside the corresponding tolerance, they are replaced with standard values and a message is issued (refer to section "Limiting value error" page 39). The changed parameters can be either sent directly to the connected Wandfluh-Electronics or the communication start-up can be terminated (the "Off-Line"-mode will become active). In the latter case the user has the possibility to correct the parameters in "Off-Line"-mode. The communication is resumed again via the menu point "File\_Activate On Line". Subsequently the user has to select the option "Reprogram the Wandfluh-Electronics", in order for the corrected values to be made active on the Wandfluh-Electronics.

The menu points in the menu line can be selected in the following manner:

- by clicking on them with the mouse
- by actuating the key "ALT" and the underlined letter of the required menu point
- if a menu point has been selected, then by means of the keys "Arrow Left" and "Arrow Right" one can change to the next menu point and with the keys "Arrow Up" and "Arrow Down" one can change to the next sub-menu point within the menu selection field.
- by clicking on the corresponding icon in the icon list

In the header line of the window, the name of the current file is always displayed. If no existing file has been loaded or if the data have not been saved to a file, then this line reads "noname".

The following states will be displayed in the status line:

PASO state:

- 1st field: Selected RS232 interface
- 2nd field: Current mode ("On Line" or "Off Line", refer to section "Mode "Off Line" and "On Line"" page 35)
- 4th field: Parameter Inconsistency (only with DSV-Electronics with Fieldbus, refer to the section "Parameter inconsistency" page 17)

Device state:

- 1st field: Derating (refer to section "Temperature monitoring" page 7)
- 2nd field: Characteristic optimisation active (refer to section "Characteristic optimisation Solenoid A" page 22)
- 3rd field: Operating mode ("Remote PASO" or "Local", refer to section "Operating mode" page 10)
- 5th field: DSV state ("Disabled" or "Active", refer to the section "DSV State machine" page 9)
- 6th field: Error state (Ready or Error, refer to the section "Analysis\_Diagnostics" page 31)

## 9.9 Store parameter

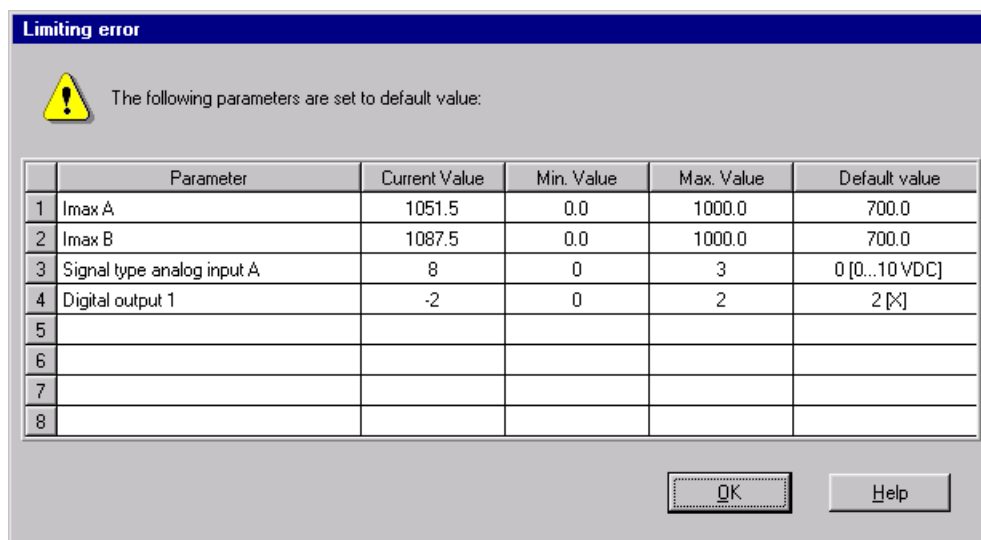
Each new input value is immediately transferred to the connected Wandfluh-Electronics after the completion of the input field (either by pushing the key ENTER or by activating another input field).

If the window is closed with the key "OK", the values are stored in the Wandfluh-Electronics so that they are available after the Wandfluh-Electronics are switched on again (non-volatile memory).

If the window is closed with the key "Cancel", the previous current values are active again. All inputs made in the current window are cancelled.

## 9.10 Limiting value error

Each incoming parameter (either transferred via the serial interface or loaded from a file) is checked against the limiting value. If a parameter is smaller or bigger than its limiting value (= limiting value error), it is set automatically to the default value and the following window appears:



Parameter: Name of the parameter with the limiting value error  
 Current value: Current value of the parameter  
 Min. value: Minimum allowed value of the parameter  
 Max. value: Maximum allowed value of the parameter  
 Default value: Default value of the parameter

After pressing the key "OK", the current value is overwritten by the default value.

Normally, a limiting value error does not happen. However, in the following cases it could happen:

- loading a file, in which parameter values have been changed from outside
- reading parameter values from a Wandfluh-Electronics device with another configuration than the current configuration in the PASO (only if the Wandfluh-Electronics were changed while in the "On Line"-mode)
- if the transmission of the parameter values is wrong

## 9.11 Description of Commands

The description of the individual commands and parameters is contained in section "Settings" page 17.

## 10 Disposal

- The DSV-Electronics have to be disposed of in accordance with the generally applicable regulations of that country, in which it is being used.
- Electronic components are recycled by companies specialised in this field.

## 11 Additional information

You can find additional information in the following Wandfluh documentations:

Wandfluh-Electronics general	Documentation A	Register	1.13
Accessories	Documentation A	Register	1.13
Proportional directional control valves	Documentation A	Register	1.10
Proportional pressure control valves	Documentation A	Register	2.3
Proportional flow control valves	Documentation A	Register	2.6