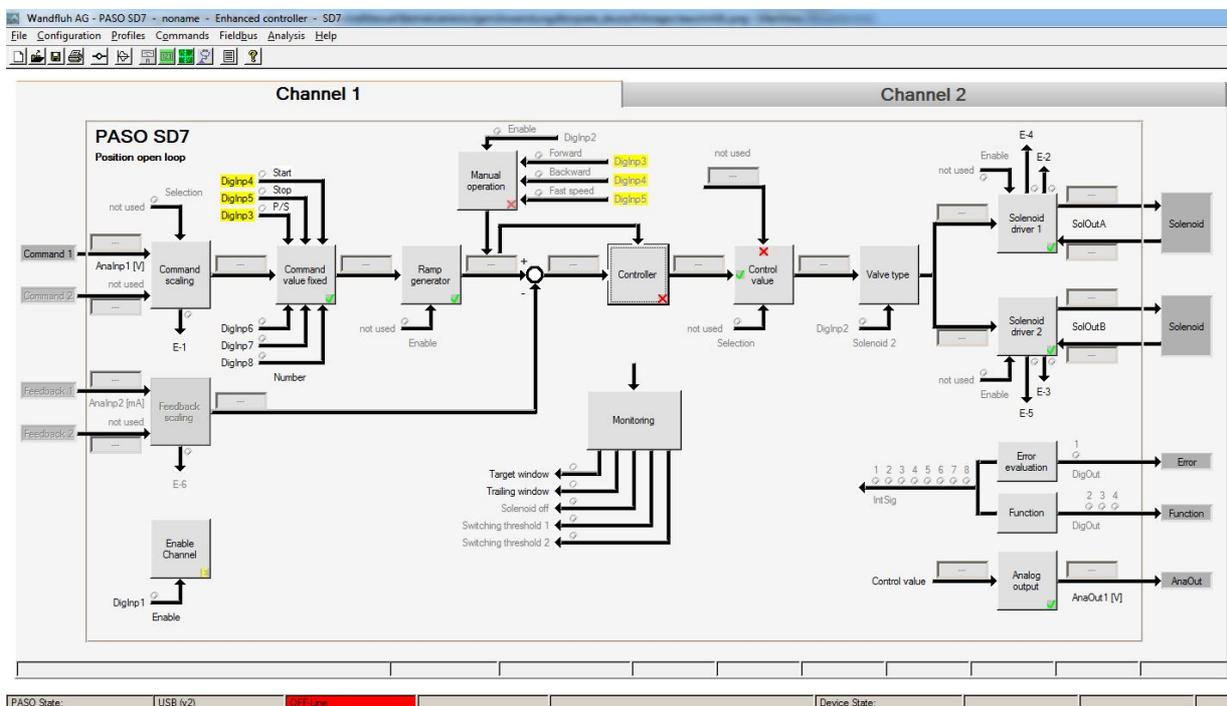


# APPLICATION EXAMPLES FOR WANDFLUH ELECTRONICS CARDS



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## 1 General information

This applications examples serve to provide users with possible solution options, It shows for different applications the respective parameter settings.

For a detailed description of the hardware, a product description and a description of all parameters, please refer to corresponding operating instructions of the Wandfluh Electronic cards.

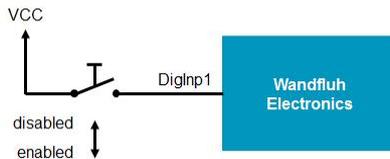
**Note:** Please read in advance the appropriate operating instruction.

## 2 Enable device

### 2.1 Enable device

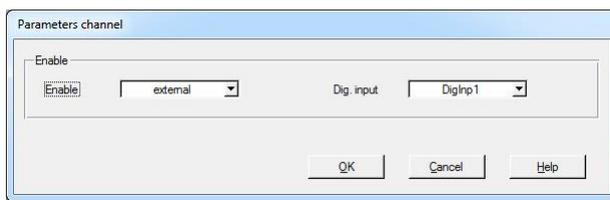
#### Application: Switch for enable device

The device enable is made through a switch. If the switch is open (no connection to VCC), the device is disabled, if it is closed (connection to VCC), the device is enabled. The switch acts as an enable signal.



#### Solution

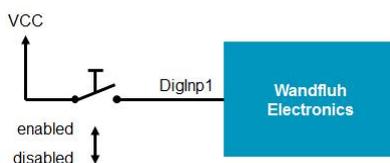
In the section "Enable channel", set the "Enable" to "external" and with "Dig. input" the input is selected, at which the switch is connected (in the example "DigInp1").



### 2.2 Disable device

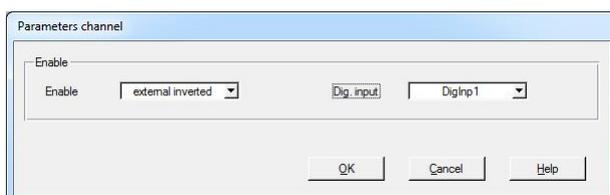
#### Application: Switch for disable device

The device enable is made through a switch. If the switch is open (no connection to VCC), the device is enabled, if it is closed (connection to VCC), the device is disabled. The switch acts as an disable signal.



#### Solution

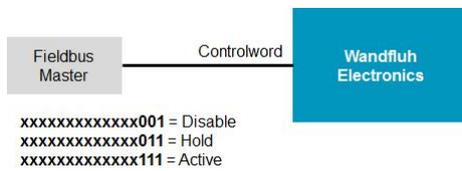
In the section "Enable channel", set the "Enable" to "external inverted" and with "Dig. input" the input is selected, at which the switch is connected (in the example "DigInp1").



## 2.3 Enable device through fieldbus

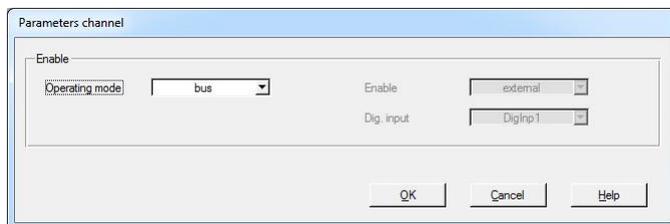
### Application: Enable through fieldbus

The device enable is made through fieldbus. With the bits "Disable", "Hold" and "Active" from the control word, the device state can be set.



### Solution

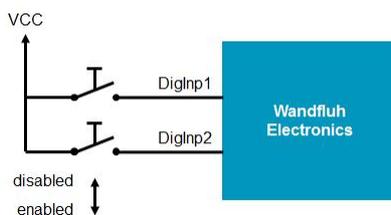
In the section "Enable channel", set the "Operating mode" to "bus". The "Enable" and "Dig. input" are not used in this case.



## 2.4 Enable device with two switches

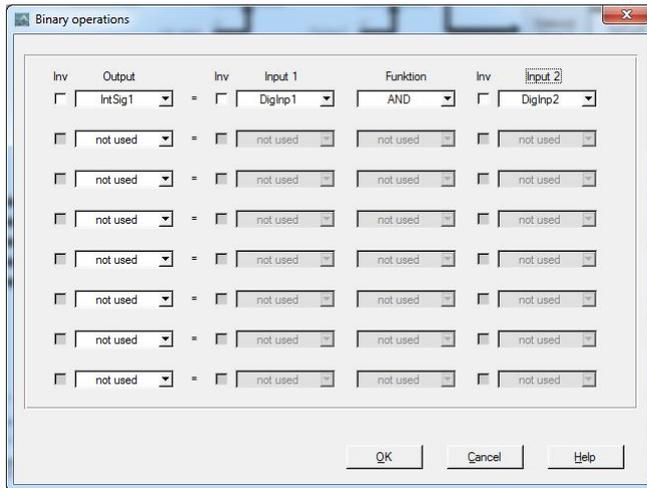
### Application: Two switches for enable device

The device enable is made through two switches. If one or both switches are open (no connection to VCC), the device is disabled, only if both switches are closed (connection to VCC), the device is enabled. The switches act as an enable signal with AND association.

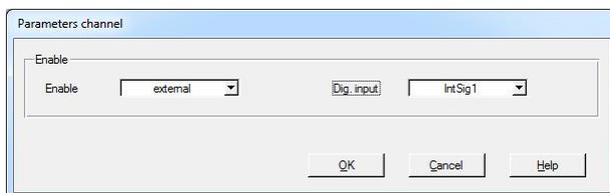


### Solution

In the menu "Configuration - Binary operations", set the output to the desired internal signal (in the example "IntSig1"), with "Input 1" and "Input 2" the inputs are selected, at which the switches are connected (in the example "DigInp1" and "DigInp2") and set the function to "AND".



In the section "Enable channel", set the "Enable" to "external" and with "Dig. input" the internal signal is selected, which is defined as output in the binary operations (in the example "IntSig1").



### 3 Controller modes

#### 3.1 Prerequisites for controller modes

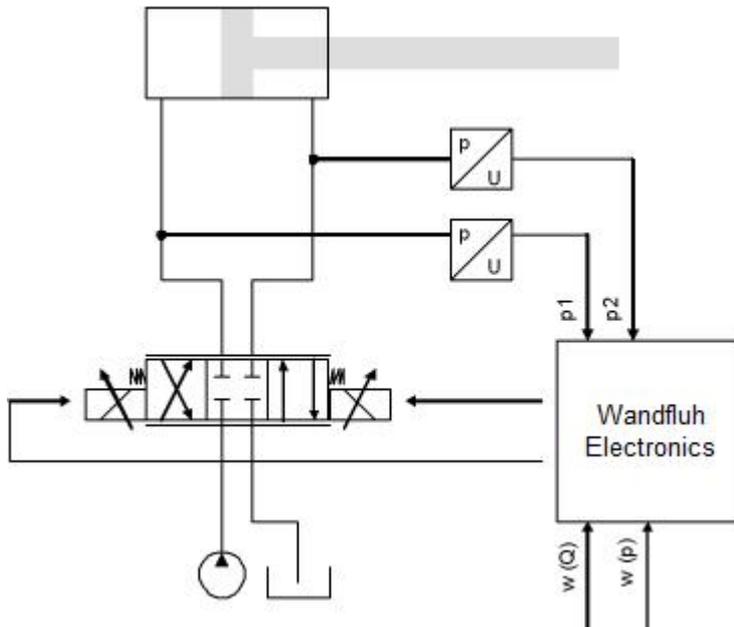
For using the controller mode "pQ-control" resp. "Alternating control", the following prerequisites must be fulfilled:

<b>WANDFLUH Electronics</b>	<b>Software version</b>	<b>PASO</b>
SD7 Basic Controller SD7 Enhanced Controller	from 1.3.1.3 onwards	PASO SD7 from 1.0.1.9 onwards
MD2 Basic Controller MD2 Enhanced Controller	from 1.4.0.4 onwards	PASO MD2 from 2.1.0.5 onwards
DSV Controller	from 1.0.2.0 onwards	PASO DSV from 1.2.0.0 onwards

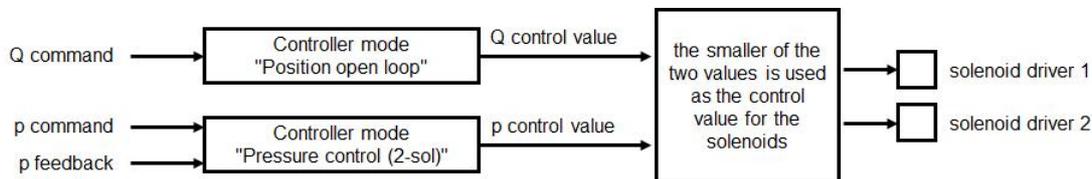
### 3.2 pQ control

#### Application

With a 4/3-proportional-spool valve, the axis will move in open loop (without feedback signal). Simultaneously the pressure is monitored (measured as differential pressure with two pressure sensors).



#### Description

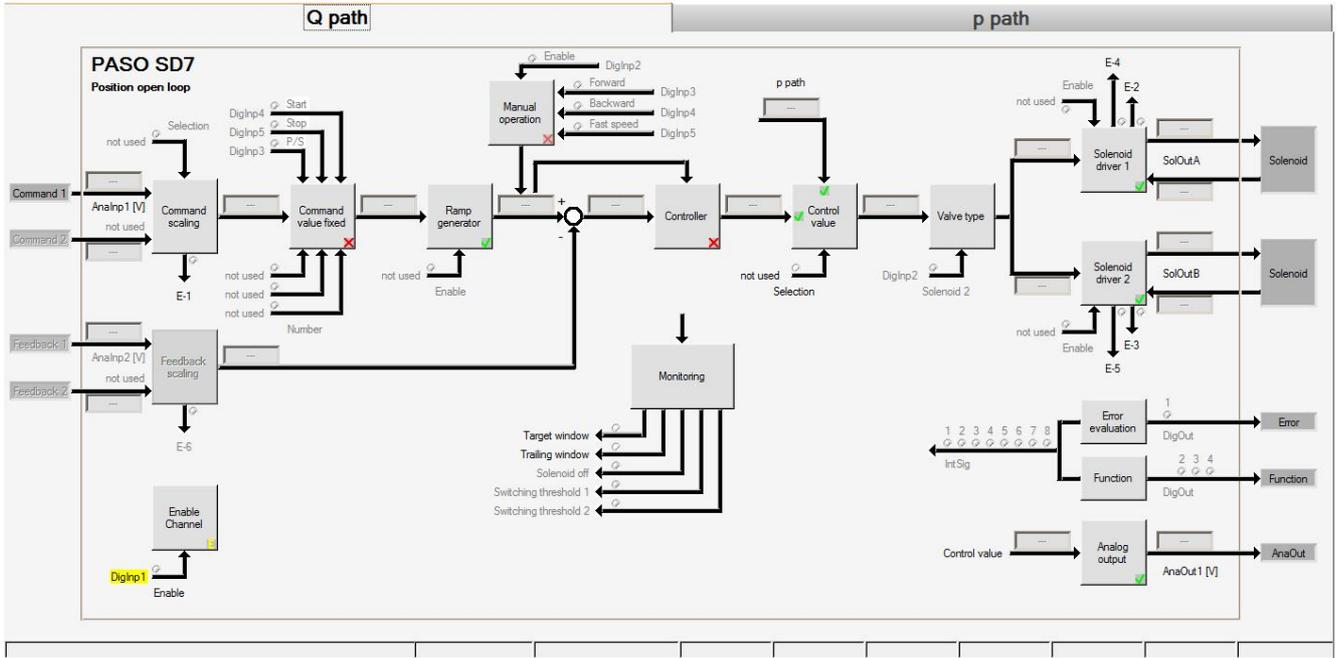


There is a Q and a p command value. With the Q command value, the cylinder can move in open loop in both directions. The p command value defines the maximum allowed pressure. If this pressure is exceeded, the controller reduces the output signal to the valve. In this case the preset pressure is not exceeded. A rear dodge (cylinder moves backward) is possible. The p feedback value can be either an absolute signal (V or mA) from a pressure or force sensor or can be built as a differential signal from two pressure or force sensors (V or mA).

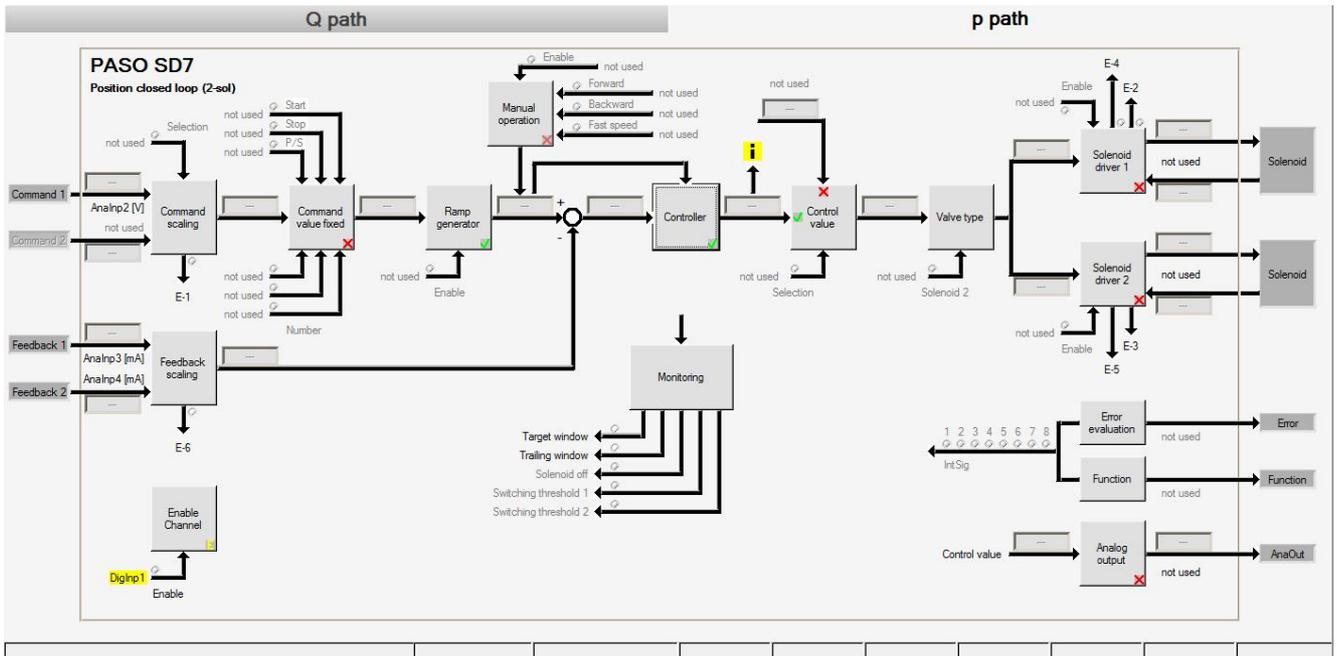
With this controller mode, the choice of the proportional valve has a high influence on the system behavior. More details about it are available from factory.

#### Solution

In the channel 1 (Q path) all settings concerning the open loop movement are made. Mode of operation, command scaling, ramps, etc. are set depending the system.



In the channel 2 (p path) all settings concerning the closed loop (pressure control) are made. Command scaling, feedback scaling, speed, controller parameter, etc. are set depending the system.



The control value from channel 2 (p path) is linked to channel 1 (Q path). With the minimum bildner, the solenoids in channel 1 (Q path) will be controlled.

The following settings are made in the section "Control value" from channel 1 (Q path).

Parameters control value

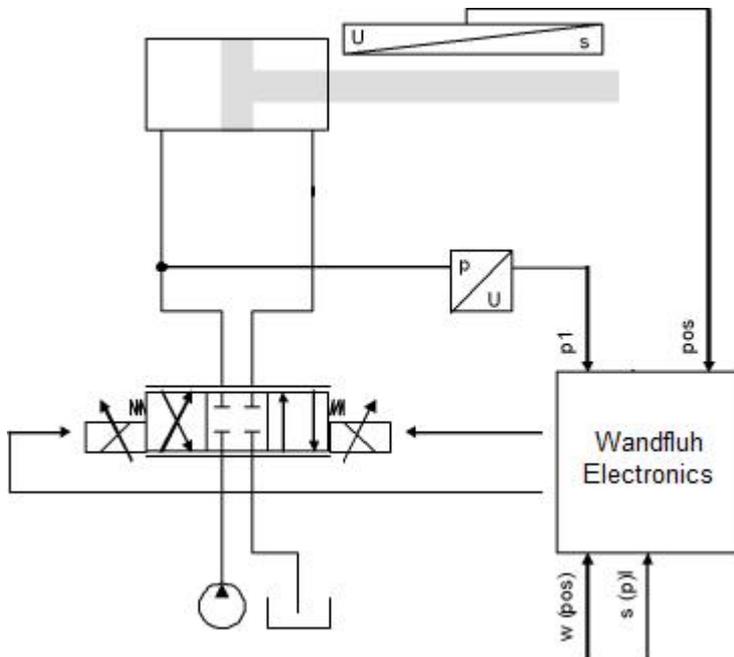
Function	minimum bildner
Source	p path
Dig. input	not used

OK Cancel Help

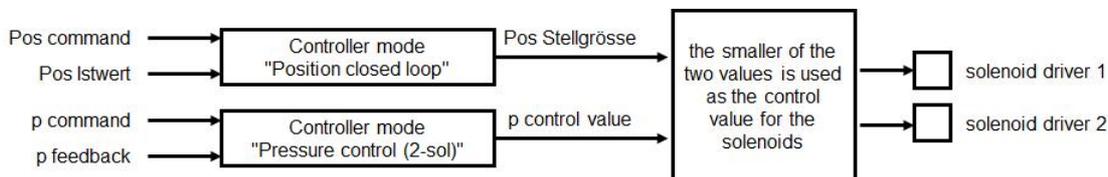
### 3.3 Alternating control

#### Application

With a 4/3-proportional-spool valve, the axis position is held constant to the command position value  $w$ . Simultaneously the pressure is monitored (measured with the pressure sensor).



#### Description

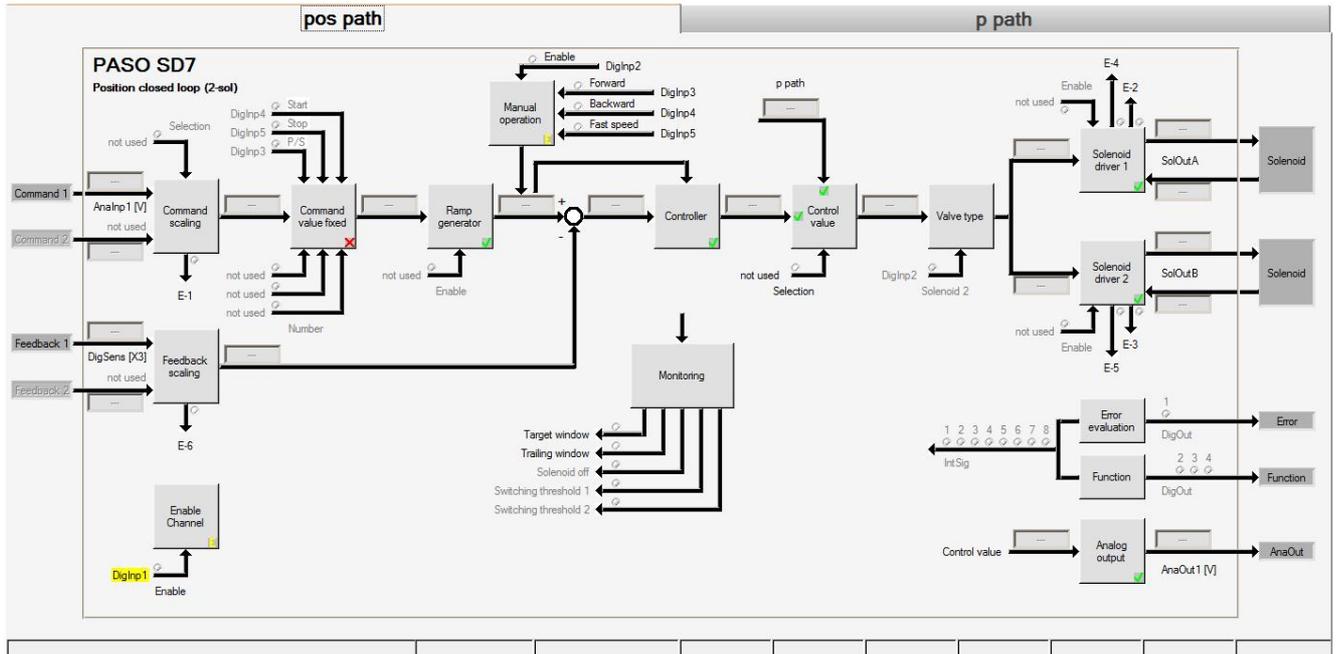


There is a  $pos$  and a  $p$  command value. With the  $pos$  command value, the cylinder can move in closed loop in both directions. The  $p$  command value defines the maximum allowed pressure. If this pressure is exceeded, the position controller is switched off and the controller reduces the output signal to the valve. In this case the preset pressure is not exceeded. If the actual pressure is smaller than the  $p$  command value, the position controller is switched on. A rear dodge (cylinder moves backward) is possible. The  $p$  feedback value can be either an absolute signal (V or mA) from a pressure or force sensor or can be built as a differential signal from two pressure or force sensors (V or mA).

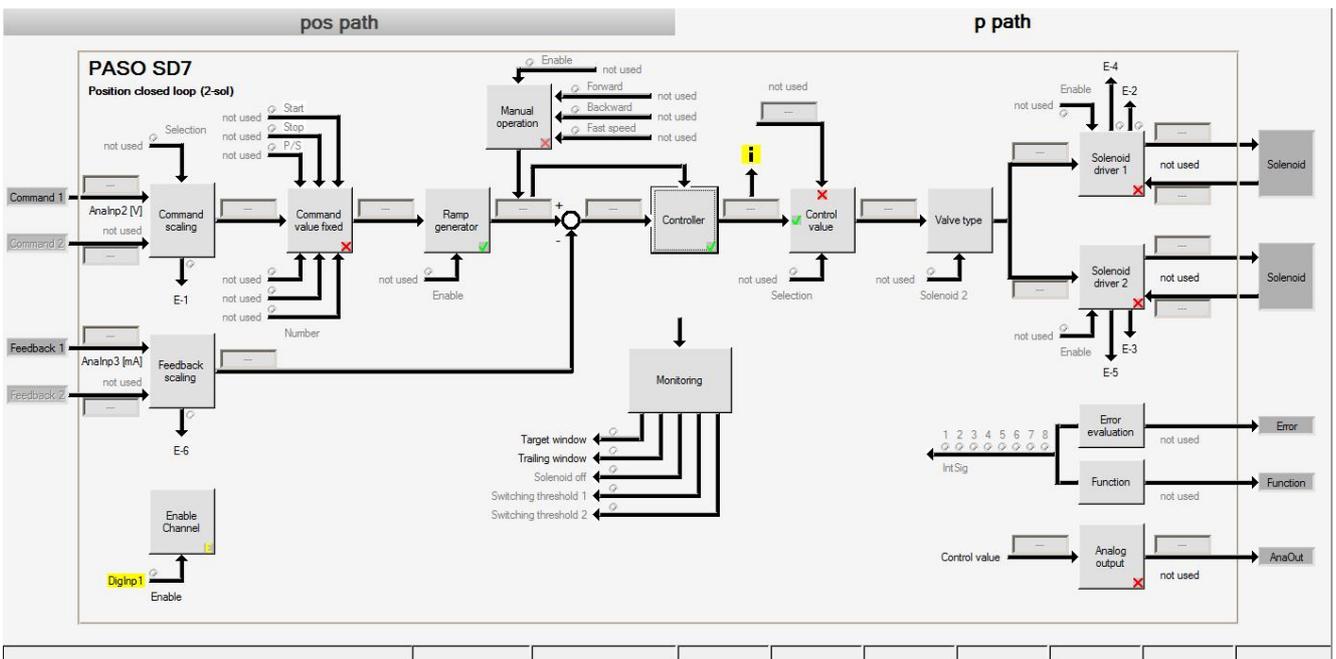
With this controller mode, the choice of the proportional valve has a high influence on the system behavior. More details about it are available from factory.

#### Solution

In the channel 1 ( $pos$  path) all settings concerning the closed loop movement are made. Command scaling, feedback scaling, speed, controller parameter, etc. are set depending the system.



In the channel 2 (p path) all settings concerning the closed loop (pressure control) are made. Command scaling, feedback scaling, speed, controller parameter, etc. are set depending the system.



The control value from channel 2 (p path) is linked to channel 1 (pos path). With the minimum bildner, the solenoids in channel 1 (pos path) will be controlled.

The following settings are made in the section "Control value" from channel 1 (pos path).

Parameters control value

Function	minimum bildher
Source	p path
Dig. input	not used

OK Cancel Help

## 4 Closing function

### 4.1 General to closing function

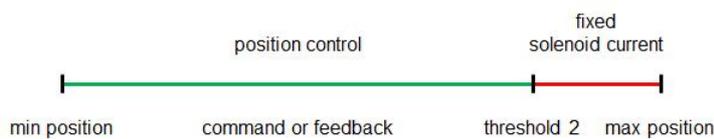
#### Application: Closing function with

In a position control, it is often required that below and / or above an adjustable position the axis will be pressed into the end position with a fixed solenoid current (= closing function). It can be selected, if only the command position, only the feedback position or both positions should be queried. The following options are available:

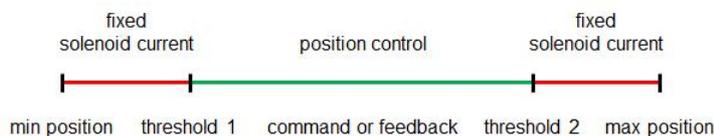
Closing function with [command or feedback less than a threshold](#) <sup>[17]</sup>



Closing function with [command or feedback more than a threshold](#) <sup>[19]</sup>



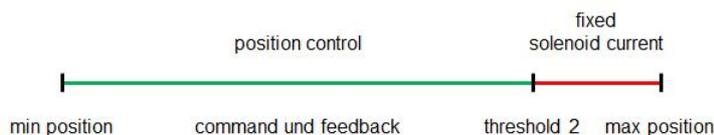
Closing function with [command or feedback less and more than a threshold](#) <sup>[21]</sup>



Closing function with [command and feedback less than threshold](#) <sup>[24]</sup>



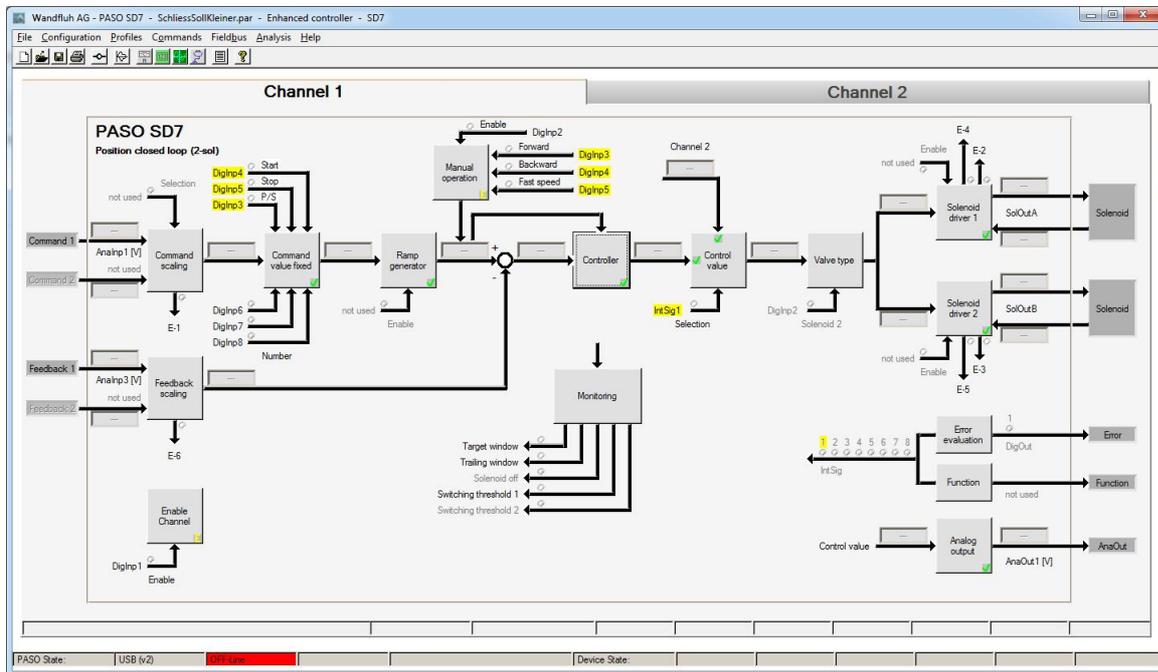
Closing function with [command and feedback more than a threshold](#) <sup>[27]</sup>



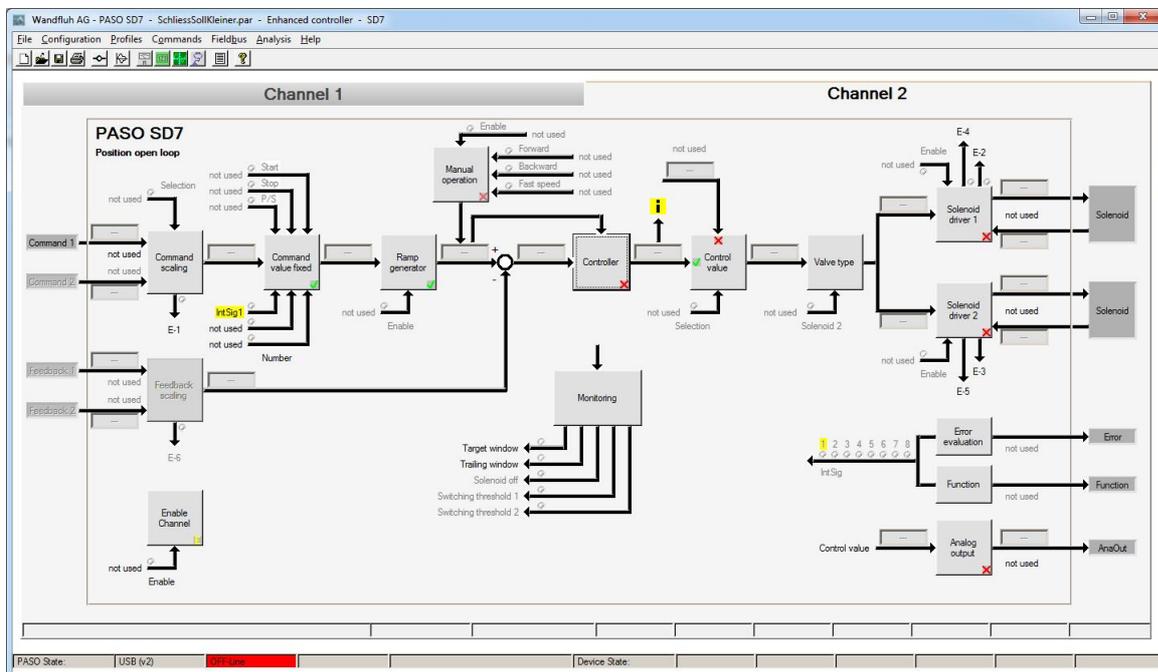
The closing function with "command **and** feedback less **and** more than a threshold" is not possible.

The functional principle is the same for all possibilities:

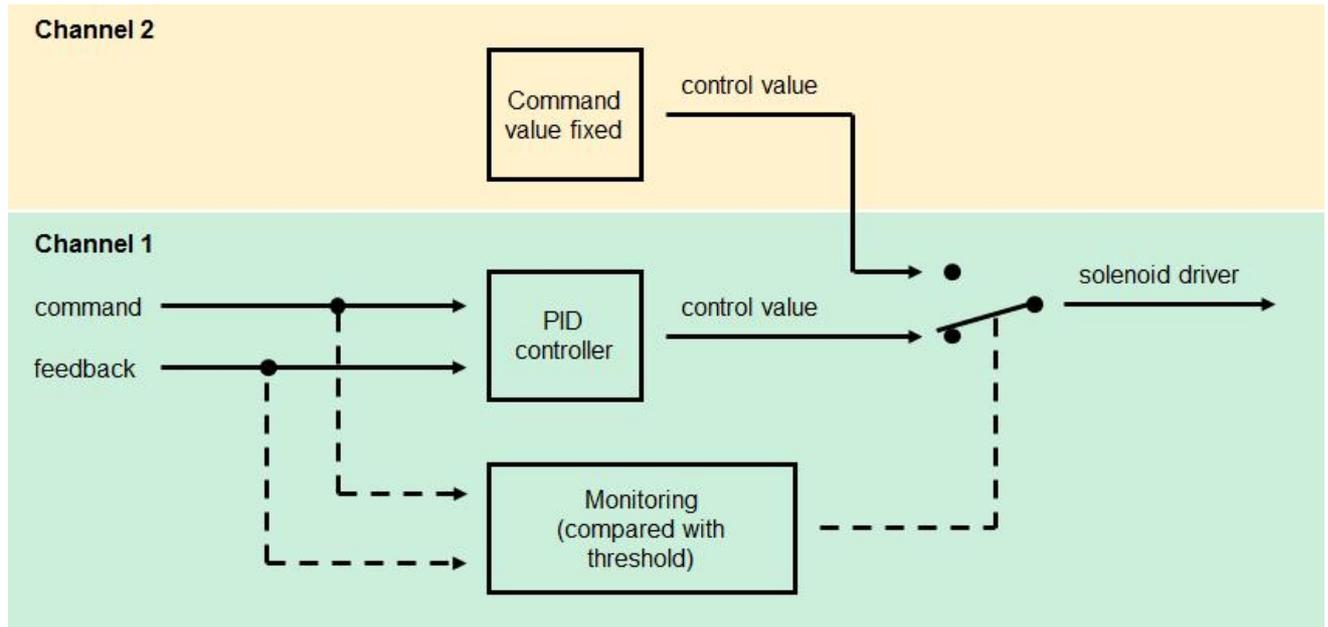
- Channel 1 is used for the position control (Controller mode = "Position closed loop (2-sol)")



- Channel 2 is used as an amplifier (Controller mode = "Position open loop")



- in channel 1, an internal signal is set by means of the "monitoring" function which becomes active if the corresponding threshold value is reached
- if the internal signal is active, the control value from channel 2 is used instead of the control value from channel 1
- this control value from channel 2 directly controls the corresponding solenoid driver from channel 1
- the following figure shows schematically the functioning of the closing function



- for detailed settings, see the following pages

## 4.2 Prerequisites for closing function

For using the closing function, the following prerequisites must be fulfilled:

WANDFLUH Electronics	Software version	PASO
SD7 Basic Controller SD7 Enhanced Controller	from 1.3.1.3 onwards	PASO SD7 from 1.0.1.9 onwards
MD2 Basic Controller MD2 Enhanced Controller	from 1.4.0.4 onwards	PASO MD2 from 2.1.0.5 onwards
DSV Controller	from 1.0.2.0 onwards	PASO DSV from 1.2.0.0 onwards

### 4.3 Command or Feedback less than a threshold

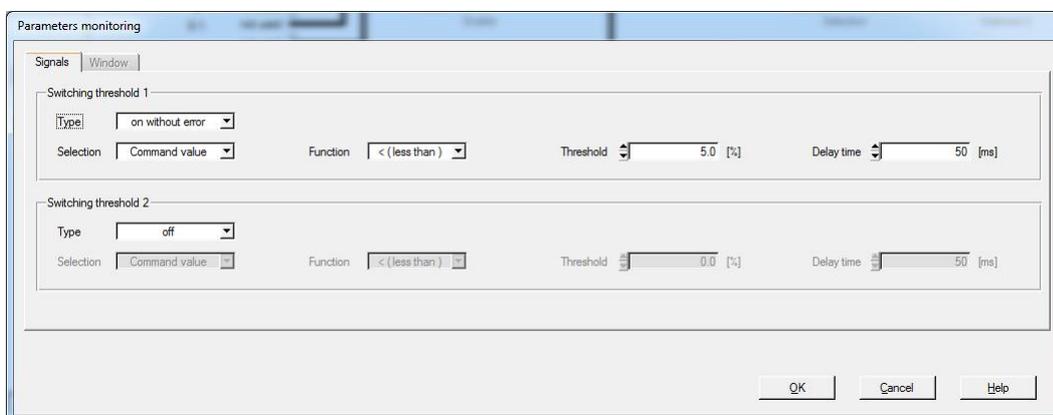
Application: Closing function with command or feedback less than a threshold



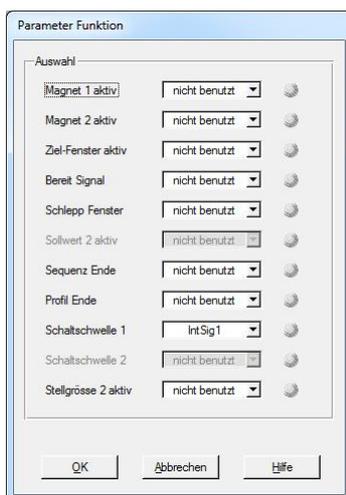
#### Solution

The following settings are made in "channel 1":

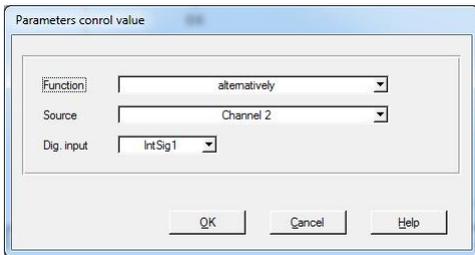
In the section "Monitoring", set the "Type" to "on without error", the "Selection" to "Command value" resp. "Feedback value" (in the example "Command vallue"), the "Function" to "< (less than)" and the "Threshold" to the desired value for the threshold (in the example "5.00 mm").



In the section "Function", set the "Switching threshold 1" to a free internal signal (in the example "IntSig1").



In the section "Control value", set the "Function" to "alternatively", the "Source" to "Channel 2" and the "Dig. input" to the in the section "Function" selected internal signal (in the example "IntSig1").



Parameters control value

Function:

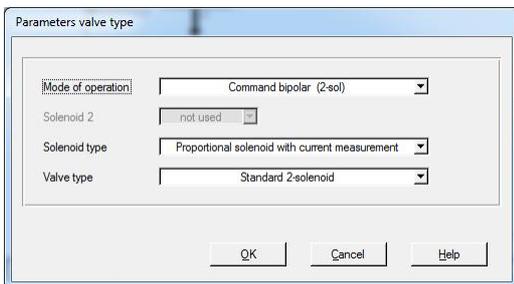
Source:

Dig. input:

OK Cancel Help

The following settings are made in "channel 2":

In the section "Valve type", set the "Mode of operation" to "Command bipolar (2-sol)".



Parameters valve type

Mode of operation:

Solenoid 2:

Solenoid type:

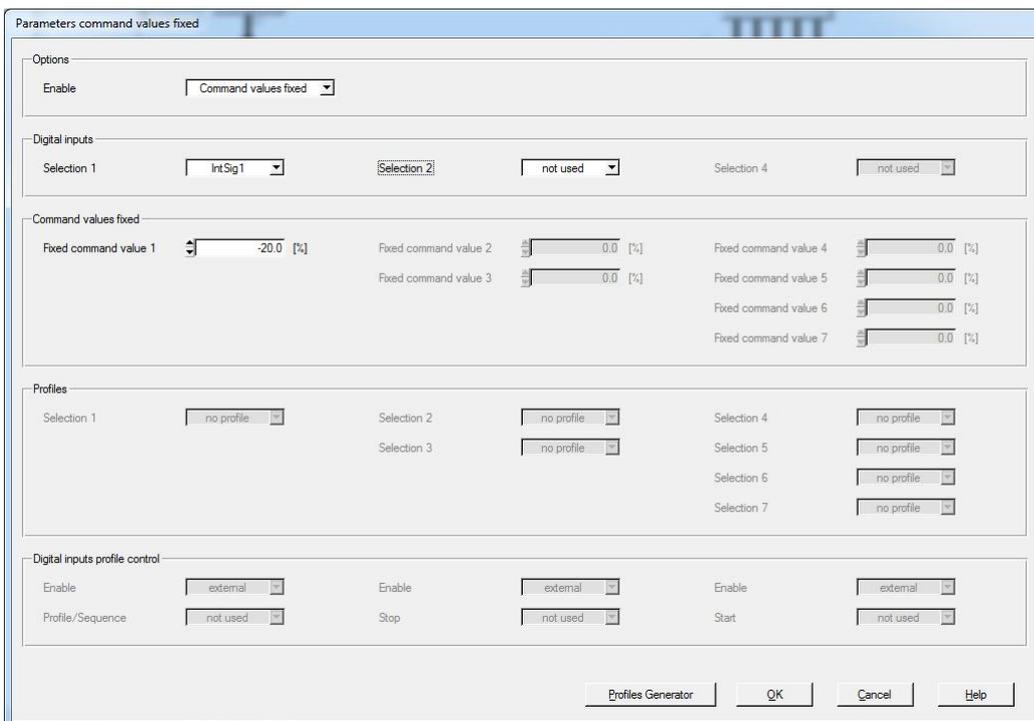
Valve type:

OK Cancel Help

In the field "Command value fixed", set the "Enable" to "Command values fixed", the "Selection 1" to the in the section "Function" selected signal for the "Switching threshold 1" (in the example "IntSig1" and the "Fixed command value 1" to the desired solenoid current value.

In which case:

- a positive value activates the solenoid from solenoid driver 1
- a negative value activates the solenoid from solenoid driver 1
- a value from 0.1% corresponds to the Imin from the corresponding solenoid
- a value from 100.0% corresponds to the Imax from the corresponding solenoid



Parameters command values fixed

Options

Enable:

Digital inputs

Selection 1:  Selection 2:  Selection 4:

Command values fixed

Fixed command value 1:  Fixed command value 2:  Fixed command value 4:  Fixed command value 5:  Fixed command value 6:  Fixed command value 7:

Profiles

Selection 1:  Selection 2:  Selection 3:  Selection 4:  Selection 5:  Selection 6:  Selection 7:

Digital inputs profile control

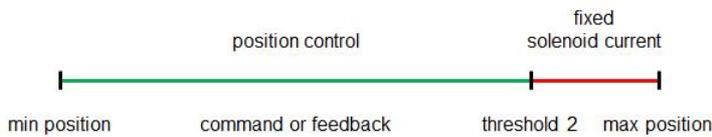
Enable:  Enable:  Enable:

Profile/Sequence:  Stop:  Start:

Profiles Generator OK Cancel Help

## 4.4 Command or Feedback more than a threshold

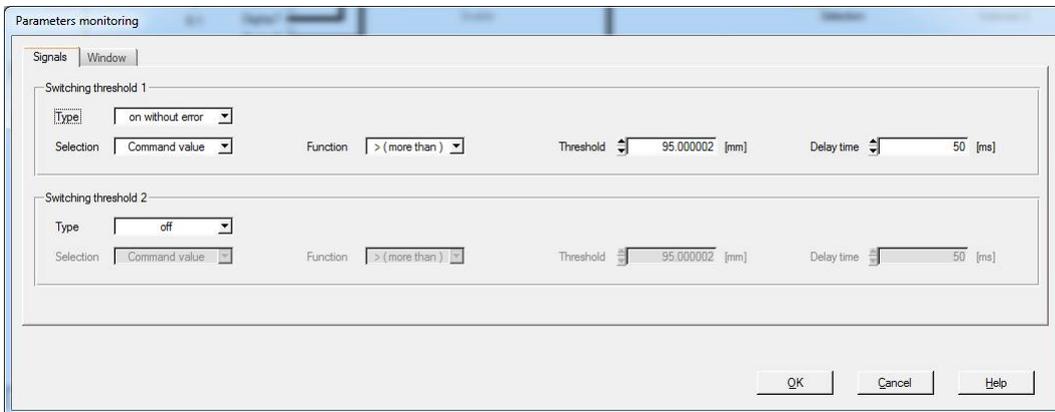
Application: Closing function with command or feedback more than an threshold



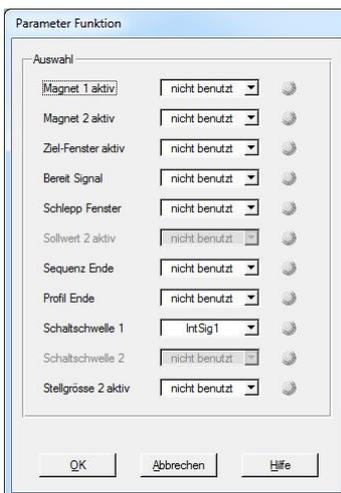
### Solution

The following settings are made in "channel 1":

In the section "Monitoring", set the "Type" to "on without error", the "Selection" to "Command value" resp. "Feedback value" (in the example "Command value"), the "Function" to "> (more than)" and the "Threshold" to the desired value for the threshold (in the example "95.00 mm").



In the section "Function", set the "Switching threshold 1" to a free internal signal (in the example "IntSig1").



In the section "Control value", set the "Function" to "alternatively", the "Source" to "Channel 2" and the "Dig. input" to the in the section "Function" selected internal signal (in the example "IntSig1").



Parameters control value

Function: alternatively

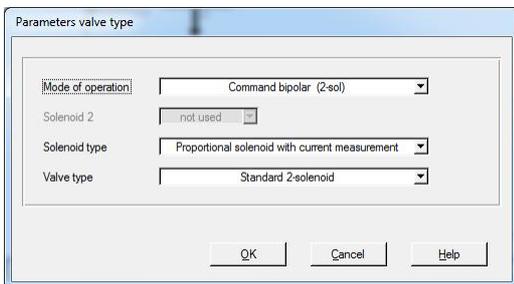
Source: Channel 2

Dig. input: IntSig1

OK Cancel Help

The following settings are made in "channel 2":

In the section "Valve type", set the "Mode of operation" to "Command bipolar (2-sol)".



Parameters valve type

Mode of operation: Command bipolar (2-sol)

Solenoid 2: not used

Solenoid type: Proportional solenoid with current measurement

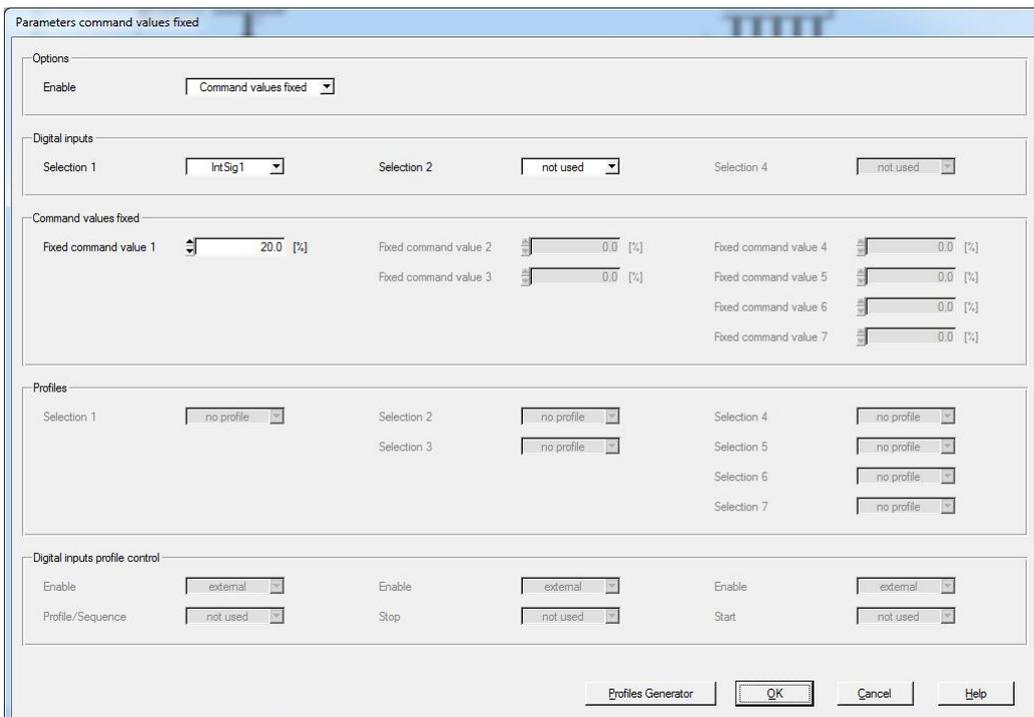
Valve type: Standard 2-solenoid

OK Cancel Help

In the field "Command value fixed", set the "Enable" to "Command values fixed", the "Selection 1" to the in the section "Function" selected signal for the "Switching threshold 1" (in the example "IntSig1" and the "Fixed command value 1" to the desired solenoid current value.

In which case:

- a positive value activates the solenoid from solenoid driver 1
- a negative value activates the solenoid from solenoid driver 1
- a value from 0.1% corresponds to the Imin from the corresponding solenoid
- a value from 100.0% corresponds to the Imax from the corresponding solenoid



Parameters command values fixed

Options: Enable: Command values fixed

Digital inputs: Selection 1: IntSig1, Selection 2: not used, Selection 4: not used

Command values fixed: Fixed command value 1: 20.0 [%], Fixed command value 2: 0.0 [%], Fixed command value 3: 0.0 [%], Fixed command value 4: 0.0 [%], Fixed command value 5: 0.0 [%], Fixed command value 6: 0.0 [%], Fixed command value 7: 0.0 [%]

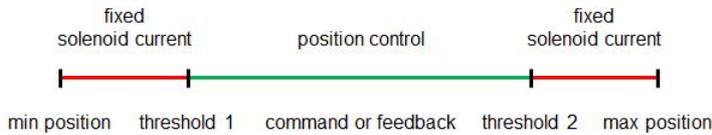
Profiles: Selection 1: no profile, Selection 2: no profile, Selection 3: no profile, Selection 4: no profile, Selection 5: no profile, Selection 6: no profile, Selection 7: no profile

Digital inputs profile control: Enable: external, external, external; Profile/Sequence: not used, Stop, not used, Start, not used

Profiles Generator OK Cancel Help

## 4.5 Command or Feedback less and more than a threshold

**Application: Closing function with command or feedback less and more than a threshold**



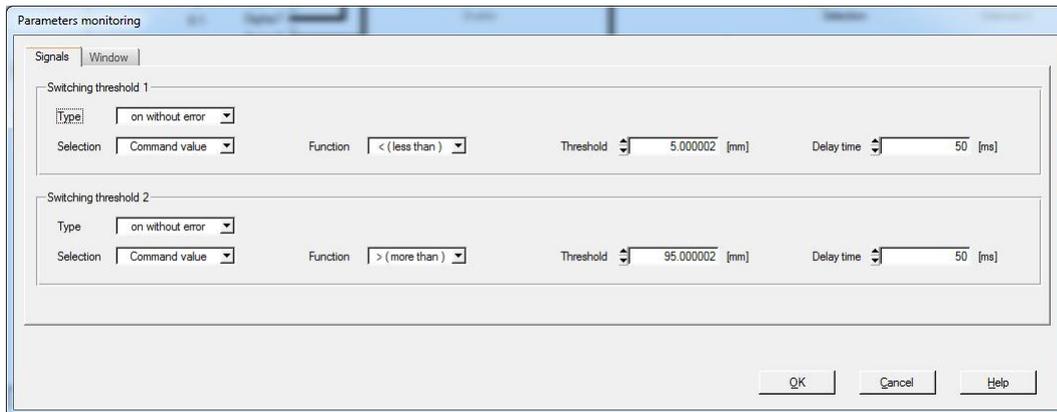
### Solution

The following settings are made in "channel 1":

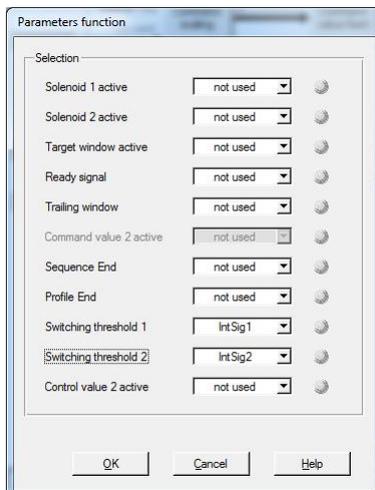
In the section "Monitoring",

- in the section "Switching threshold 1" set the "Type" to "on without error", the "Selection" to "Command value" resp. "Feedback value" (in the example "Command value"), the "Function" to "< (less than)" and the "Threshold" to the desired value for the threshold (in the example "5.00 mm").

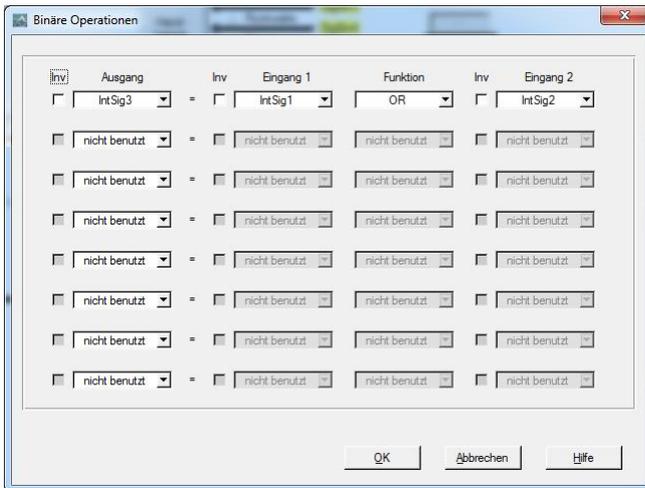
- in the section "Switching threshold 2" set the "Type" to "on without error", the "Selection" to "Command value" resp. "Feedback value" (in the example "Command value"), the "Function" to "> (more than)" and the "Threshold" to the desired value for the threshold (in the example "95.00 mm").



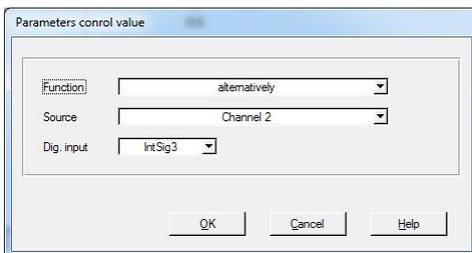
In the section "Function", set the "Switching threshold 1" to a free internal signal (in the example "IntSig1") and the "Switching threshold 2" to another free internal signal (in the example "IntSig2").



In the menu "Configuration - Binary operators", the two internal signals selected in the section "Function" will be linked together with "OR" and connected to another free internal signal (in the example "IntSig3").

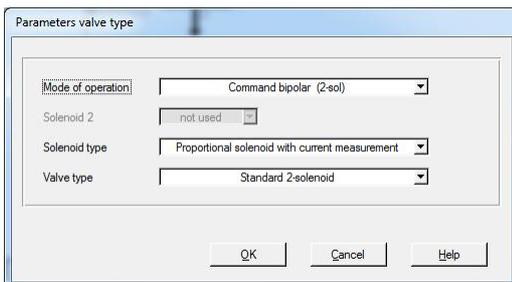


In the section "Control value", set the "Function" to "alternatively", the "Source" to "Channel 2" and the "Dig. input" to the in the menu "Configuration - Binary Operation" selected internal signal (in the example "IntSig3").



The following settings are made in "channel 1":

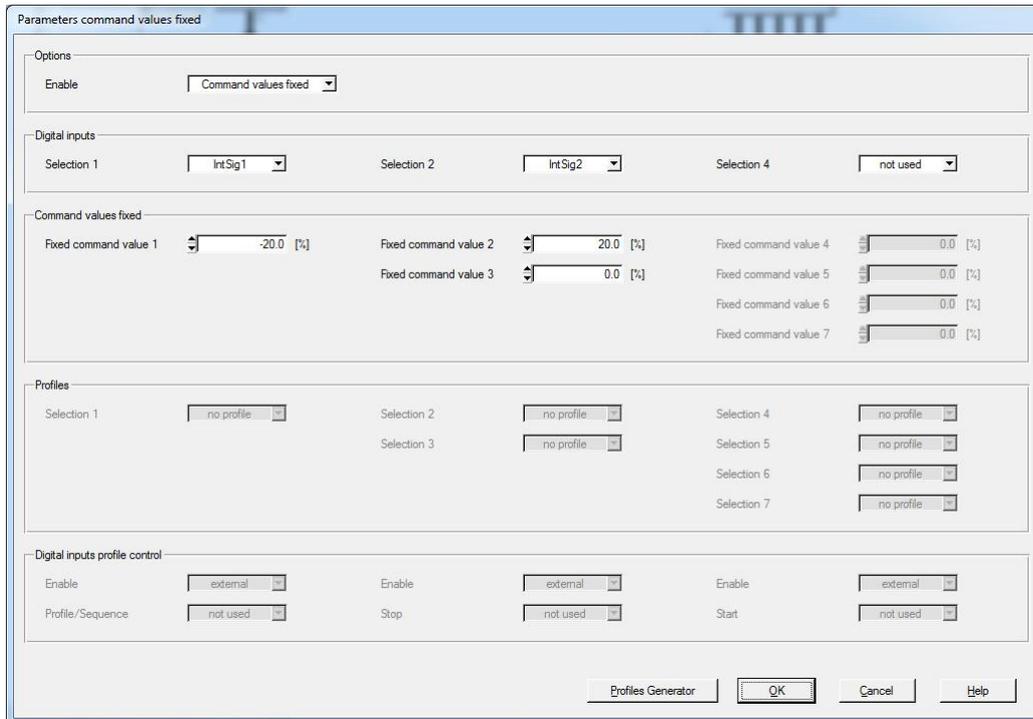
In the section "Valve type", set the "Mode of operation" to "Command bipolar (2-sol)".



In the field "Command value fixed", set the "Enable" to "Command values fixed", the "Selection 1" to the in the section "Function" selected signal for the "Switching threshold 1" (in the example "IntSig1", the "Selection 2" to the in the section "Function" selected signal for the "Switching threshold 2" (in the example "IntSig2") and the "Fixed command value 1" resp. "Fixed command value 2" to the desired solenoid current value.

In which case:

- a positive value activates the solenoid from solenoid driver 1
- a negative value activates the solenoid from solenoid driver 1
- a value from 0.1% corresponds to the Imin from the corresponding solenoid
- a value from 100.0% corresponds to the Imax from the corresponding solenoid



## 4.6 Command and Feedback less than a threshold

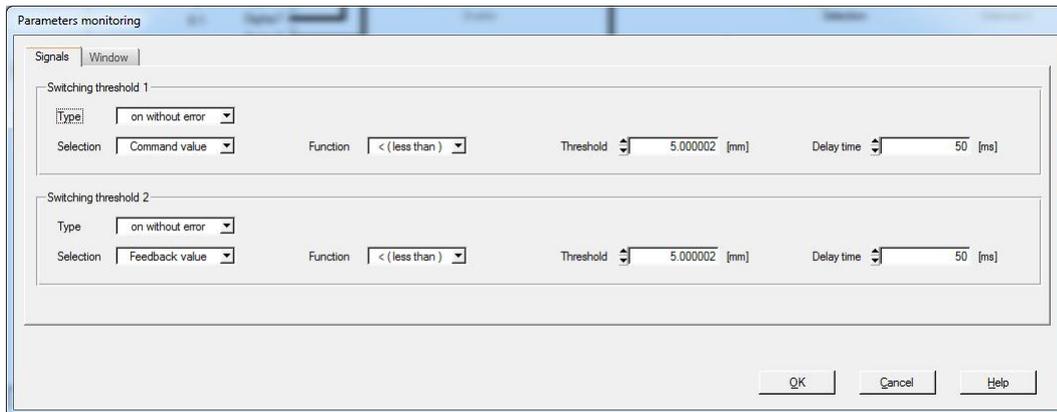
**Application: Cosing function with comamnd *and* feedback less than a threshold**



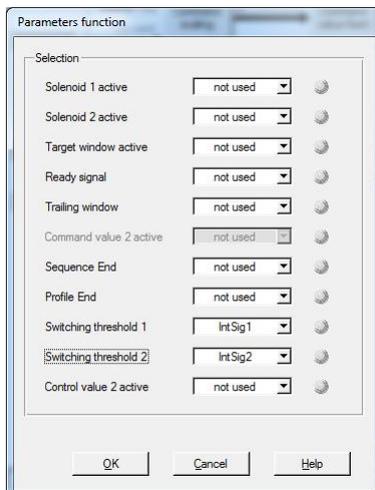
### Solution

The following settings are made in "channel 1":

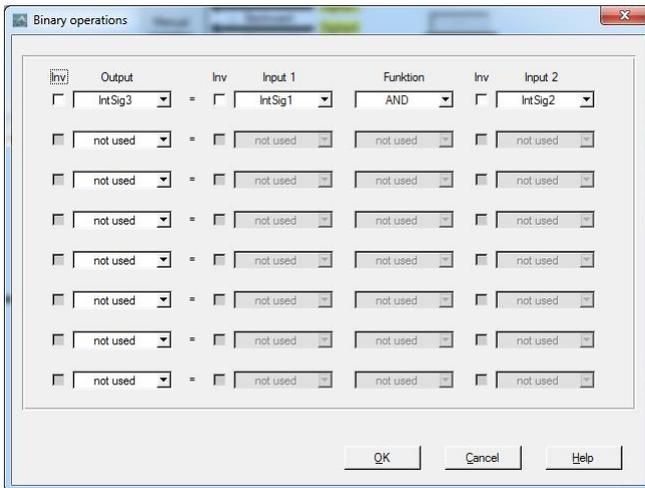
- In the section "Monitoring",
- in the section "Switching threshold 1" set the "Type" to "on without error", the "Selection" to "Command value", the "Function" to "< (less than)" and the "Threshold" to the desired value for the threshold (in the example "5.00 mm").
  - in the section "Switching threshold 2" set the "Type" to "on without error", the "Selection" to "Feedback value", the "Function" to "< (less than)" and the "Threshold" to the desired value for the threshold (in the example "5.00 mm").



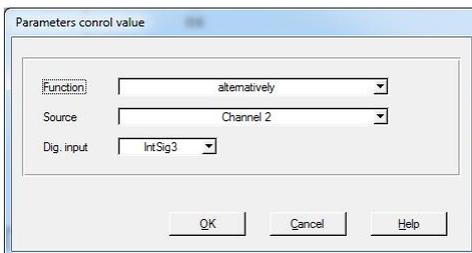
In the section "Function", set the "Swtiching threshold 1" to a free internal signal (in the example "IntSig1") and the "Swtiching threshold 2" to another free internal signal (in the example "IntSig2").



In the menu "Configuration - Binary operators", the two internal signals selected in the section "Function" will be linked together with "AND" and connected to another free internal signal (in the example "IntSig3").

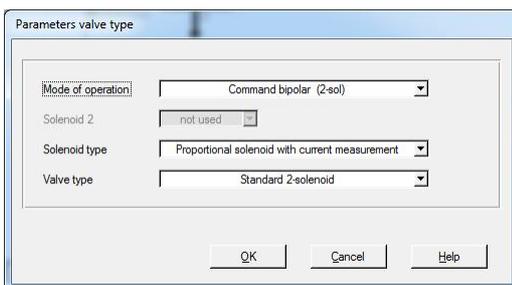


In the section "Control value", set the "Function" to "alternatively", the "Source" to "Channel 2" and the "Dig. input" to the in the menu "Configuration - Binary Operation" selected internal signal (in the example "IntSig3").



The following settings are made in "channel 2":

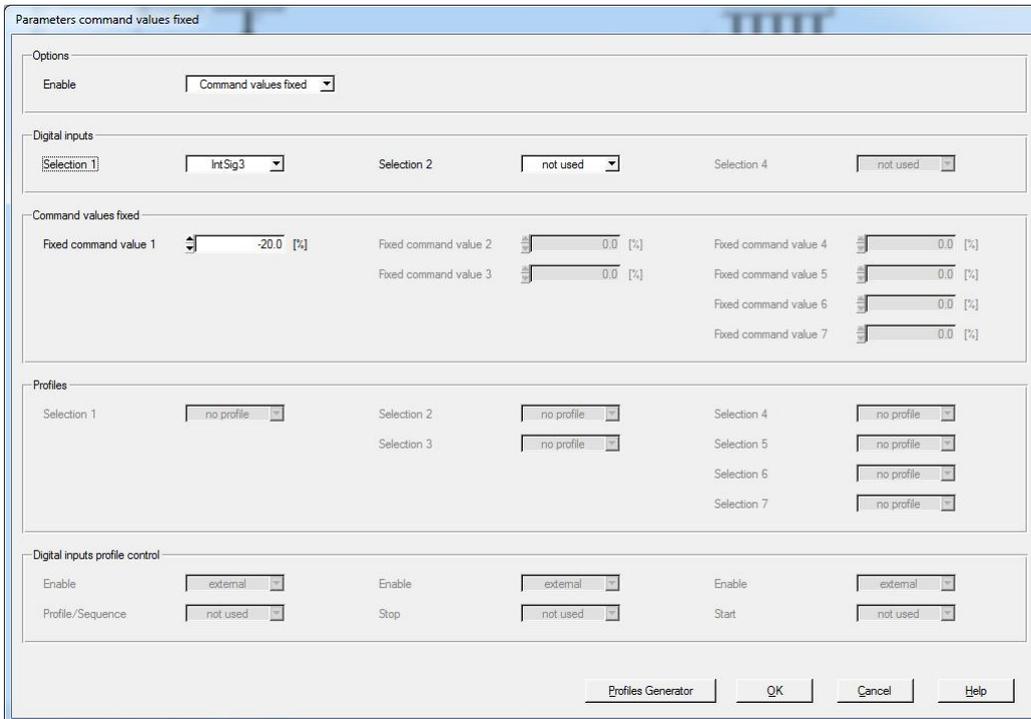
In the section "Valve type", set the "Mode of operation" to "Command bipolar (2-sol)".



In the field "Command value fixed", set the "Enable" to "Command values fixed", the "Selection 1" to the in the menu "Configuration - Binary Operation" selected "Output" (in the example "IntSig3" and the "Fixed command value 1" to the desired solenoid current value.

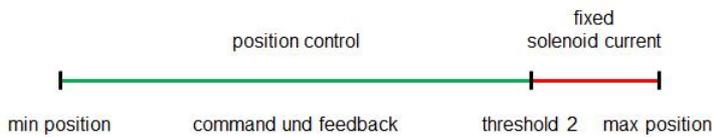
In which case:

- a positive value activates the solenoid from solenoid driver 1
- a negative value activates the solenoid from solenoid driver 1
- a value from 0.1% corresponds to the Imin from the corresponding solenoid
- a value from 100.0% corresponds to the Imax from the corresponding solenoid



## 4.7 Command and Feedback more than a threshold

### Application: Closing function with command and feedback more than a threshold



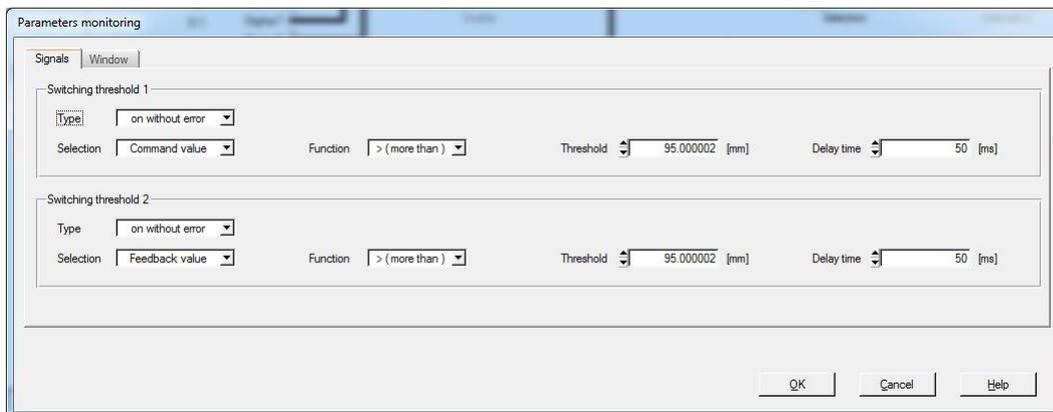
### Solution

The following settings are made in "channel 1":

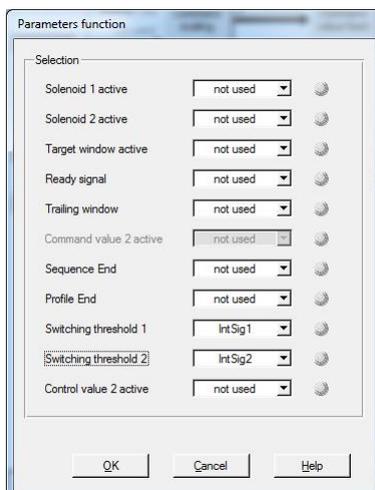
In the section "Monitoring",

- in the section "Switching threshold 1" set the "Type" to "on without error", the "Selection" to "Command value", the "Function" to "> (more than)" and the "Threshold" to the desired value for the threshold (in the example "5.00 mm").

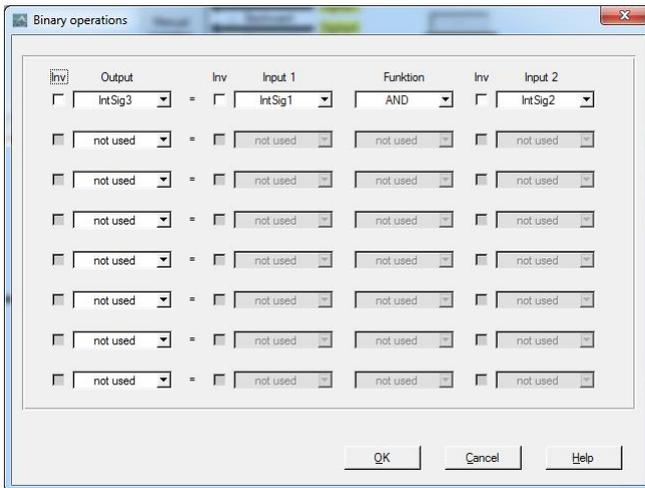
- in the section "Switching threshold 2" set the "Type" to "on without error", the "Selection" to "Feedback value", the "Function" to "> (more than)" and the "Threshold" to the desired value for the threshold (in the example "5.00 mm").



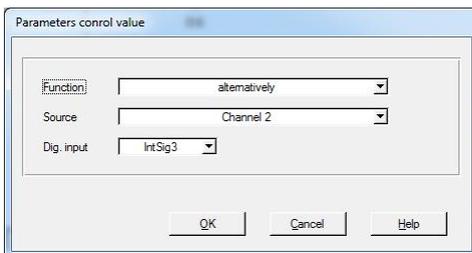
In the section "Function", set the "Switching threshold 1" to a free internal signal (in the example "IntSig1") and the "Switching threshold 2" to another free internal signal (in the example "IntSig2").



In the menu "Configuration - Binary operators", the two internal signals selected in the section "Function" will be linked together with "AND" and connected to another free internal signal (in the example "IntSig3").

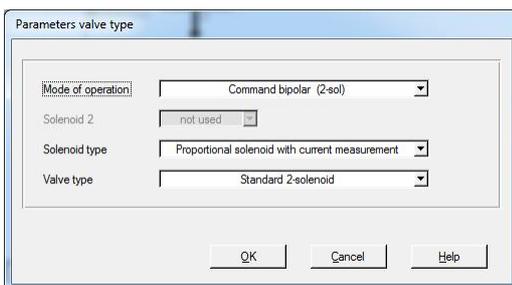


In the section "Control value", set the "Function" to "alternatively", the "Source" to "Channel 2" and the "Dig. input" to the in the menu "Configuration - Binary Operation" selected internal signal (in the example "IntSig3").



The following settings are made in "channel 2":

In the section "Valve type", set the "Mode of operation" to "Command bipolar (2-sol)".



In the field "Command value fixed", set the "Enable" to "Command values fixed", the "Selection 1" to the in the menu "Configuration - Binary Operation" selected "Output" (in the example "IntSig3" and the "Fixed command value 1" to the desired solenoid current value.

In which case:

- a positive value activates the solenoid from solenoid driver 1
- a negative value activates the solenoid from solenoid driver 1
- a value from 0.1% corresponds to the Imin from the corresponding solenoid
- a value from 100.0% corresponds to the Imax from the corresponding solenoid

