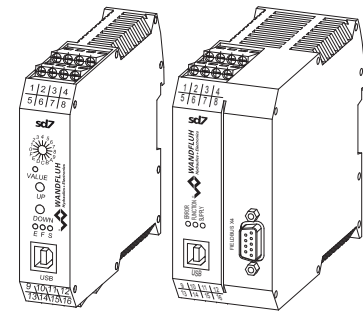


Digital amplifier module SD7

- for 1 or 2 proportional solenoids
- **Interface:**
 - analogue
 - CANopen / J1939
 - Profibus DP
 - HART
- max. 4 analogue differential inputs
- max. 8 digital inputs
- Fixed command values
- **Adjustable via PC**
(optionally with manual operation on front panel)
- for snapping on to dome rail
- also available as controller module (see data sheet 1.13-106)


DESCRIPTION

Digital amplifier module for installation on dome rail for driving proportional or black/white valves with one or two solenoids. The parameterisation takes place by means of menu-controlled parameterisation- and diagnostics software «PASO» from Wandfluh (USB-interface) or optionally with a manual control on the front panel. Separate ramps for up and down as well as fixed adjustable command values are integrated in the amplifier module as standard. The electronics are optionally available with different field bus interfaces.

FUNCTION

The amplifier module has one, resp., two **Pulse-Width-Modulated** current outputs with superimposed dither signal. The solenoid outputs can also be parameterised for black/white solenoids. The analogue and digital inputs as well as the digital outputs can be programmed individually. With this device control tasks can be solved in a very simple manner. The field bus connection enables reading the command value signal as well as the parameterisation directly via the field bus.

APPLICATION

As snap-on module, the amplifier module is mainly utilised in the industrial field. The module can be mounted on dome-rails. The connection with terminal screws enables commissioning without special tools in a short time. The amplifier module is particularly suitable for applications with additional functions such as ramps, fixed command values, etc. Customer-specific requirements can be implemented in a simple manner.

CONTENT

GENERAL SPECIFICATIONS.....	1
BASIC AMPLIFIER WITH ANALOGUE INTERFACE	3
BASIC AMPLIFIER WITH CANopen INTERFACE.....	7
BASIC AMPLIFIER WITH PROFIBUS INTERFACE	13
BASIC AMPLIFIER WITH HART INTERFACE	19
ENHANCED AMPLIFIER WITH ANALOGUE INTERFACE	23
ENHANCED AMPLIFIER WITH CANopen INTERFACE.....	28
ENHANCED AMPLIFIER WITH PROFIBUS INTERFACE.....	34
ENHANCED AMPLIFIER WITH HART INTERFACE	40

GENERAL SPECIFICATIONS

Execution	Module for electrical control cubicle housing made of plastic
Dimensions	
• Basic amplifier analogue	105 x 114 x 22,5 mm
• Basic amplifier CANopen/J1939	105 x 114 x 45 mm
• Basic amplifier Profibus DP	105 x 114 x 45 mm
• Basic amplifier HART	105 x 114 x 45 mm
• Enhanced amplifier analogue	105 x 114 x 45 mm
• Enhanced amplifier CANopen/J1939	105 x 114 x 45 mm
• Enhanced amplifier Profibus DP	105 x 114 x 45 mm
• Enhanced amplifier HART	105 x 114 x 45 mm
Installation	for 35 mm dome rail acc. to EN 60715
Weight	
• Basic amplifier analogue	130 g
• Basic amplifier CANopen/J1939	220 g
• Basic amplifier Profibus DP	220 g
• Basic amplifier HART	220 g
• Enhanced amplifier analogue	220 g
• Enhanced amplifier CANopen/J1939	240 g
• Enhanced amplifier Profibus DP	240 g
• Enhanced amplifier HART	240 g
Connections	Screw terminals, max. cable cross-section 2,5 mm ² -20...+70 °C
Working temperature	The accumulated current of the simultaneously powered solenoid depends on the ambient temperature. Further information can be found in the operating instructions.

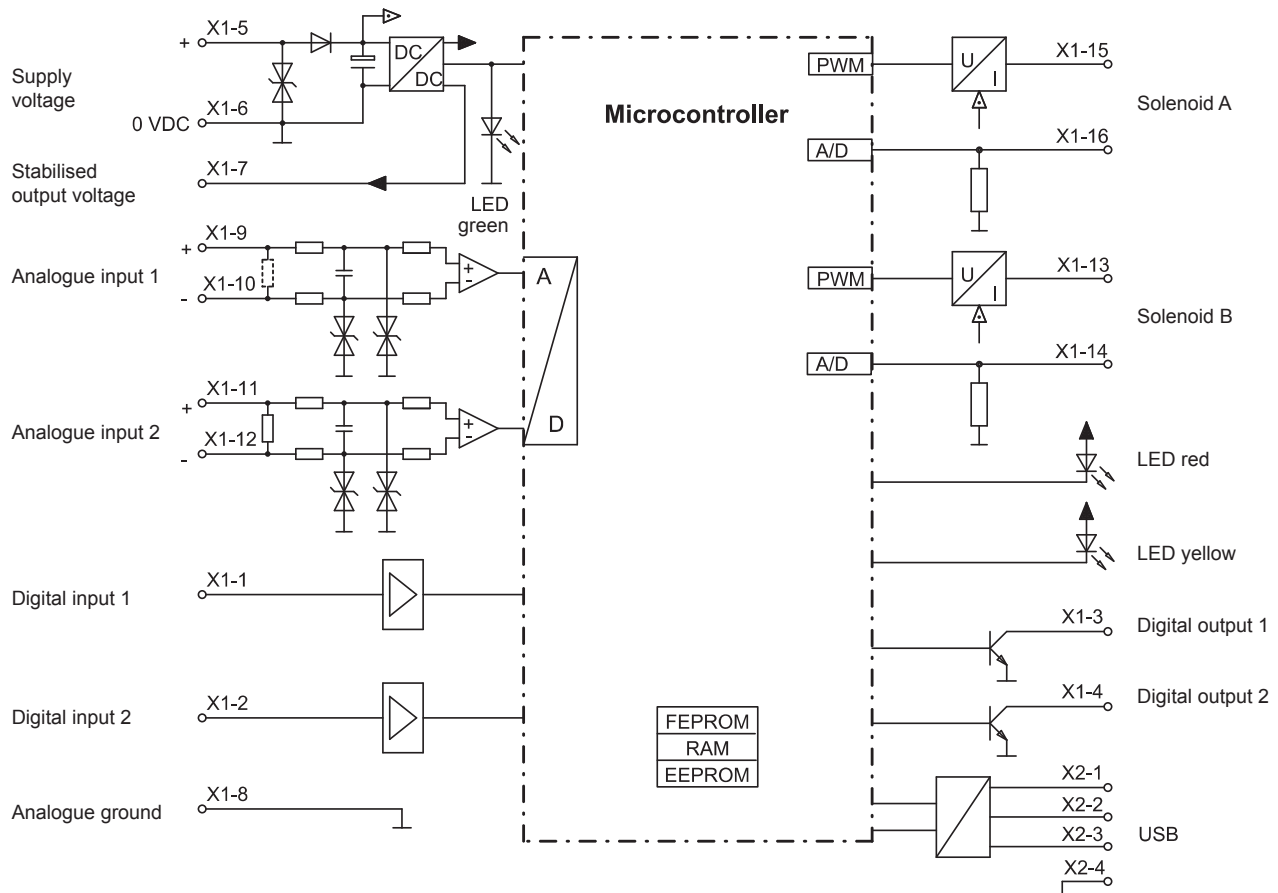
TYPE CODE

			S	D7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-	<input type="checkbox"/>	<input type="checkbox"/>	#	<input type="checkbox"/>
Module for electrical control cubicle														
Digital														
Adjustable with:														
• PASO and manual operation														
• PASO without manual operation														
Software configuration (function of card):														
• Basic amplifier														
• Enhanced amplifier														
1-solenoid version														
2-solenoid version														
Supply voltage:	24 VDC													
	12 VDC													
Basic amplifier:														
• Analogue input 1: voltage														
2: current														
• Analogue input 1 and 2: both voltage														
• Analogue input 1 and 2: both current														
Analogue input 3: always current (only with HART)														
Enhanced amplifier:														
• Analogue input 1 and 3: both voltage														
Analogue input 2 and 4: both current														
• Analogue input 1 to 4: all voltage														
• Analogue input 1 to 4: all current														
• Analogue input 1 and 2: both voltage														
Analogue input 3 and 4: both current														
• Analogue input 1 and 2: both current														
Analogue input 3 and 4: both voltage														
Basic amplifier without HART														
• Analogue input 1 and 2: 10-Bit resolution														
Basic amplifier with HART														
• Analogue input 1 and 2: 10-Bit resolution														
• Analogue input 3: 16-Bit resolution														
Enhanced amplifier														
• Analogue input 1 and 2: 10-Bit resolution														
• Analogue input 3 and 4: 16-Bit resolution														
Option field bus:														
• without field bus														
• with CANopen														
• with Profibus DP														
• with J1939														
• with HART														
Design-Index (Subject to change)														

Basic amplifier with analogue interface

ELECTRICAL SPECIFICATIONS

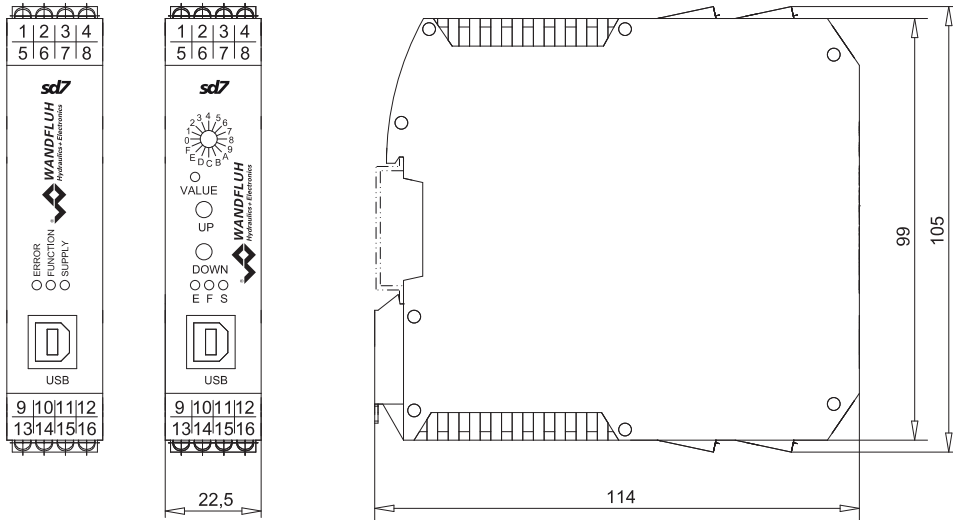
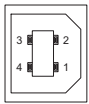
<p>Protection class IP 30 acc. to EN 60 529</p> <p>Supply voltage 24 VDC or 12 VDC</p> <p>Voltage range:</p> <ul style="list-style-type: none"> • 24 VDC 21...30 V • 12 VDC 10,5...15 V <p>Residual ripple <10%</p> <p>Fuse low</p> <p>Current consumption:</p> <ul style="list-style-type: none"> • No-load current approx. 40 mA • Maximum current consumption non-load current + 1,8 A per solenoid (with 24 VDC) non-load current + 2,3 A per solenoid (with 12 VDC) <p>Command value signal: Selectable with software Differential input not galvanically separated, for ground potential differences up to 1,5 V 4...+20 mA/0...+20 mA 0...+10 V (1- or 2-solenoid version) -10...+10 V (only 2-solenoid version)</p> <p>Resolution 10-Bit</p> <p>Input resistance Voltage input >18 kΩ Load for current input = 250 Ω</p> <p>Stabilised output voltage 10 VDC (with 24 VDC) 8 VDC (with 12 VDC) max. load 30 mA</p>	<p><i>Solenoid current:</i></p> <ul style="list-style-type: none"> • Minimal current I_{min} Adjustable 0...950 mA Factory setting 150 mA • Maximal current I_{max} Adjustable I_{min}...1,8A (with 24 VDC) I_{min}...2,3A (with 12 VDC) Factory setting 700 mA <p>• Accumulated current limitation The accumulated current of the simultaneously powered solenoids depends on the ambient temperature. Further information can be found in the operating instructions.</p> <p>Dither Frequency adjustable 20...500 Hz Factory setting 100 Hz Level adjustable 0...400 mA Factory setting 100 mA</p> <p>Temperature drift <1% at $\Delta T = 40^\circ C$</p> <p>Digital inputs Switching threshold high 6...30 VDC Switching threshold low 0...1 VDC</p> <p>Digital outputs Low-Side-Switch: $U_{max} = 40$ VDC $I_{max} = -700$ mA 0...500 s</p> <p>Ramps adjustable</p> <p>Serial interface USB (receptacle type B) for parameterising with «PASO»</p> <p>EMV Immunity EN 61 000-6-2 Emission EN 61 000-6-4</p>
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BLOCK DIAGRAM


DIMENSIONS

Type: SD73

Type: SD72


CONNECTOR WIRING DIAGRAM / PIN ASSIGNMENT
USB-interface, USB Type B X2


- 1 = VBUS
- 2 = D-
- 3 = D+
- 4 = GND


REMARK!

The parameterisation cable is not part of the scope of supply (commercially available USB-cable, plug type A to plug type B)

PIN-assignment X1


- 1 = Digital input 1
- 2 = Digital input 2
- 3 = Digital output 1
- 4 = Digital output 2
- 5 = Supply voltage +
- 6 = Supply voltage 0 VDC
- 7 = Stabilised output voltage
- 8 = Analogue ground
- 9 = Analogue input 1+
- 10 = Analogue input 1-
- 11 = Analogue input 2+
- 12 = Analogue input 2-
- 13 = Output solenoid driver 2+
- 14 = Output solenoid driver 2-
- 15 = Output solenoid driver 1+
- 16 = Output solenoid driver 1-

Configuration analogue input

Type description	Analogue input 1	Analogue input 2
SD7x0xDx0-AA	Voltage	Current
SD7x0xDx1-AA	Voltage	Voltage
SD7x0xDx2-AA	Current	Current

START-UP

Information regarding installation and commissioning are contained in the information leaflet supplied with the amplifier module and in the operating instructions.

Additional information can be found on our website:

www.wandfluh.com

Free-of-charge download:

- «PASO-SD7» Parameterisation software
- Operating instructions (*.pdf)

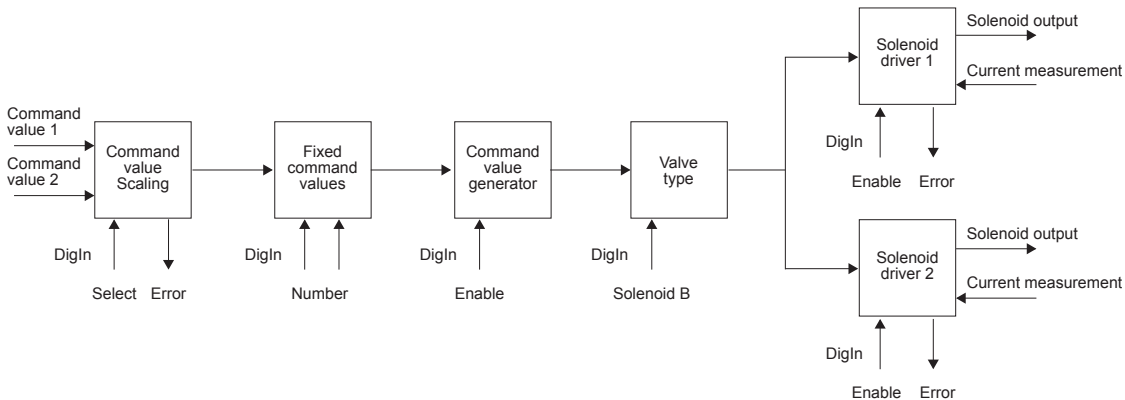
ADDITIONAL INFORMATION

Wandfluh electronics general	Wandfluh documentation register	1.13
Proportional spool valves	register	1.10
Proportional pressure valves	register	2.3
Proportional flow control valves	register	2.6

DESIGN

The amplifier module can be parameterised by means of the parameterisation software «PASO-SD7» through the USB-interface. In addition, the parameterisation software makes a data analysis possible. The software «PASO-SD7» is supported by Windows 2000 and Windows XP, Vista and Windows 7 with 32/64-Bit. Optionally the amplifier

module is equipped with a manual control, which enables the setting of the most important parameters by means of rotary selector switch and push-buttons and therefore makes a commissioning of the amplifier module possible without a PC.

FUNCTION DESCRIPTION

SD7 BASIC AMPLIFIER WITH ANALOGUE INTERFACE
Command value scaling

The command value can be applied as a voltage, current or digital signal. For every command value, the input utilised can be selected. The scaling takes place via the parameters „Interface“ and „Reference“. Furthermore every command value can be monitored for a cable break (except for voltage and digital signal). For every command value a dead band can also be set. Optionally one can operate with two command values. The characteristic of these command values can be adjusted.

Fixed command values

There are 3 fixed command values available, which can be selected via 2 digital inputs.

Command value generator

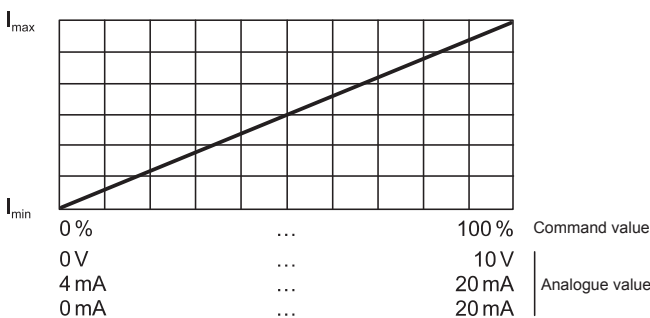
For each solenoid output two linear ramps for up and down are available which can be adjusted separately.

Valve type

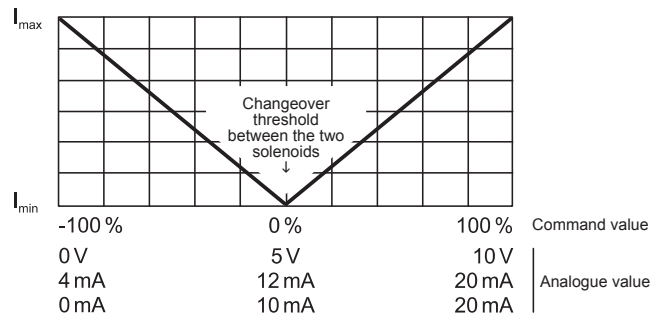
Here the operating mode is set. In addition it can be selected whether proportional or switching solenoids are driven.

Mode of operation „Command value unipolar (1-Sol)“

Dependent on a unipolar command value (voltage, current), the solenoid is driven (e.g. 0...10V correspond to 0...100% command value, 0...100% command value correspond to I_{min} ... I_{max} solenoid driver 1).

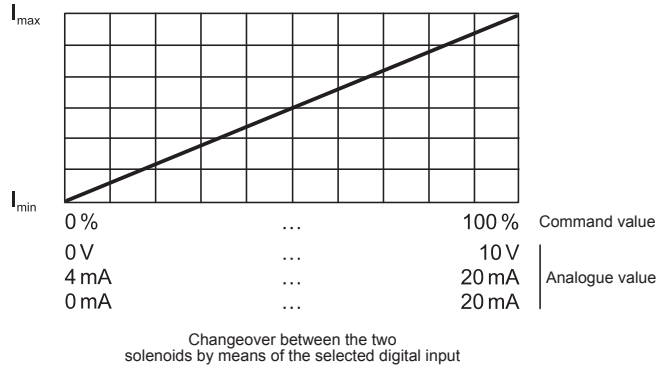
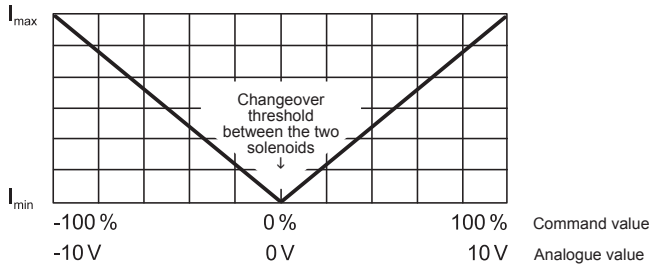

Mode of operation „Command value unipolar (2-Sol)“

Dependent on a unipolar command value signal (voltage, current), one of the two solenoids is driven, acc. to the signal level. The changeover threshold between the two solenoids as standard is in the middle of the values range of the command value signal (e.g. 0...10V correspond to -100...+100% command value, -100...0% command value correspond to I_{min} ... I_{max} solenoid driver 2, 0...+100% command value correspond to I_{min} ... I_{max} solenoid driver 1).



Mode of operation „Command value bipolar (2-Sol)“

Dependent on a bipolar command value signal (voltage), one of the two solenoids is driven, acc. to the signal level. The changeover threshold between the two solenoids as standard is at 0V (e.g. -10...+10V correspond to -100...+100% command value, -100...0% command value correspond to I_{min} ... I_{max} solenoid driver 2, 0...+100% command value correspond to I_{min} ... I_{max} solenoid driver 1).


Signal recording

The SD7 amplifier module has a signal recording function. This, by means of PASO, enables the recording of various system signals, such as command value, solenoid currents, etc., which can be represented on a common time axis.

Mode of operation „Command value unipolar (2-Sol with DigIn)“

Dependent on a unipolar command value signal (voltage, current), the solenoid is driven by solenoid driver 1, when the selected digital input is „not activated“, resp. the solenoid by the solenoid driver 2, when the selected digital input is „activated“ (e.g. 0...10V correspond to 0...100% command value, 0...100% command value correspond to I_{min} ... I_{max} solenoid driver 1 or 2).

Solenoid driver

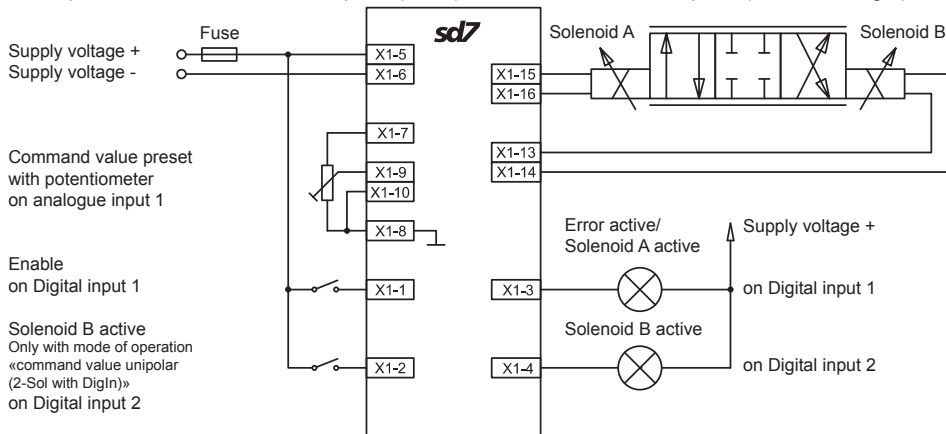
Two Pulse-Width-Modulated current outputs are available. To each output, a dither signal is superimposed, whereas dither frequency and dither level can be adjusted separately. For each output, the minimum (I_{min}) and maximum (I_{max}) current can be adjusted separately. The solenoid outputs can also be configured as switching outputs. Therewith for each output a power reduction can be adjusted separately.

Optimisation of characteristic curve

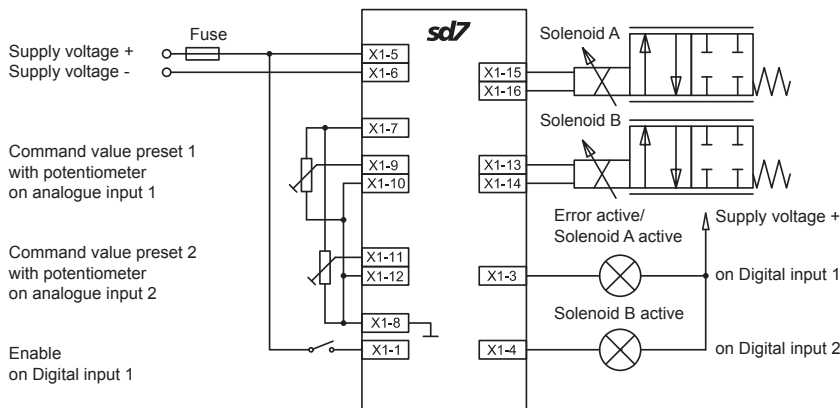
A characteristic curve adjustable per solenoid „Command value input – solenoid current output“ enables an optimised (e.g., linearised) characteristic of the hydraulic system.

CONNECTION EXAMPLE

Mode of operation „command value unipolar (2-Sol)“ or „command value unipolar (2-Sol with DigIn)“



Mode of operation „command value unipolar (1-Sol)“

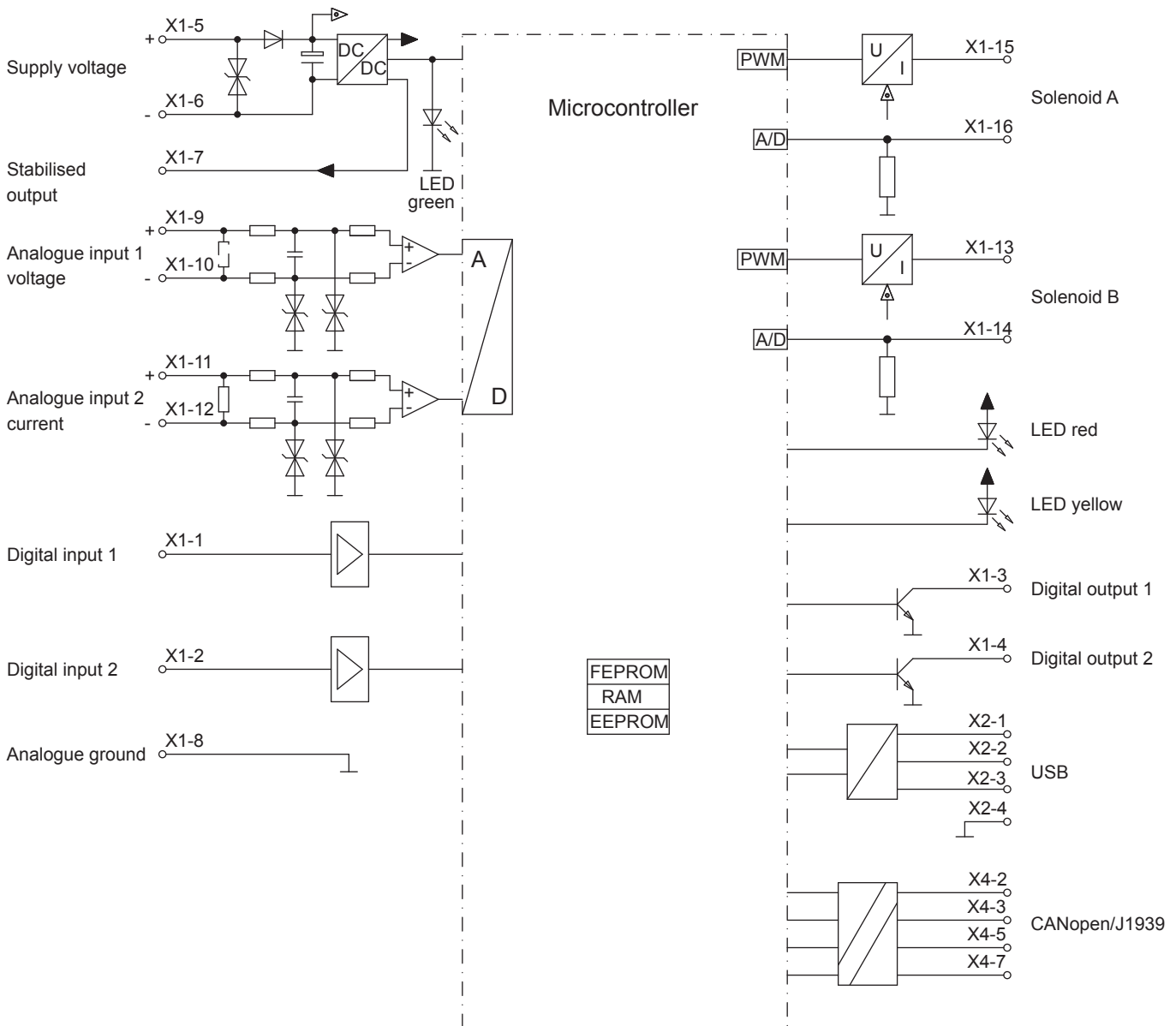


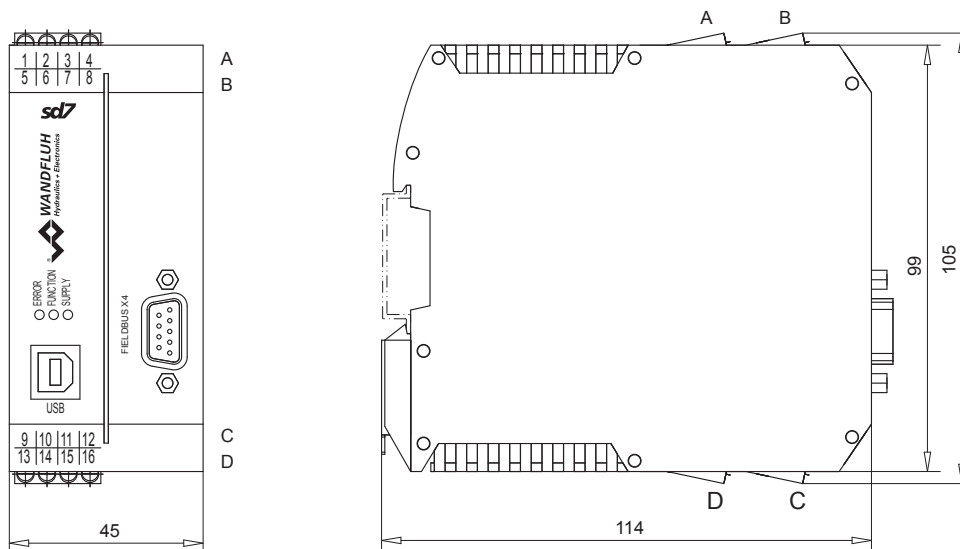
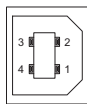
Basic amplifier with CANopen/J1939 interface

ELECTRICAL SPECIFICATIONS

Protection class Device receptacle CANopen (male) Mating connector Supply voltage <i>Voltage range:</i> • 24 VDC • 12 VDC Residual ripple Fuse <i>Current consumption:</i> • Non-load current • Maximum current consumption Analogue inputs: Resolution Input resistance Stabilised output voltage Bus topology Potential separation <i>Solenoid current:</i>	IP 30 acc. to EN 60 529 DSUB, 9-pole Plug (female) DSUB, 9-pole 24 VDC or 12 VDC 21,0...30,0 VDC 10,5...15,0 VDC <10 % low approx. 40 mA non-load current + 1,8 A per solenoid (with 24 VDC) non-load current + 2,3 A per solenoid (with 12 VDC) Selectable with software Differential input not galvanically separated, for ground potential differences up to 1,5 V 4...+20 mA/0...+20 mA 0...+10 V (1- or 2-solenoid version) -10...+10 V (only 2-solenoid version) 10-Bit Voltage input >18 kΩ Load for current input = 250 Ω 10 VDC (with 24 VDC) 8 VDC (with 12 VDC) max. load 30 mA Line, differential signal transmission CANopen/J1939 to «SD7»-electronics 500 VDC	• Minimal current I_{min} • Maximal current I_{max} • Accumulated current limitation Dither Temperature drift Digital inputs Digital outputs Ramps adjustable Serial interface EMV Immunity Emission	Adjustable 0...950 mA Factory setting 150 mA Adjustable I_{min} ...1,8 A (with 24 VDC) I_{min} ...2,3 A (with 12 VDC) Factory setting 700 mA The accumulated current of the simultaneously powered solenoids depends on the ambient temperature. Further information can be found in the operating instructions. Frequency adjustable 2...500 Hz Factory setting 100 Hz Level adjustable 0...400 mA Factory setting 100 mA <1 % at $\Delta T = 40^\circ C$ Switching threshold high 6...30 VDC Switching threshold low 0...1 VDC Low-Side-Switch: $U_{max} = 40$ VDC $I_{max} = -700$ mA Adjustable 0...500 s USB (receptacle type B) EN 61 000-6-2 EN 61 000-6-4
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BLOCK DIAGRAM

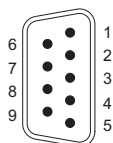


DIMENSIONS

CONNECTOR WIRING DIAGRAM / PIN ASSIGNMENT
USB-interface, USB-Type B X2


- 1 = VBUS
- 2 = D -
- 3 = D +
- 4 = GND


REMARK!

The parameterisation cable is not part of the scope of supply (commercially available USB-cable, plug type A to plug type B)

Device receptacle CANopen (male) X4

CANOPEN/J1939

- 1 = Reserved
- 2 = CANLow
- 3 = CANGnd
- 4 = Reserved
- 5 = CANSshield
- 6 = Reserved
- 7 = CANHigh
- 8 = Reserved
- 9 = Reserved

The mating connector (plug female, DSUB, 9-pole) is not included in the delivery.

START-UP

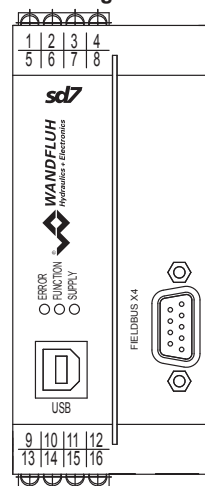
Information regarding installation and commissioning are contained in the information leaflet supplied with the amplifier module and in the operating instructions.

Additional information can be found on our website:

www.wandfluh.com

Free-of-charge download:

- «PASO-SD7» Parameterisation software
- Operating instructions (*.pdf)
- EDS-file «WAGOB8E.ed»

PIN Assignment X1


- 1 = Digital input 1
- 2 = Digital input 2
- 3 = Digital output 1
- 4 = Digital output 2
- 5 = Supply Analogue input +
- 6 = Supply voltage 0 VDC
- 7 = Stabilised output voltage
- 8 = Analogue ground
- 9 = Analogue input 1 +
- 10 = Analogue input 1 -
- 11 = Analogue input 2 +
- 12 = Analogue input 2 -
- 13 = Output solenoid 2 +
- 14 = Output solenoid 2 -
- 15 = Output solenoid 1 +
- 16 = Output solenoid 1 -

Configuration Analogue input

Type description	Analogue input 1	Analogue input 2
SD730xDx0-AC	Voltage	Current
SD730xDx1-AC	Voltage	Voltage (only 0...10V possible)
SD730xDx2-AC	Current	Current

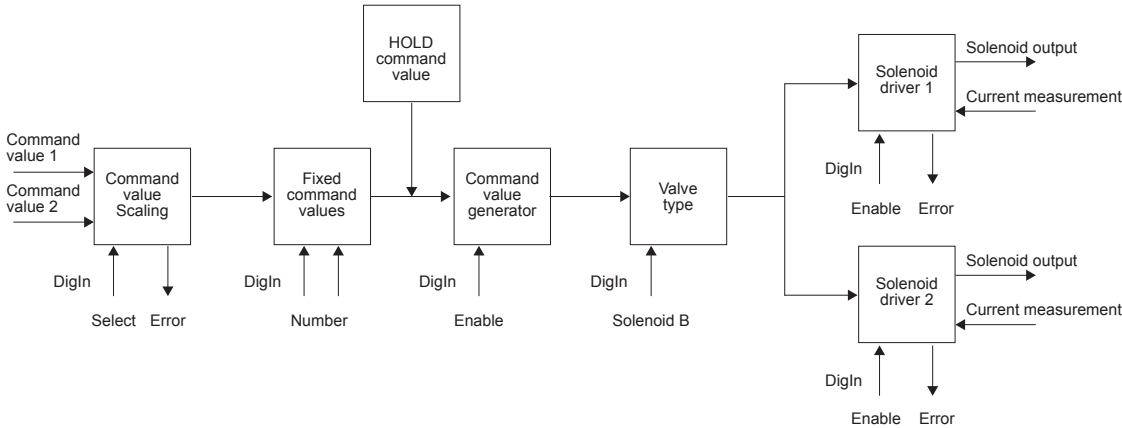
ADDITIONAL INFORMATION

Wandfluh electronics general	Wandfluh documentation register	1.13
Proportional directional valves	register	1.10
Proportional pressure valves	register	2.3
Proportional flow control valves	register	2.6

DESIGN

The amplifier module can be parameterised by means of the parameterisation software «PASO-SD7» through the USB-interface. In addition, the parameterisation software makes a data analysis possible. The software «PASO-SD7» is supported by Windows 2000 and Windows XP, Vista and Windows 7 with 32/64-Bit. The device control

(enable, etc.) as well as the command value setting can be preset via the CANopen/J1939 or locally via digital, resp. analogue inputs. Furthermore the parameterisation as well as an analysis/diagnostic are possible via the CANopen (with J1939 on request).

FUNCTION DESCRIPTION

SD7 BASIC AMPLIFIER WITH CANOPEN/J1939 INTERFACE
Command value scaling

The command value can be applied via the CANopen/J1939 or as a voltage, current or digital signal. For every command value, the input utilised can be selected. The scaling takes place via the parameters „Interface“ and „Reference“. Furthermore every command value can be monitored for a cable break (except for CANopen/J1939, voltage or digital signal). For every command value a dead band can also be set. Optionally one can operate with two command values. The characteristic of these command values can be adjusted.

Fixed command values

There are 3 fixed command values available, which can be selected via 2 digital inputs.

Command value generator

For each solenoid output two linear ramps for up and down are available which can be adjusted separately.

HOLD command value

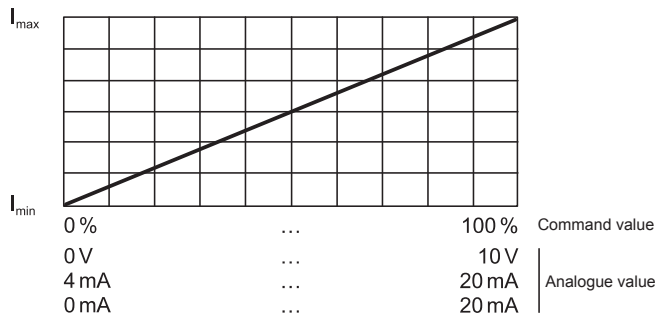
If via CANopen/J1939 the device is put into the „HOLD“ condition, the respective command value is activated.

Valve type

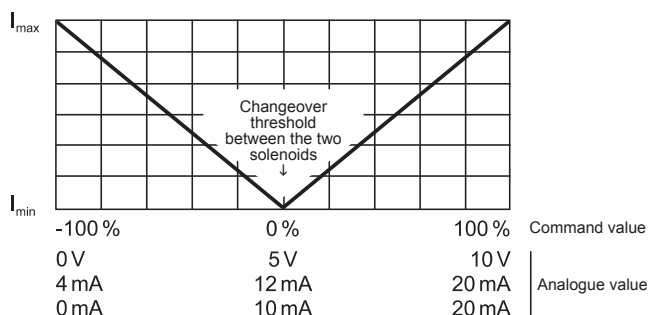
Here the operating mode is set. In addition it can be selected whether proportional or switching solenoids are driven.

Mode of operation „Command value unipolar (1-Sol)“

Dependent on a unipolar command value signal (voltage, current), the solenoid is driven (e.g. 0...10V correspond to 0...100% command value, 0...100% command value correspond to I_{min} ... I_{max} solenoid driver 1).

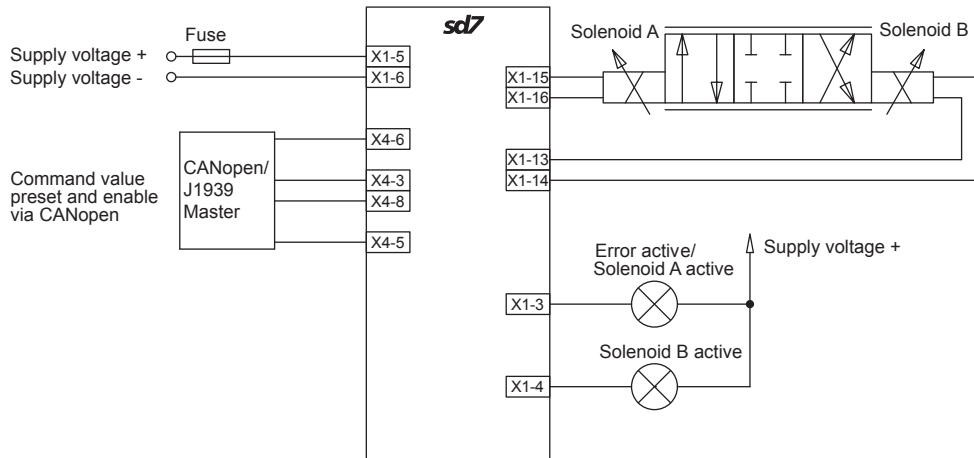

Mode of operation „Command value unipolar (2-Sol)“

Dependent on a unipolar command value signal (voltage, current), one of the two solenoids is driven, acc. to the signal level. The changeover threshold between the two solenoids as standard is in the middle of the values range of the command value signal. (e.g. 0...10V correspond to -100...+100% command value, -100...0% command value correspond to I_{min} ... I_{max} solenoid driver 2, 0...+100% command value correspond to I_{min} ... I_{max} solenoid driver 1).

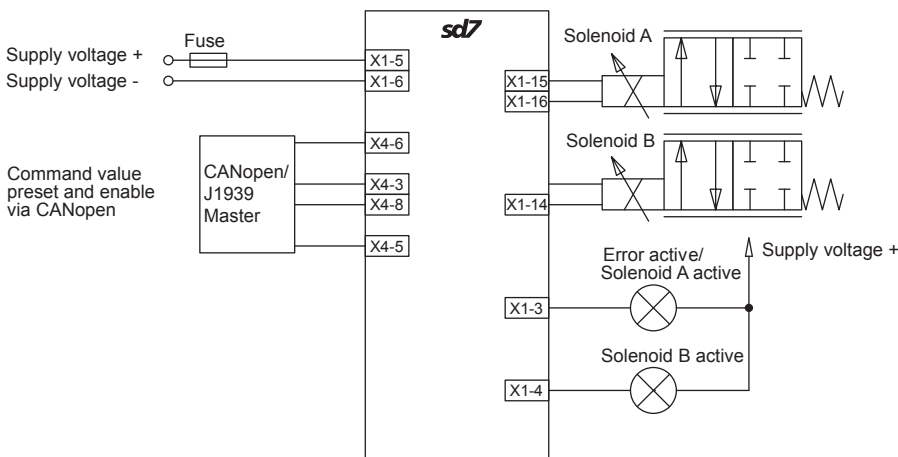


CONNECTION EXAMPLE

Mode of operation „command value unipolar (2-Sol)“ or „command value unipolar (2-Sol with DigIn)“



Mode of operation „command value unipolar (1-Sol)“

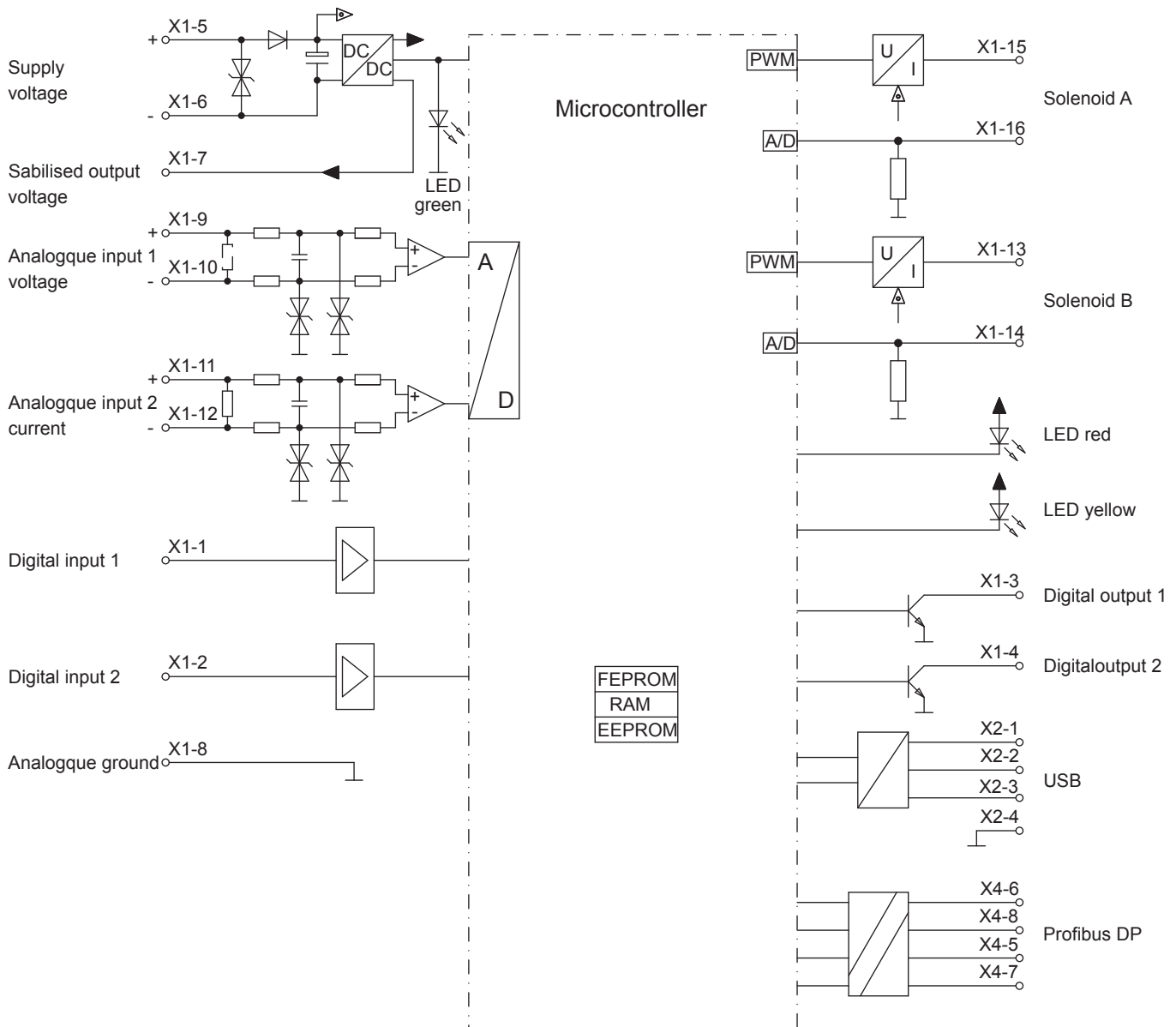


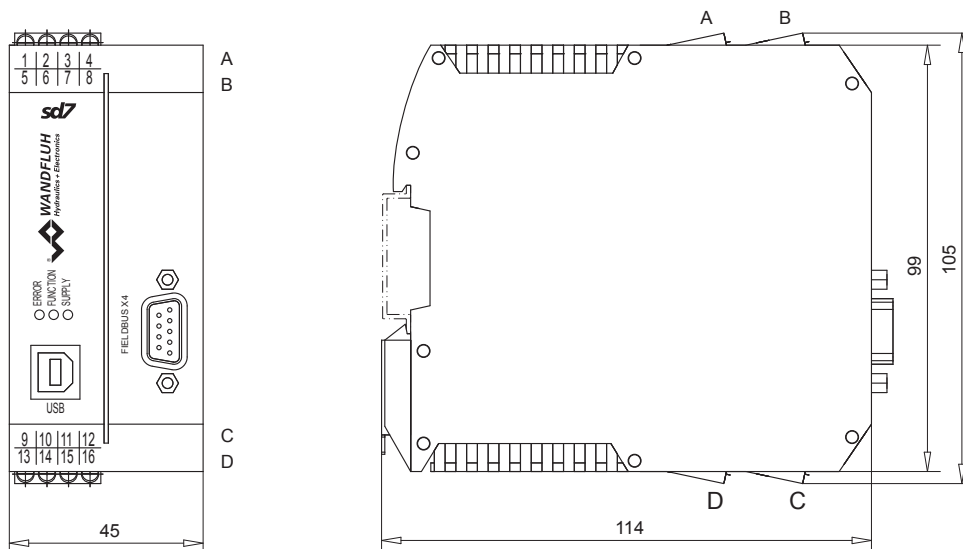
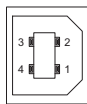
Basic amplifier with Profibus DP interface

ELECTRICAL SPECIFICATIONS

Protection class Device receptacle Profibus (female) Mating connector Supply voltage <i>Voltage range:</i> • 24 VDC • 12 VDC Residual ripple Fuse <i>Current consumption:</i> • No-load current • Maximum current-consumption Command value signal: Resolution Eingangswiderstand Stabilisierte Ausgangsspannung Bus topology Potential separation	IP 30 acc. to EN 60 529 DSUB, 9-pole Plug (male) DSUB, 9-pole 24 VDC or 12 VDC 21...30 V 10,5...15 V <10 % low approx. 40 mA non-load current + 1,8 A per solenoid (with 24 VDC) non-load current + 2,3 A per solenoid (with 12 VDC) Selectable with software Diff. inputs not galvanically separated, for ground potential differences up to 1,5 V 4...+20 mA/0...+20 mA 0...+10 V (1- or 2-solenoid version) -10...+10 V (only 2-solenoid version) 10-Bit Voltage input >18 kΩ Load for current input = 250 Ω 10 VDC (with 24 VDC) 8 VDC (with 12 VDC) max. load 30 mA Line, differential signal transmission Profibus to «SD7» electronics 500 VDC	<i>Solenoid current:</i> • Minimal current I_{min} • Maximal current I_{max} • Accumulated current-limitation Dither Temperature drift Digital inputs Digital outputs Ramps adjustable Serial interface EMV Immunity Emission	Adjustable 0...950 mA Factory setting 150 mA Adjustable I_{min} ...1,8A (with 24 VDC) I_{min} ...2,3A (with 12 VDC) Factory setting 700 mA The accumulated current of the simultaneously powered solenoids depends on the ambient temperature. Further information can be found in the operating instructions. Frequency adjustable 20...500 Hz Factory setting 100 Hz Level adjustable 0...400 mA Factory setting 100 mA <1% at $\Delta T = 40^{\circ}C$ Switching threshold high 6...30 VDC Switching threshold low 0...1 VDC Low-Side-Switch: $U_{max} = 40$ VDC $I_{max} = -700$ mA 0...500 s USB (receptacle type B) EN 61 000-6-2 EN 61 000-6-4
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BLOCK DIAGRAM

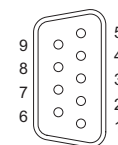


DIMENSIONS

CONNECTOR WIRING DIAGRAM / PIN ASSIGNMENT
USB-interface, USB-Type B X2


- 1 = VBUS
- 2 = D -
- 3 = D +
- 4 = GND

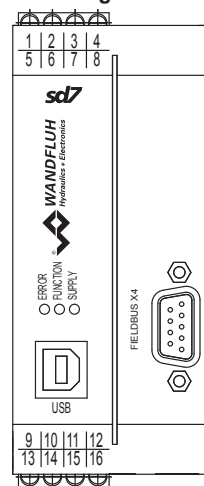

REMARK!

The parameterisation cable is not part of the scope of supply (commercially available USB-cable, plug type A to plug type B)

Device receptacle Profibus (female) X4

PROFIBUS

- 1 = Reserved
- 2 = Reserved
- 3 = RxD/TxD - P
- 4 = Reserved
- 5 = DGND
- 6 = VP
- 7 = Reserved
- 8 = RxD/TxD - N
- 9 = Reserved

The mating connector (plug male, DSUB, 9-pole) is not included in the delivery.

PIN-assignment X1


- 1 = Digital input 1
- 2 = Digital input 2
- 3 = Digital output 1
- 4 = Digital output 2
- 5 = Supply Analogue input +
- 6 = Supply voltage 0 VDC
- 7 = Stabilised output voltage
- 8 = Analogue ground
- 9 = Analogue input 1 +
- 10 = Analogue input 1 -
- 11 = Analogue input 2 +
- 12 = Analogue input 2 -
- 13 = Output solenoid 2 +
- 14 = Output solenoid 2 -
- 15 = Output solenoid 1 +
- 16 = Output solenoid 1 -

Configuration Analogue input

Type description	Analogue input 1	Analogue input 2
SD730xDx0-AP	Voltage	Current
SD730xDx1-AP	Voltage	Voltage (only 0...10V possible)
SD730xDx2-AP	Current	Current

START-UP

Information regarding installation and commissioning are contained in the information leaflet supplied with the amplifier module and in the operating instructions.

Additional information can be found on our website:
www.wandfluh.com

Free-of-charge download:

- «PASO-SD7» Parameterisation software
- Operating instructions (*.pdf)
- GSD-file «WAGOB8E.gsd»

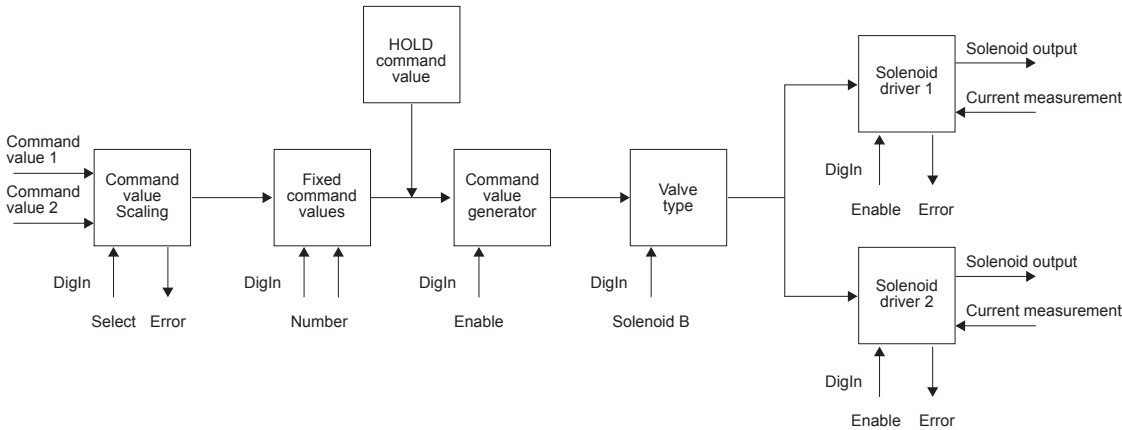
ADDITIONAL INFORMATION

Wandfluh electronics general	Wandfluh documentation register	
Proportional directional valves	register	1.10
Proportional pressure valves	register	2.3
Proportional flow control valves	register	2.6

DESIGN

The amplifier module can be parameterised by means of the parameterisation software «PASO-SD7» through the USB-interface. In addition, the parameterisation software makes a data analysis possible. The software «PASO-SD7» is supported by Windows 2000 and Windows XP, Vista and Windows 7 with 32/64-Bit. The device control

(enable, etc.) as well as the command value setting can be preset via the Profibus DP or locally via digital, resp. analogue inputs. Furthermore the parameterisation as well as an analysis diagnostic are possible via the Profibus DP.

FUNCTION DESCRIPTION

SD7 BASIC AMPLIFIER WITH PROFIBUS DP INTERFACE
Command value scaling

The command value can be applied via the Profibus DP or as a voltage, current or digital signal. For every command value, the input utilised can be selected. The scaling takes place via the parameters „Interface“ and „Reference“. Furthermore every command value can be monitored for a cable break (except for Profibus DP, voltage or digital signal). For every command value a dead band can also be set. Optionally one can operate with two command values. The characteristic of these command values can be adjusted.

Fixed command values

There are 3 fixed command values available, which can be selected via 2 digital inputs.

Command value generator

For each solenoid output two linear ramps for up and down are available which can be adjusted separately.

HOLD command value

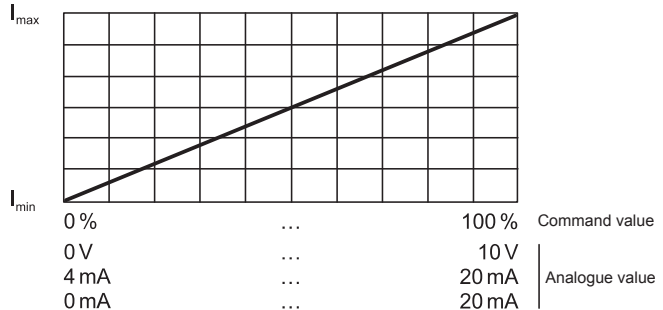
If via Profibus DP the device is put into the "HOLD" condition, the respective command value is activated.

Valve type

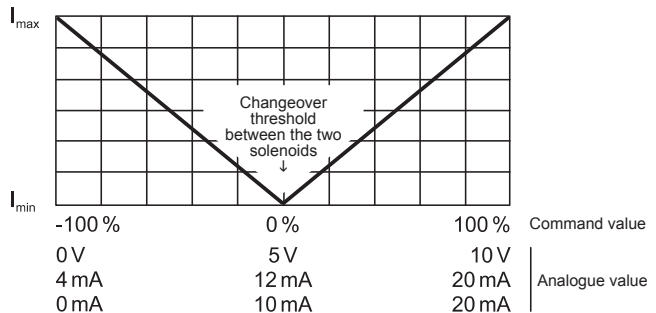
Here the operating mode is set. In addition it can be selected whether proportional or switching solenoids are driven.

Mode of operation „Command value unipolar (1-Sol)“

Dependent on a unipolar command value signal (voltage, current), the solenoid is driven (e.g. 0...10V correspond to 0...100% command value, 0...100% command value correspond to I_{min} ... I_{max} solenoid driver 1).

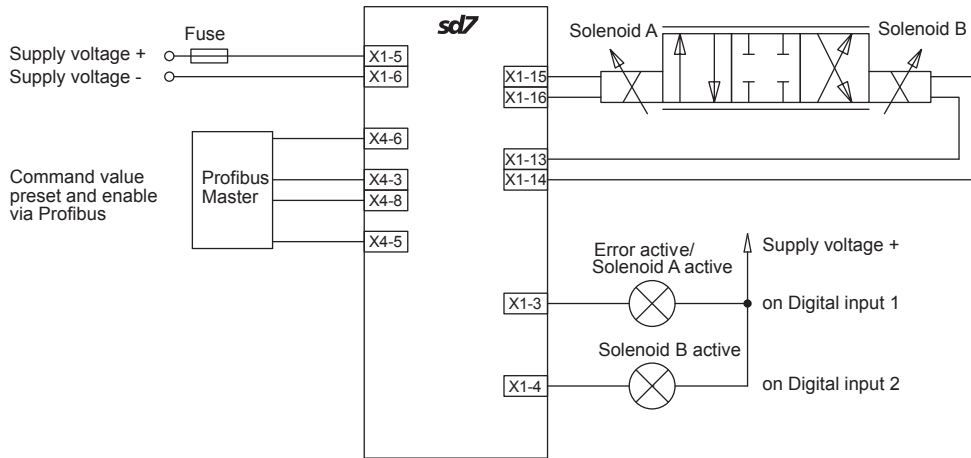

Mode of operation „Command value unipolar (2-Sol)“

Dependent on a unipolar command value signal (voltage, current), one of the two solenoids is driven, acc. to the signal level. The changeover threshold between the two solenoids as standard is in the middle of the values range of the command value signal. (e.g. 0...10V correspond to -100...+100% command value, -100...0% command value correspond to I_{min} ... I_{max} solenoid driver 2, 0...+100% command value correspond to I_{min} ... I_{max} solenoid driver 1).

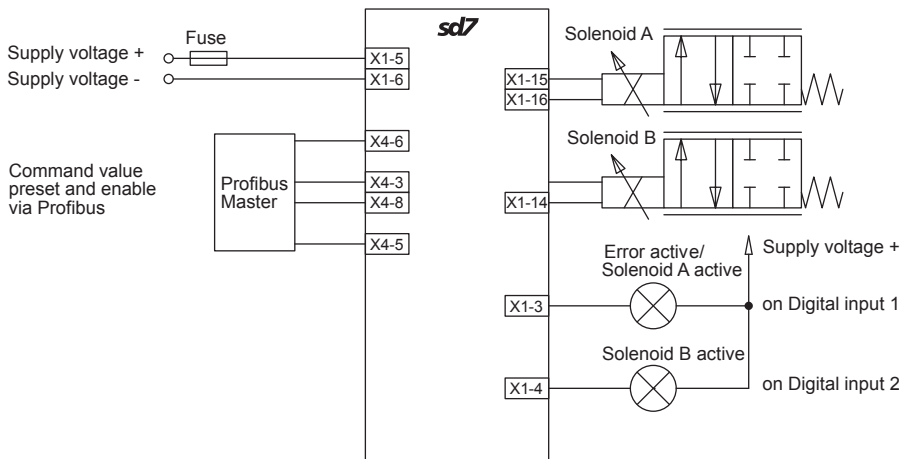


CONNECTION EXAMPLE

Mode of operation „command value unipolar (2-Sol)“ or „command value unipolar (2-Sol with DigIn)“



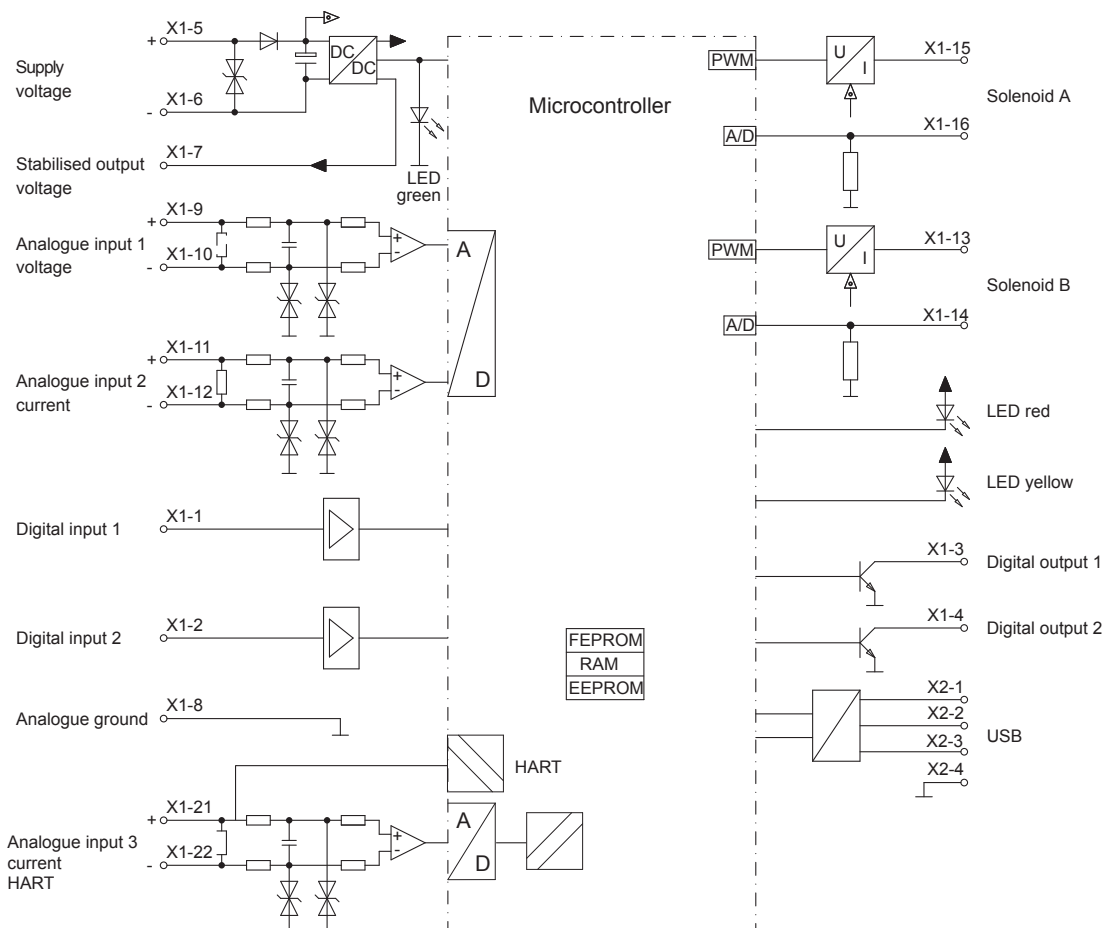
Mode of operation „command value unipolar (1-Sol)“

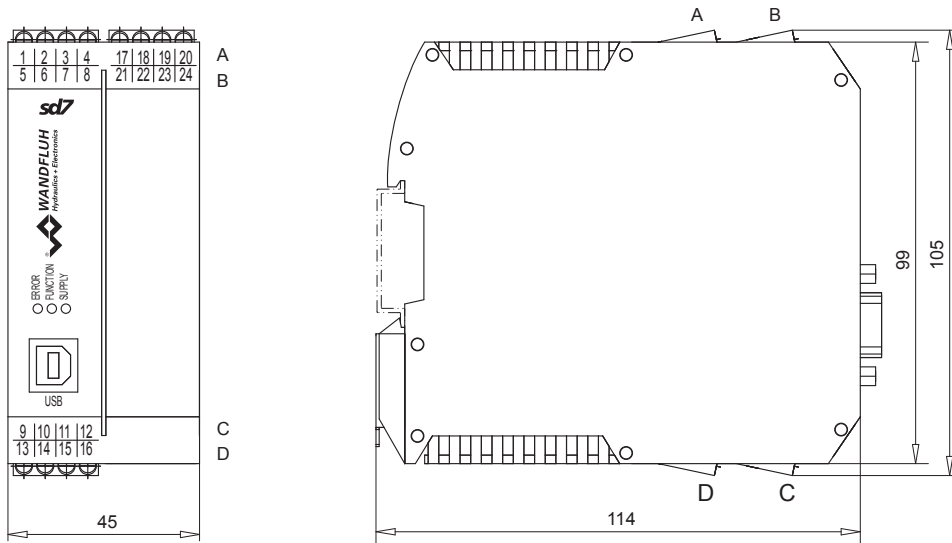
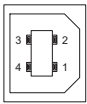


Basic amplifier with HART interface

ELECTRICAL SPECIFICATIONS

Protection class IP 30 acc. to EN 60 529 Supply voltage 24 VDC or 12 VDC Voltage range: • 24 VDC 21...30 V • 12 VDC 10,5...15 V Residual ripple <10% Fuse low Current consumption: • No-load current approx. 40 mA • Maximum current-consumption non-load current + 1,8 A per solenoid (with 24 VDC) non-load current + 2,3 A per solenoid (with 12 VDC)	HART input via analogue inputs 3 Solenoid current: • Minimal current I_{min} Adjustable 0...950 mA Factory setting 150 mA • Maximal current I_{max} Adjustable $I_{min}...1,8A$ (with 24 VDC) $I_{min}...2,3A$ (with 12 VDC) Factory setting 700 mA • Accumulated current-limitation The accumulated current of the simultaneously powered solenoids depends on the ambient temperature. Further information can be found in the operating instructions.	Frequency adjustable 20...500 Hz Factory setting 100 Hz Level adjustable 0...400 mA Factory setting 100 mA Temperature drift <1% at $\Delta T = 40^\circ C$ Digital inputs Switching threshold high 6...30 VDC Switching threshold low 0...1 VDC Digital outputs Low-Side-Switch: $U_{max} = 40$ VDC $I_{max} = -700$ mA Ramps adjustable 0...500 s Serial interface USB (receptacle type B) EMV Immunity EN 61 000-6-2 Emission EN 61 000-6-4
Command value signal: Selectable with software Inputs 1 and 2: Diff. inputs not galvanically separated, for ground potential differences up to 1,5 V 4...+20 mA/0...+20 mA 0...+10 V (1- or 2-solenoid version, not input 3) -10...+10 V (only 2-solenoid version, not input 3) Input 3: galvanically separated for HART Signal 4... +20 mA / 0 ... +20 mA	Dither Temperature drift Digital inputs Digital outputs	Resolution 10-Bit (Analogue inputs 1 and 2) 16-Bit (Analogue inputs 3) Input resistance Voltage input >18 k Ω Load for current input = 250 Ω Stabilised output-voltage 10 VDC (with Version 24 VDC) 8 VDC (with version 12 VDC) max. load 30 mA

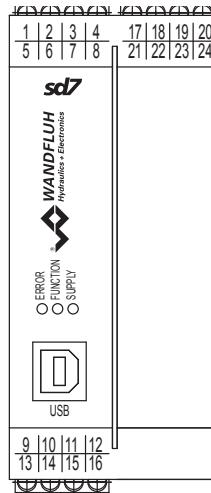
BLOCK DIAGRAM


DIMENSIONS

CONNECTOR WIRING DIAGRAM / PIN ASSIGNMENT
USB interface, USB Type B X2


- 1 = VBUS
- 2 = D-
- 3 = D+
- 4 = GND


REMARK!

The parameterisation cable is not part of the scope of supply (commercially available USB-cable, plug type A to plug type B)

PIN Assignment X1


- 1 = Digital input 1
- 2 = Digital input 2
- 3 = Digital output 1
- 4 = Digital output 2
- 5 = Supply voltage +
- 6 = Supply voltage 0 VDC
- 7 = Stabilised output voltage
- 8 = Analogue ground
- 9 = Analogue input 1+
- 10 = Analogue input 1-
- 11 = Analogue input 2+
- 12 = Analogue input 2-
- 13 = Output solenoid driver 2+
- 14 = Output solenoid driver 2-
- 15 = Output solenoid driver 1+
- 16 = Output solenoid driver 1-
- 21 = Analogue input 3 + HART
- 22 = Analogue input 3 - HART

Configuration Analogue input

Type description	Analogue input 1	Analogue input 2	Analogue input 3
SD7x0xDx0-BH	Voltage	Current	Current
SD7x0xDx1-BH	Voltage	Voltage	Current
SD7x0xDx2-BH	Current	Current	Current

START-UP

Information regarding installation and commissioning are contained in the information leaflet supplied with the amplifier module and in the operating instructions.

Additional information can be found on our website:
www.wandfluh.com

Free-of-charge download:

- «PASO-SD7» Parameterisation software
- Operating instructions (*.pdf)

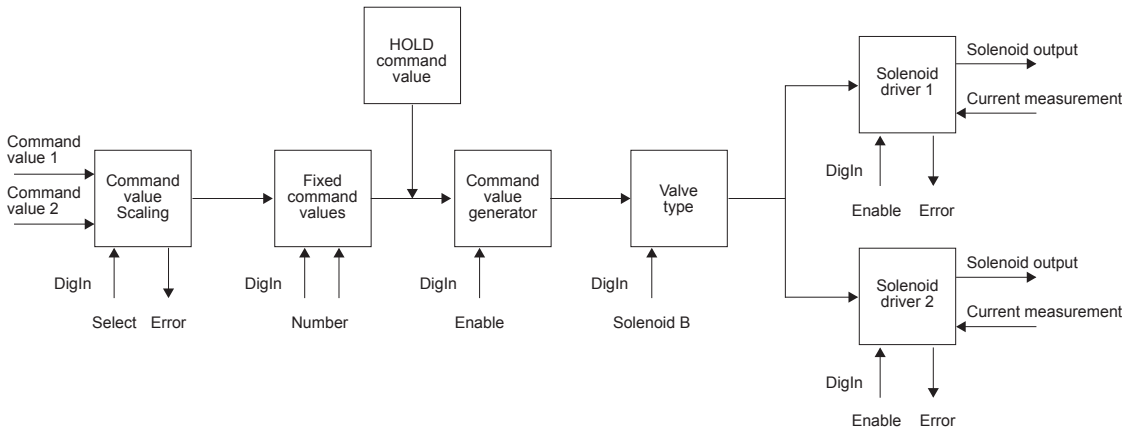
ADDITIONAL INFORMATION

Wandfluh electronics general	Wandfluh documentation register
Proportional directional valves	register 1.10
Proportional pressure valves	register 2.3
Proportional flow control valves	register 2.6

DESIGN

The amplifier module can be parameterised by means of the parameterisation software «PASO-SD7» through the USB-interface. In addition, the parameterisation software makes a data analysis possible. The software «PASO-SD7» is supported by Windows 2000 and Windows XP, Vista and Windows 7 with 32/64-Bit. Optionally the amplifier

module is equipped with a manual control, which enables the setting of the most important parameters by means of rotary selector switch and push-buttons and therefore makes a commissioning of the amplifier module possible without a PC.

FUNCTION DESCRIPTION

SD7 BASIC AMPLIFIER WITH HART INTERFACE
Command value scaling

The command value can be applied via HART or as a voltage, current or digital signal. For every command value, the input utilised can be selected. The scaling takes place via the parameters „Interface“ and „Reference“. Furthermore every command value can be monitored for a cable break (except for HART, voltage or digital signal). For every command value a dead band can also be set. Optionally one can operate with two command values. The characteristic of these command values can be adjusted.

Fixed command values

There are 3 fixed command values available, which can be selected via 2 digital inputs.

Command value generator

For each solenoid output two linear ramps for up and down are available which can be adjusted separately.

HOLD command value

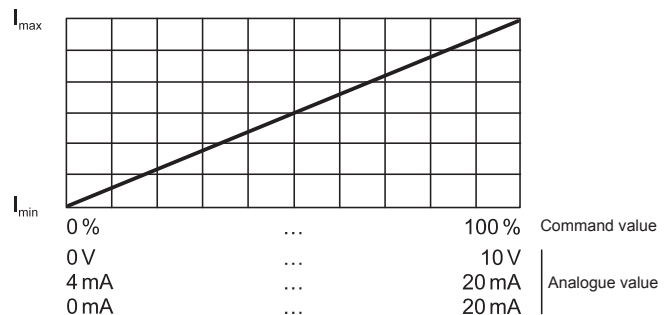
If via CANopen/J1939 the device is put into the "HOLD" condition, the respective command value is activated.

Valve type

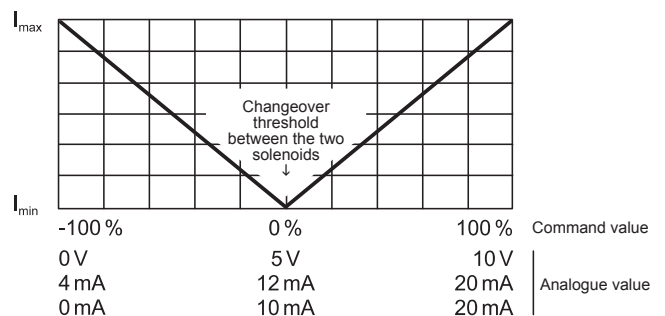
Here the operating mode is set. In addition it can be selected whether proportional or switching solenoids are driven.

Mode of operation „Command value unipolar (1-Sol)“

Dependent on a unipolar command value signal (voltage, current), the solenoid is driven (e.g. 0...10V correspond to 0...100% command value, 0...100% command value correspond to I_{min} ... I_{max} solenoid driver 1).

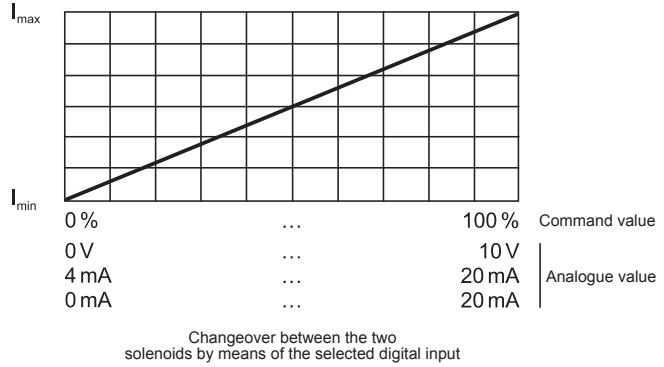
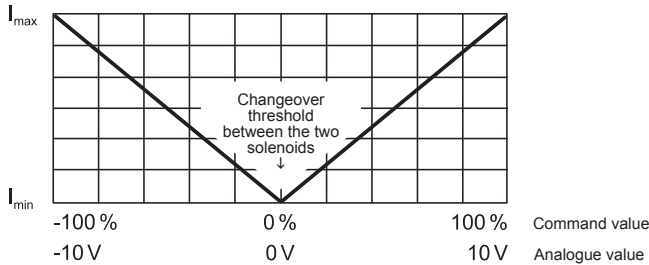

Mode of operation „Command value unipolar (2-Sol)“

Dependent on a unipolar command value signal (voltage, current), one of the two solenoids is driven, acc. to the signal level. The changeover threshold between the two solenoids as standard is in the middle of the values range of the command value signal. (e.g. 0...10V correspond to -100...+100% command value, -100...0% command value correspond to I_{min} ... I_{max} solenoid driver 2, 0...+100% command value correspond to I_{min} ... I_{max} solenoid driver 1).



Mode of operation „Command value bipolar (2-Sol)“

Dependent on a bipolar command value signal (voltage), one of the two solenoids is driven, acc. to the signal level. The changeover threshold between the two solenoids as standard is at 0V (e.g. -10....+10V correspond to -100....+100% command value, -100....0% command value correspond to I_{min} I_{max} solenoid driver 2, 0....+100% command value correspond to I_{min} I_{max} solenoid driver 1).



Signal recording

The SD7 amplifier module has a signal recording function. This, by means of PASO, enables the recording of various system signals, such as command value, solenoid currents, etc., which can be represented on a common time axis.

Solenoid driver

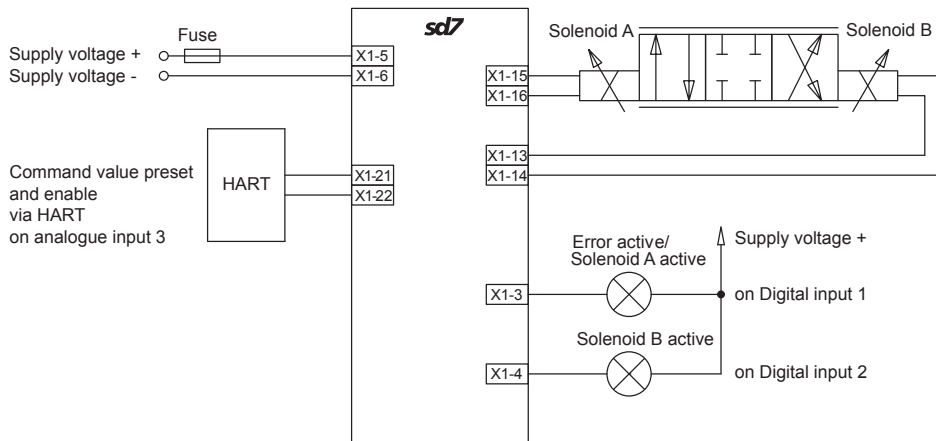
Two Pulse-Width-Modulated current outputs are available. To each output, a dither signal is superimposed, whereas dither frequency and dither level can be adjusted separately. For each output, the minimum (I_{min}) and maximum (I_{max}) current can be adjusted separately. The solenoid outputs can also be configured as switching outputs. The re-wire for each output a power reduction can be adjusted separately.

Optimisation of characteristic curve

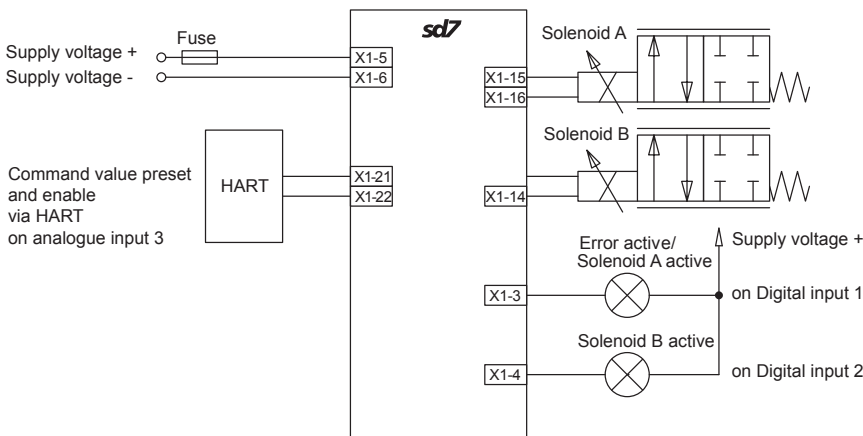
A characteristic curve adjustable per solenoid „Command value input – solenoid current output“ enables an optimised (e.g., linearised) characteristic of the hydraulic system.

CONNECTION EXAMPLE

Mode of operation „command value unipolar (2-Sol)“ or „command value unipolar (2-Sol with DigIn)“



Mode of operation „command value unipolar (1-Sol)“

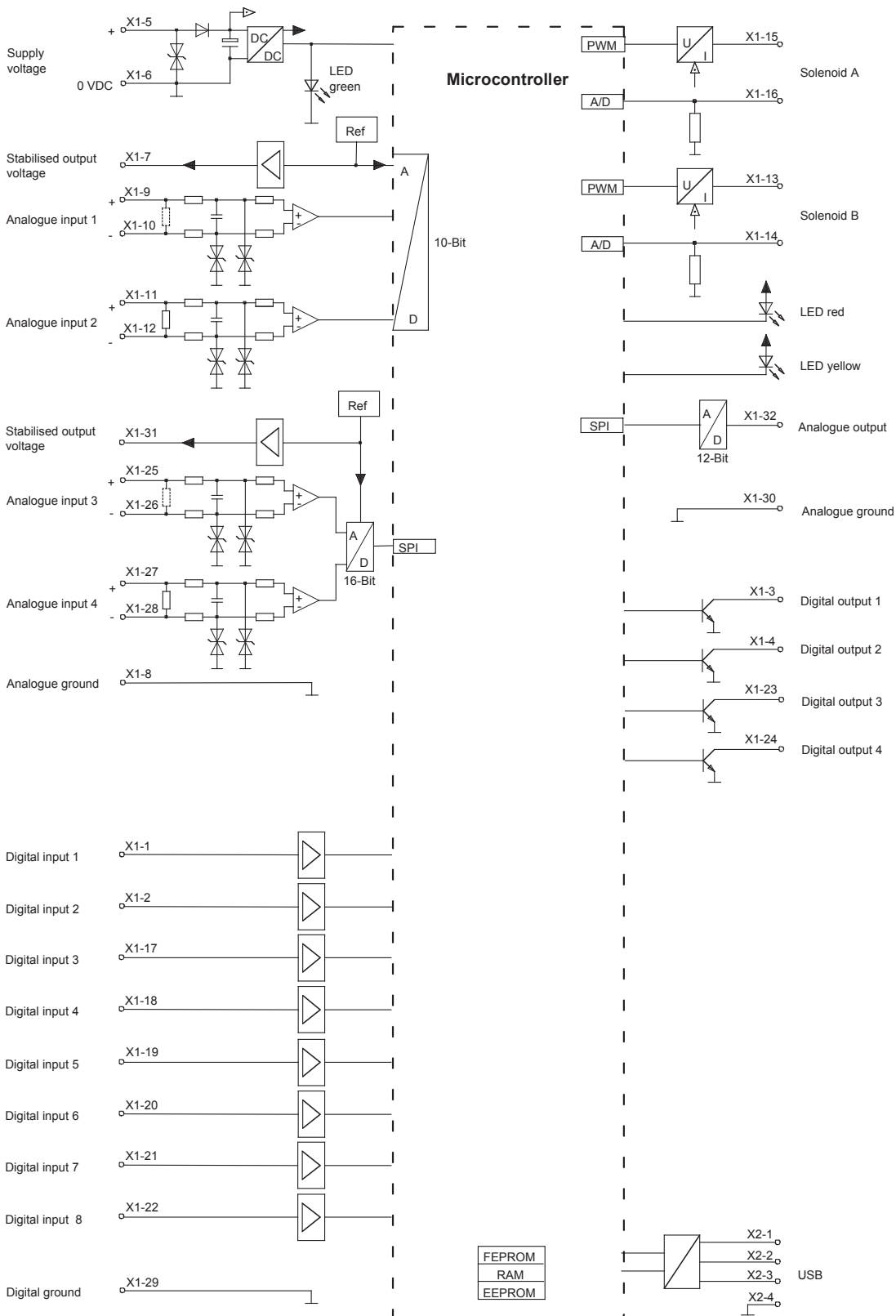


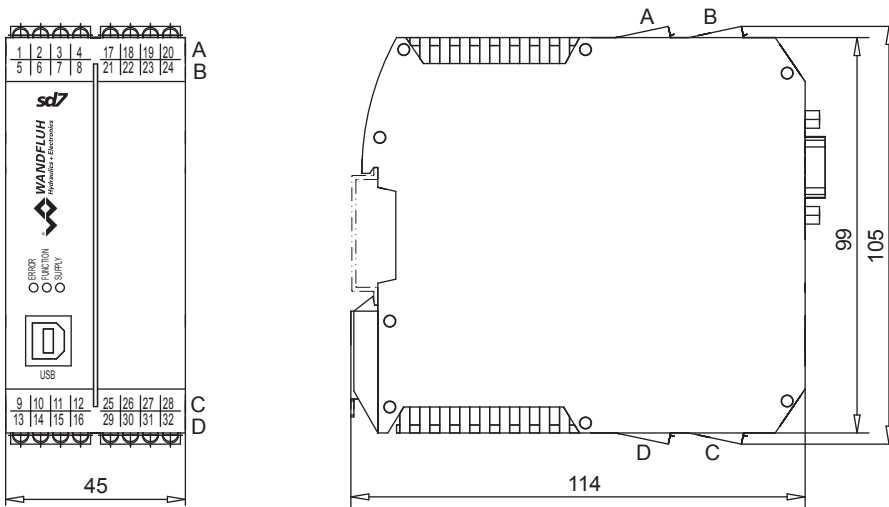
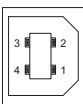
Enhanced amplifier with analogue interface

ELECTRICAL SPECIFICATIONS

Protection class Supply voltage <i>Voltage range:</i> • 24 VDC • 12 VDC Residual ripple Fuse <i>Current consumption:</i> • No-load current • Maximum current consumption Command value signal: Resolution Input resistance Analogue output Stabilised output voltage	IP 30 acc. to EN 60 529 24 VDC or 12 VDC 21...30 V 10,5...15 V <10 % low approx. 40 mA non-load current + 1,8 A per solenoid (with 24 VDC) non-load current + 2,3 A per solenoid (with 12 VDC) Selectable with software Diff. inputs not galvanically separated, for ground potential differences up to 1,5 V 4...+20 mA/0...+20 mA 0...+10 V (1- or 2-solenoid version) -10...+10 V (only 2-solenoid version) 10-Bit (Analogue inputs 1 and 2) 16-Bit (Analogue inputs 3 and 4) Voltage input >18 k Ω Load for current input = 250 Ω Voltage output \pm 10 VDC max. Current output \pm 3 mA 10 VDC (with 24 VDC) 8 VDC (with 12 VDC) max. load 30 mA	<i>Solenoid current:</i> • Minimal current I_{min} • Maximal current I_{max} • Accumulated current limitation Dither Temperature drift Digital inputs Digital outputs Ramps adjustable Serial interface EMV Immunity Emission	Adjustable 0...950 mA Factory setting 150 mA Adjustable I_{min} ...1,8A (with 24 VDC) I_{min} ...2,3A (with 12 VDC) Factory setting 700 mA The accumulated current of the simultaneously powered solenoids depends on the ambient temperature. Further information can be found in the operating instructions. Frequency adjustable 20...500 Hz Factory setting 100 Hz Level adjustable 0...400 mA Factory setting 100 mA <1% at $\Delta T = 40^{\circ}C$ Switching threshold high 6...30 VDC Switching threshold low 0...1 VDC Digital input 5-7 can be used as frequency input (frequencies 0...5 kHz) and as PWM input (automatic frequency recognition) Low-Side-Switch: $U_{max} = 40$ VDC $I_{max} = -700$ mA 0...500 s USB (receptacle type B) EN 61 000-6-2 EN 61 000-6-4
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BLOCK DIAGRAM

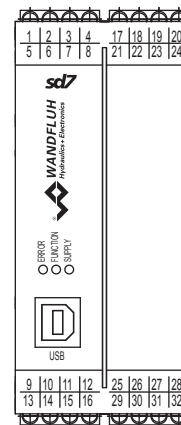


DIMENSIONS

CONNECTOR WIRING DIAGRAM / PIN ASSIGNMENT
USB interface, USB Type B X2


- 1 = VBUS
- 2 = D -
- 3 = D +
- 4 = GND


REMARK!

The parameterisation cable is not part of the scope of supply (commercially available USB-cable, plug type A to plug type B)

PIN Assignment X1


- 1 = Digital input 1
- 2 = Digital input 2
- 3 = Digital output 1
- 4 = Digital output 2
- 5 = Supply Analogue input +
- 6 = Supply voltage 0 VDC
- 7 = Stabilised output voltage
- 8 = Analogue ground
- 9 = Analogue input 1 +
- 10 = Analogue input 1 -
- 11 = Analogue input 2 +
- 12 = Analogue input 2 -
- 13 = Output solenoid 2 +
- 14 = Output solenoid 2 -
- 15 = Output solenoid 1 +
- 16 = Output solenoid 1 -
- 17 = Digital input 3
- 18 = Digital input 4
- 19 = Digital input 5
- 20 = Digital input 6
- 21 = Digital input 7
- 22 = Digital input 8
- 23 = Digital output 3
- 24 = Digital output 4
- 25 = Analogue input 3 +
- 26 = Analogue input 3 -
- 27 = Analogue input 4 +
- 28 = Analogue input 4 -
- 29 = Digital ground
- 30 = Analogue ground
- 31 = Stabilised output voltage
- 32 = Analogue output

START-UP

Information regarding installation and commissioning are contained in the information leaflet supplied with the amplifier module and in the operating instructions.

Additional information can be found on our website:

www.wandfluh.com

Free-of-charge download:

- «PASO-DSV/SD7» Parameterisation software
- Operating instructions (*.pdf)

ADDITIONAL INFORMATION

		Wandfluh documentation	
Wandfluh electronics general	register	1.13	
Proportional directional valves	register	1.10	
Proportional pressure valves	register	2.3	
Proportional flow control valves	register	2.6	

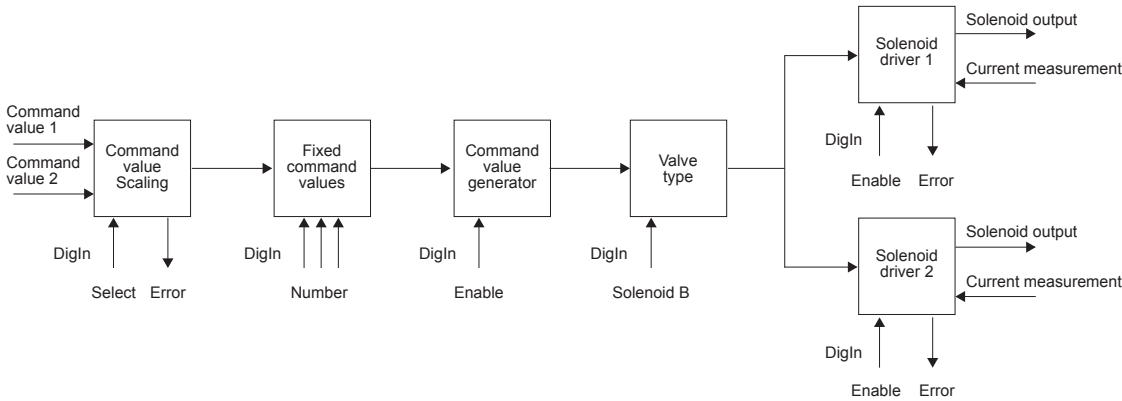
Configuration Analogue input

Type description	Analogue inputs			
	Nr. 1	Nr. 2	Nr. 3	Nr. 4
SD731xDx4-BA	Voltage	Current	Voltage	Current
SD731xDx5-BA	Voltage	Voltage	Voltage	Voltage
SD731xDx6-BA	Current	Current	Current	Current
SD731xDx7-BA	Voltage	Voltage	Current	Current
SD731xDx8-BA	Current	Current	Voltage	Voltage

DESIGN

The amplifier module can be parameterised by means of the parameterisation software «PASO-SD7» through the USB-interface. In addition, the parameterisation software makes a data analysis possible.

The software «PASO-SD7» is supported by Windows 2000 and Windows XP, Vista and Windows 7 with 32/64-Bit.

FUNCTION DESCRIPTION

SD7 ENHANCED AMPLIFIER WITH ANALOGUE INTERFACE
Command value scaling

The command value can be applied as a voltage, current, digital, frequency or PWM signal. For every command value, the input utilised can be selected. The scaling takes place via the parameters „Interface“ and „Reference“. Furthermore every command value can be monitored for a cable break (except for voltage and digital signal). For every command value a dead band can also be set. Optionally one can operate with two command values. The characteristic of these command values can be adjusted.

Fixed command values

There are 7 fixed command values available, which can be selected via 3 digital inputs.

Command value generator

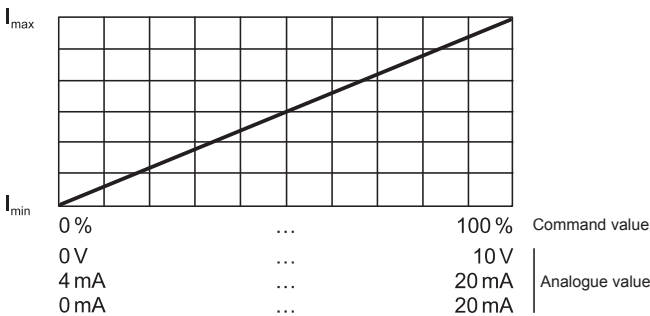
For each solenoid output two linear ramps for up and down are available which can be adjusted separately.

Valve type

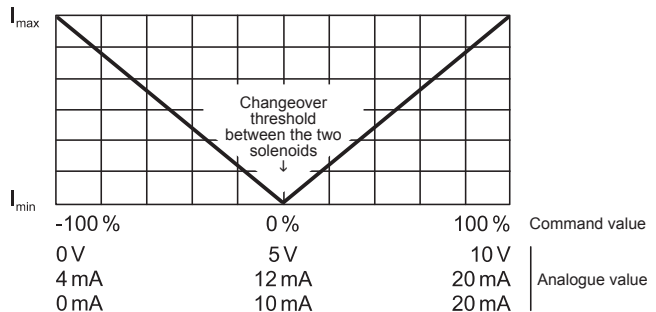
Here the operating mode is set. In addition it can be selected whether proportional or switching solenoids are driven.

Mode of operation „Command value unipolar (1-Sol)“

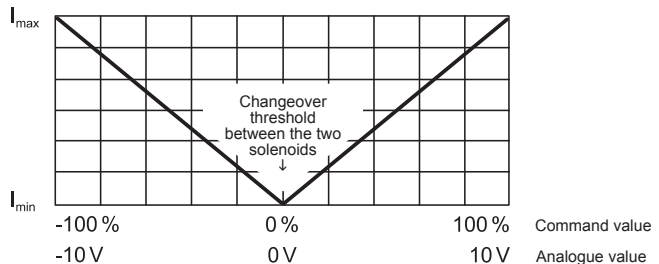
Dependent on a unipolar command value signal (voltage, current, frequency or PWM), the solenoid is driven (e.g. 0...10V correspond to 0...100% command value, 0...100% command value correspond to I_{min} ... I_{max} solenoid driver 1).


Mode of operation „Command value unipolar (2-Sol)“

Dependent on a unipolar command value signal (voltage, current, frequency or PWM), one of the two solenoids is driven, acc. to the signal level. The changeover threshold between the two solenoids as standard is in the middle of the values range of the command value signal. (e.g. 0...10V correspond to -100...+100% command value, -100...0% command value correspond to I_{min} ... I_{max} solenoid driver 2, 0...+100% command value correspond to I_{min} ... I_{max} solenoid driver 1).

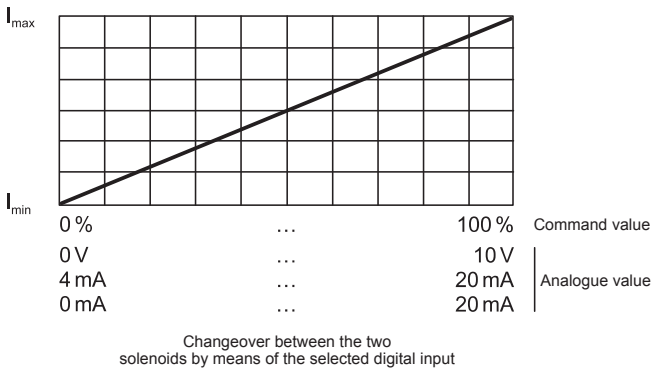

Mode of operation „Command value bipolar (2-Sol)“

Dependent on a bipolar command value signal (voltage), one of the two solenoids is driven, acc. to the signal level. The changeover threshold between the two solenoids as standard is at 0V (e.g. -10...+10V correspond to -100...+100% command value, -100...0% command value correspond to I_{min} ... I_{max} solenoid driver 2, 0...+100% command value correspond to I_{min} ... I_{max} solenoid driver 1).



Mode of operation „Command value unipolar (2-Sol with Dign)“

Dependent on a unipolar command value signal (voltage, current, frequency or PWM), the solenoid is driven by solenoid driver 1, when the selected digital input is „not activated“, resp. the solenoid by the solenoid driver 2, when the selected digital input is „activated“ (e.g. 0...10V correspond to 0...100% command value, 0...100% command value correspond to I_{min}...I_{max} solenoid driver 1 or 2).


Solenoid driver

Two Pulse-Width-Modulated current outputs are available. To each output, a dither signal is superimposed, whereas dither frequency and dither level can be adjusted separately. For each output, the minimum (I_{min}) and maximum (I_{max}) current can be adjusted separately. The solenoid outputs can also be configured as switching outputs. Therewith for each output a power reduction can be adjusted separately.

Optimisation of characteristic curve

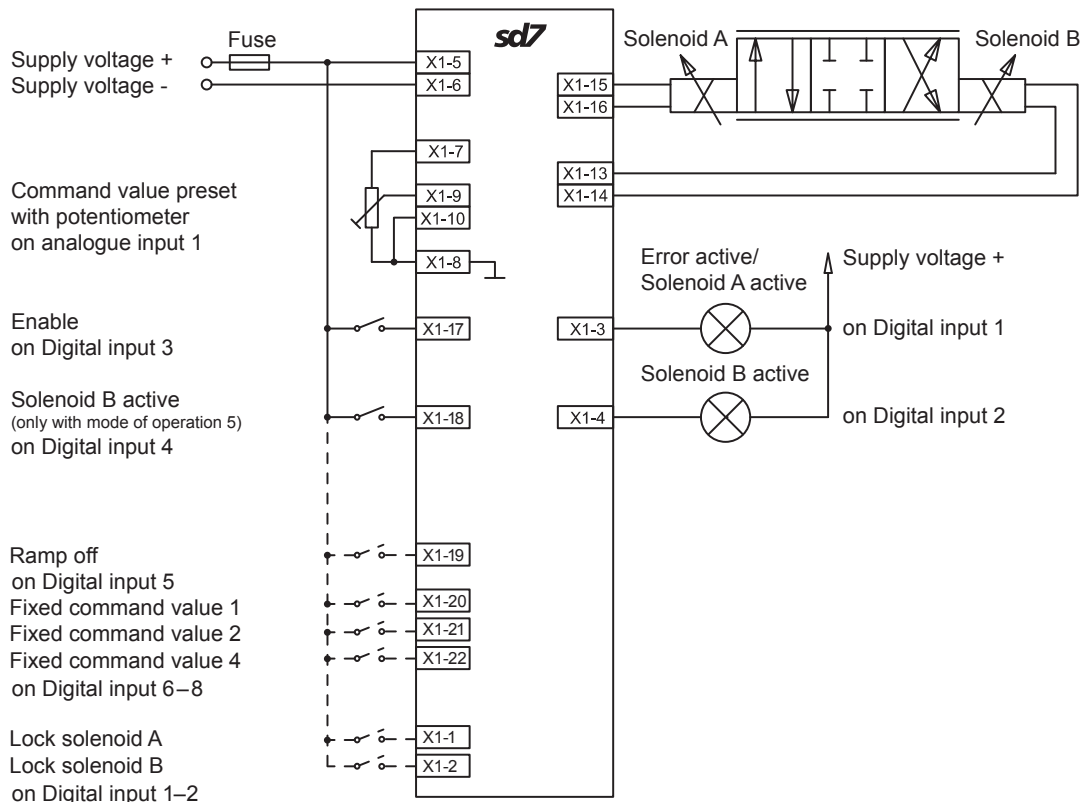
A characteristic curve adjustable per solenoid „Command value input – solenoid current output“ enables an optimised (e.g., linearised) characteristic of the hydraulic system.

Signal recording

The SD7 amplifier module has a signal recording function. This, by means of PASO, enables the recording of various system signals, such as command value, solenoid currents, etc., which can be represented on a common time axis.

CONNECTION EXAMPLE

Mode of operation „command value unipolar (2-Sol)“ or „command value unipolar (2-Sol with Dign)“

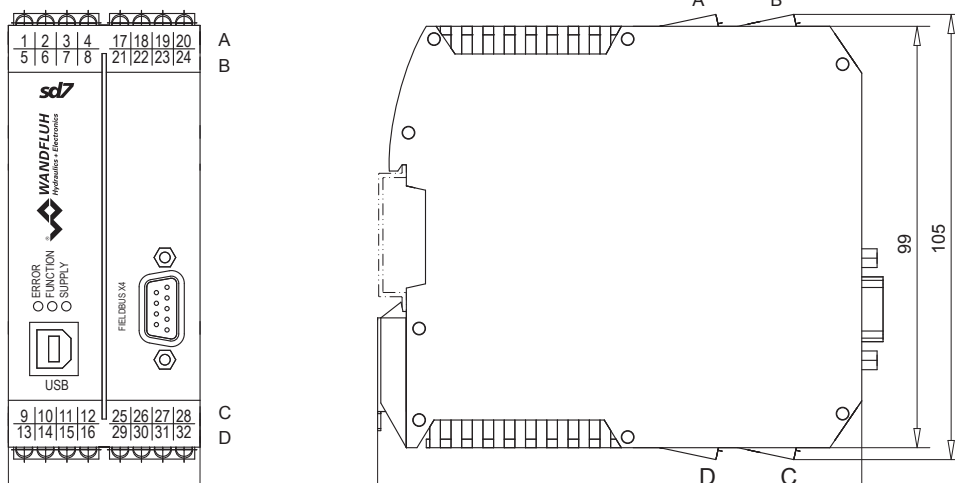


Enhanced amplifier with CANopen/J1939 interface

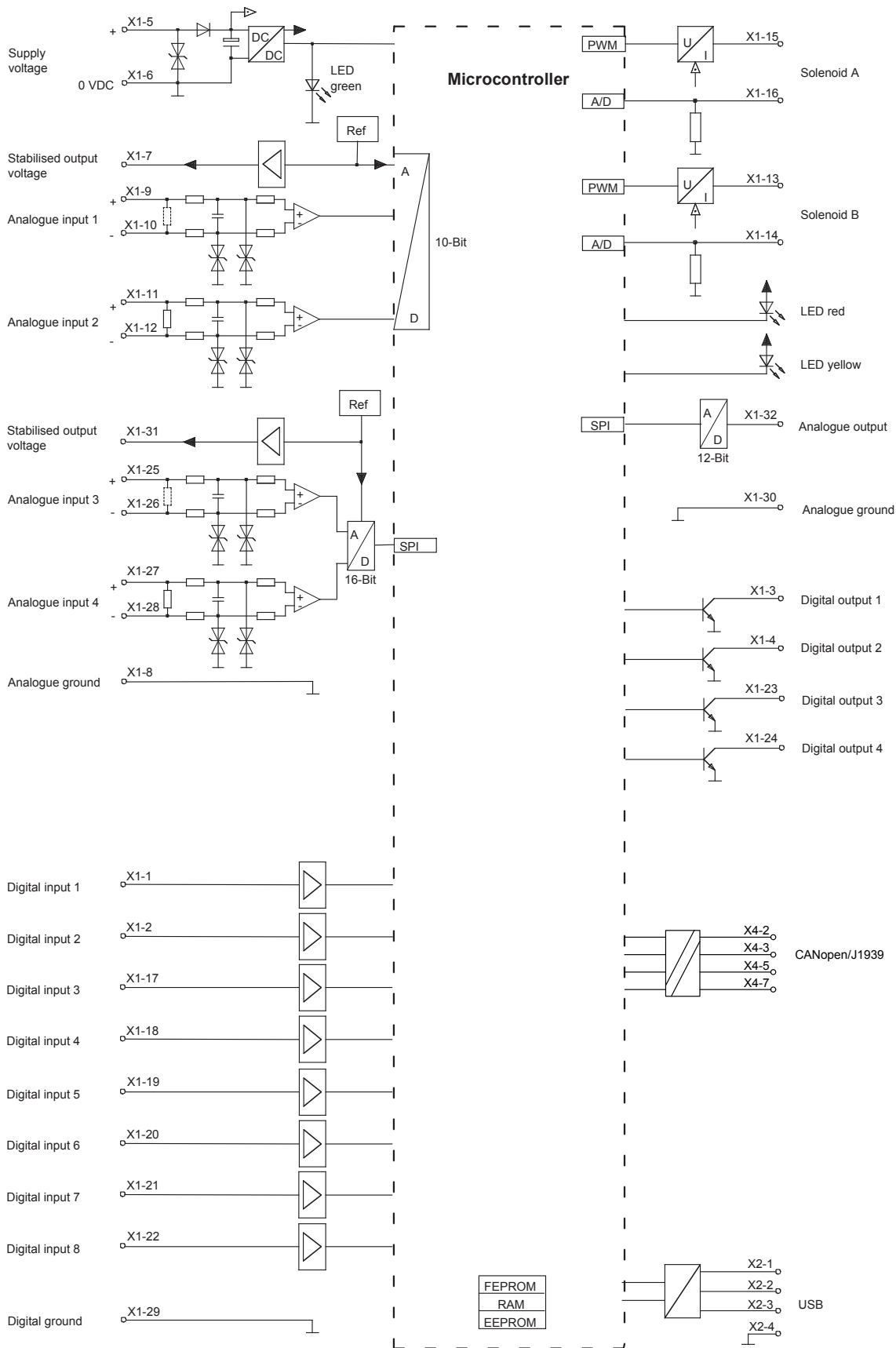
ELECTRICAL SPECIFICATIONS

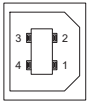
<p>Protection class IP 30 acc. to EN 60 529</p> <p>Device receptacle CANopen (male) DSUB, 9-polig</p> <p>Mating connector Plug (female) DSUB, 9-pole</p> <p>Supply voltage 24 VDC or 12 VDC</p> <p>Voltage range:</p> <ul style="list-style-type: none"> • 24 VDC 21,0...30,0 VDC • 12 VDC 10,5...15,0 VDC <p>Residual ripple <10%</p> <p>Fuse low</p> <p>Current consumption:</p> <ul style="list-style-type: none"> • Non-load current approx. 40 mA • Maximum current consumption non-load current + 1,8 A per solenoid (with 24 VDC) non-load current + 2,3 A per solenoid (with 12 VDC) <p>Analogue inputs: Selectable with software Diff. inputs not galvanically separated, for ground potential differences up to 1,5 V 4...+20 mA/0...+20 mA 0...+10 V (1- or 2-solenoid version) -10...+10 V (only 2-solenoid version)</p> <p>Resolution 10-Bit (Analogue inputs 1 and 2) 16-Bit (Analogue inputs 3 and 4)</p> <p>Input resistance Voltage input >18 kΩ Load for current input = 250 Ω</p> <p>Analogue output Voltage output ± 10 VDC max. current output ± 3 mA</p> <p>Stabilised output voltage 10 VDC (with 24 VDC) 8 VDC (with 12 VDC) max. load 30 mA</p> <p>Bus topology Line, differential signal transmission</p> <p>Potential separation CANopen/J1939 to «SD7» electronics 500 VDC</p>	<p>Solenoid current:</p> <ul style="list-style-type: none"> • Minimal current I_{min} Adjustable 0...950 mA Factory setting 150 mA • Maximal current I_{max} Adjustable I_{min}...1,8A (with 24 VDC) I_{min}...2,3A (with 12 VDC) Factory setting 700 mA • Accumulated current-limitation The accumulated current of the simultaneously powered solenoids depends on the ambient temperature. Further information can be found in the operating instructions.. <p>Dither Frequenz adjustable 2...500 Hz Factory setting 100 Hz Level adjustable 0...400 mA Factory setting 100 mA</p> <p>Temperaturdrift <1% at $\Delta T = 40^\circ C$</p> <p>Digital inputs Switching threshold high 6...30 VDC Switching threshold low 0...1 VDC Digital input 5-7 can be used as frequency input (frequencies 0...5 kHz) and as PWM input (automatic frequency recognition)</p> <p>Digital outputs Low-Side-Switch: $U_{max} = 40$ VDC $I_{max} = -700$ mA Adjustable 0...500 s</p> <p>Serial interface USB (receptacle type B)</p> <p>EMV</p> <ul style="list-style-type: none"> • Immunity EN 61 000-6-2 • Emission EN 61 000-6-4
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DIMENSIONS



BLOCK DIAGRAM

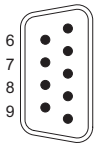


CONNECTOR WIRING DIAGRAM / PIN ASSIGNMENT
USB interface, USB Type B X2


- 1 = VBUS
- 2 = D -
- 3 = D +
- 4 = GND

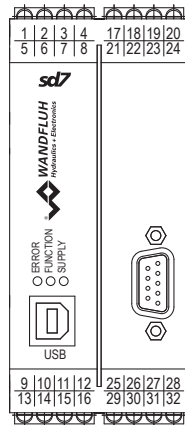

REMARK!

The parameterisation cable is not part of the scope of supply (commercially available USB-cable, plug type A to plug type B)

Device receptacle CANopen/J1939 (male) X4

CANOPEN/J1939

- 1 = Reserved
- 2 = CANLow
- 3 = CANGnd
- 4 = Reserved
- 5 = CANShield
- 6 = Reserved
- 7 = CANHigh
- 8 = Reserved
- 9 = Reserved

The mating connector (plug male, DSUB, 9-pole) is not included in the delivery.

PIN Assignment X1


- 1 = Digital input 1
- 2 = Digital input 2
- 3 = Digital output 1
- 4 = Digital output 2
- 5 = Supply Analogue input +
- 6 = Supply voltage 0 VDC
- 7 = Stabilised output voltage
- 8 = Analogue ground
- 9 = Analogue input 1 +
- 10 = Analogue input 1 -
- 11 = Analogue input 2 +
- 12 = Analogue input 2 -
- 13 = Output solenoid 2 +
- 14 = Output solenoid 2 -
- 15 = Output solenoid 1 +
- 16 = Output solenoid 1 -
- 17 = Digital input 3
- 18 = Digital input 4
- 19 = Digital input 5
- 20 = Digital input 6
- 21 = Digital input 7
- 22 = Digital input 8
- 23 = Digital output 3
- 24 = Digital output 4
- 25 = Analogue input 3 +
- 26 = Analogue input 3 -
- 27 = Analogue input 4 +
- 28 = Analogue input 4 -
- 29 = Digital-ground
- 30 = Analog-Masse
- 31 = Stabilised output voltage
- 32 = Analogue output

Configuration Analogue input

Type description	Analogue inputs			
	No. 1	No. 2	No. 3	No. 4
SD7362Dx4-BC	Voltage	Current	Voltage	Current
SD7362Dx5-BC	Voltage	Voltage	Voltage	Voltage
SD7362Dx6-BC	Current	Strom	Current	Current
SD7362Dx7-BC	Voltage	Spannung	Current	Current
SD7362Dx8-BC	Current	Current	Voltage	Voltage

START-UP

Information regarding installation and commissioning are contained in the information leaflet supplied with the amplifier module and in the operating instructions.

Additional information can be found on our website:
www.wandfluh.com

Free-of-charge download:

- «PASO-SD7» Parameterisation software
- Operating instructions (*.pdf)
- EDS-file «WAGOB8E.eds»

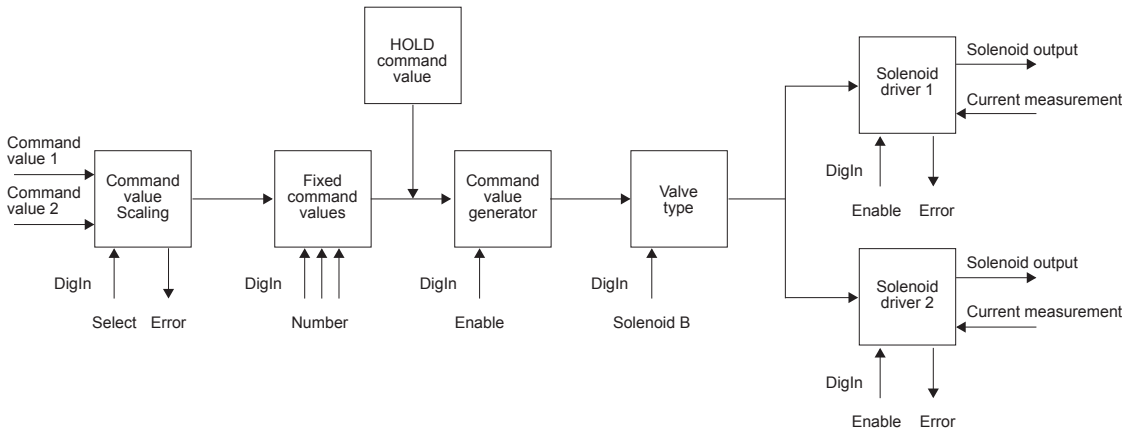
ADDITIONAL INFORMATION

	Wandfluh electronics general	Wandfluh documentation register
Proportional directional valves		1.13
Proportional pressure valves		1.10
Proportional flow control valves		2.3
		2.6

DESIGN

The amplifier module can be parameterised by means of the parameterisation software «PASO-SD7» through the USB-interface. In addition, the parameterisation software makes a data analysis possible. The software «PASO-SD7» is supported by Windows 2000 and Windows XP, Vista and Windows 7 with 32/64-Bit. The device control

(enable, etc.) as well as the command value setting can be preset via the CANopen/J1939 or locally via digital, resp. analogue inputs. Furthermore the parameterisation as well as an analysis/diagnostic are possible via the CANopen (with J1939 on request).

FUNCTION DESCRIPTION

SD7 ENHANCED AMPLIFIER WITH CANopen/J1939 INTERFACE
Command value scaling

The command value can be applied via the CANopen/J1939 or as a voltage, current, digital, frequency or PWM-signal. For every command value, the input utilised can be selected. The scaling takes place via the parameters „Interface“ and „Reference“. Furthermore every command value can be monitored for a cable break (except for CANopen/J1939, voltage or digital signal). For every command value a dead band can also be set. Optionally one can operate with two command values. The characteristic of these command values can be adjusted.

Fixed command values

There are 7 fixed command values available, which can be selected via 3 digital inputs.

Command value generator

For each solenoid output two linear ramps for up and down are available which can be adjusted separately.

HOLD command value

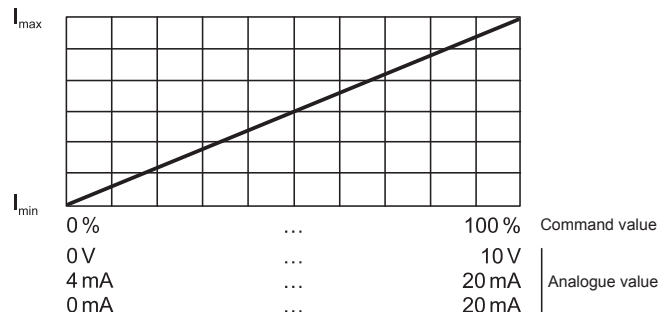
If via CANopen/J1939 the device is put into the "HOLD" condition, the respective command value is activated.

Valve type

Here the operating mode is set. In addition it can be selected whether proportional or switching solenoids are driven.

Mode of operation „Command value unipolar (1-Sol)“

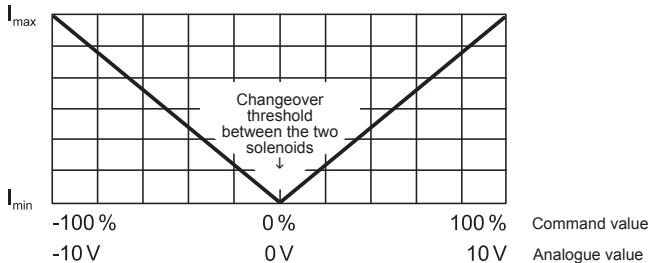
Dependent on a unipolar command value signal (voltage, current, frequency or PWM), the solenoid is driven (e.g. 0...10V correspond to 0...100% command value, 0...100% command value correspond to I_{min} ... I_{max} solenoid driver 1).


Mode of operation „Command value unipolar (2-Sol)“

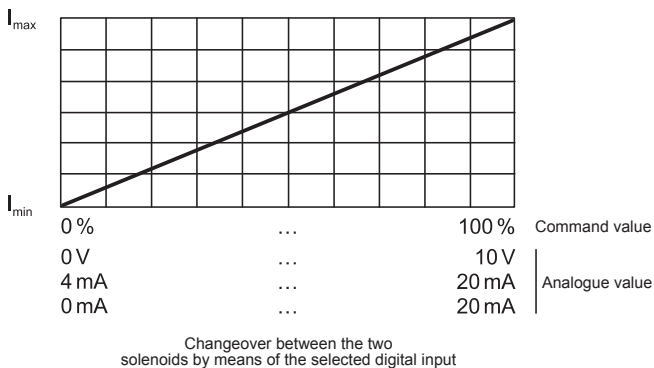
Dependent on a unipolar command value signal (voltage, current, frequency or PWM), one of the two solenoids is driven, acc. to the signal level. The changeover threshold between the two solenoids as standard is in the middle of the values range of the command value signal. (e.g. 0...10V correspond to -100...+100% command value, -100...0% command value correspond to I_{min} ... I_{max} solenoid driver 2, 0...+100% command value correspond to I_{min} ... I_{max} solenoid driver 1).

Mode of operation „Command value bipolar (2-Sol)“

Dependent on a bipolar command value signal (voltage), one of the two solenoids is driven, acc. to the signal level. The changeover threshold between the two solenoids as standard is at 0V (e.g. -10....+10V correspond to -100....+100% command value, -100....0% command value correspond to I_{min} I_{max} solenoid driver 2, 0....+100% command value correspond to I_{min} I_{max} solenoid driver 1).


Mode of operation „Command value unipolar (2-Sol with DigIn)“

Dependent on a unipolar command value signal (voltage, current, frequency or PWM), the solenoid is driven by solenoid driver 1, when the selected digital input is „not activated“, resp. the solenoid by the solenoid driver 2, when the selected digital input is „activated“ (e.g. 0....10V correspond to 0....100% command value, 0....100% command value correspond to I_{min} I_{max} solenoid driver 1 or 2).


Signal recording

The SD7 amplifier module has a signal recording function. This, by means of PASO, enables the recording of various system signals, such as command value, solenoid currents, etc., which can be represented on a common time axis.

Solenoid driver

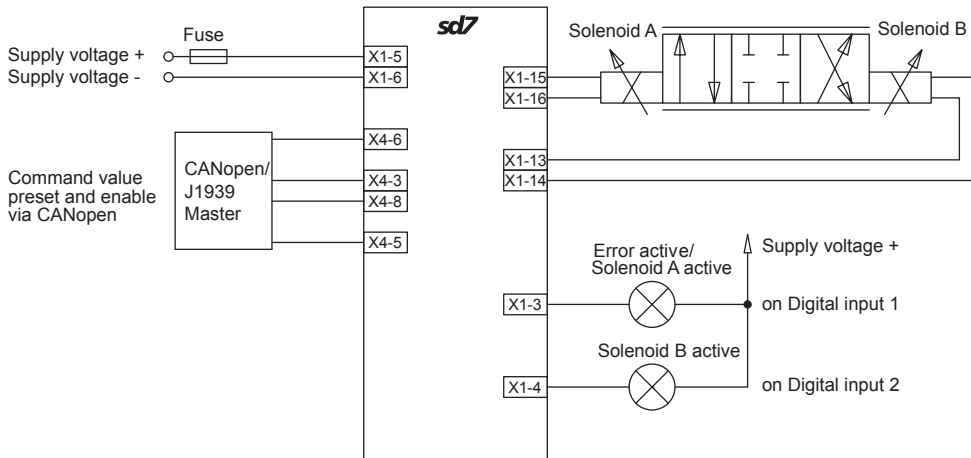
Two Pulse-Width-Modulated current outputs are available. To each output, a dither signal is superimposed, whereas dither frequency and dither level can be adjusted separately. For each output, the minimum (I_{min}) and maximum (I_{max}) current can be adjusted separately. The solenoid outputs can also be configured as switching outputs. Therewith for each output a power reduction can be adjusted separately.

Optimisation of characteristic curve

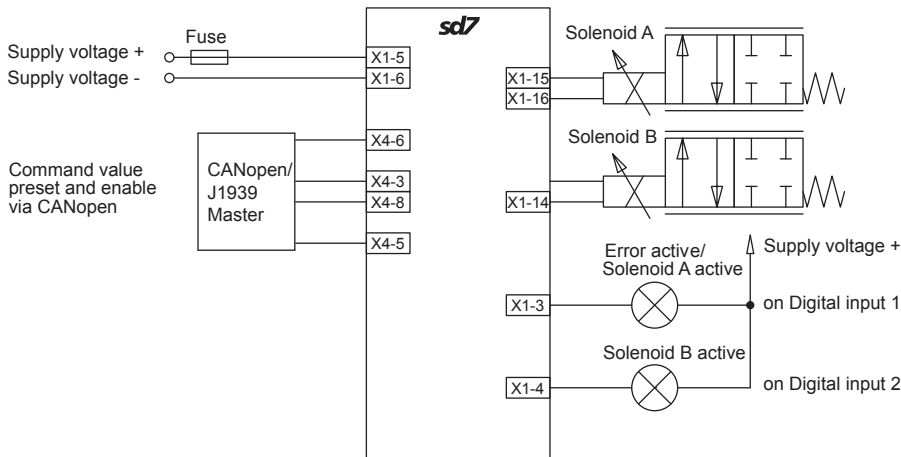
A characteristic curve adjustable per solenoid „Command value input – solenoid current output“ enables an optimised (e.g., linearised) characteristic of the hydraulic system.

CONNECTION EXAMPLE

Mode of operation „command value unipolar (2-Sol)“ or „command value unipolar (2-Sol with DigIn)“



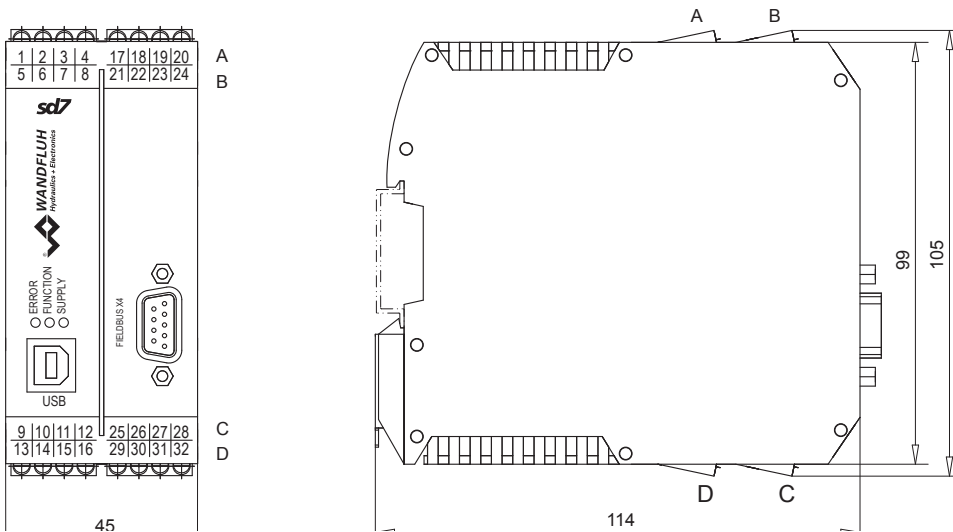
Mode of operation „command value unipolar (1-Sol)“



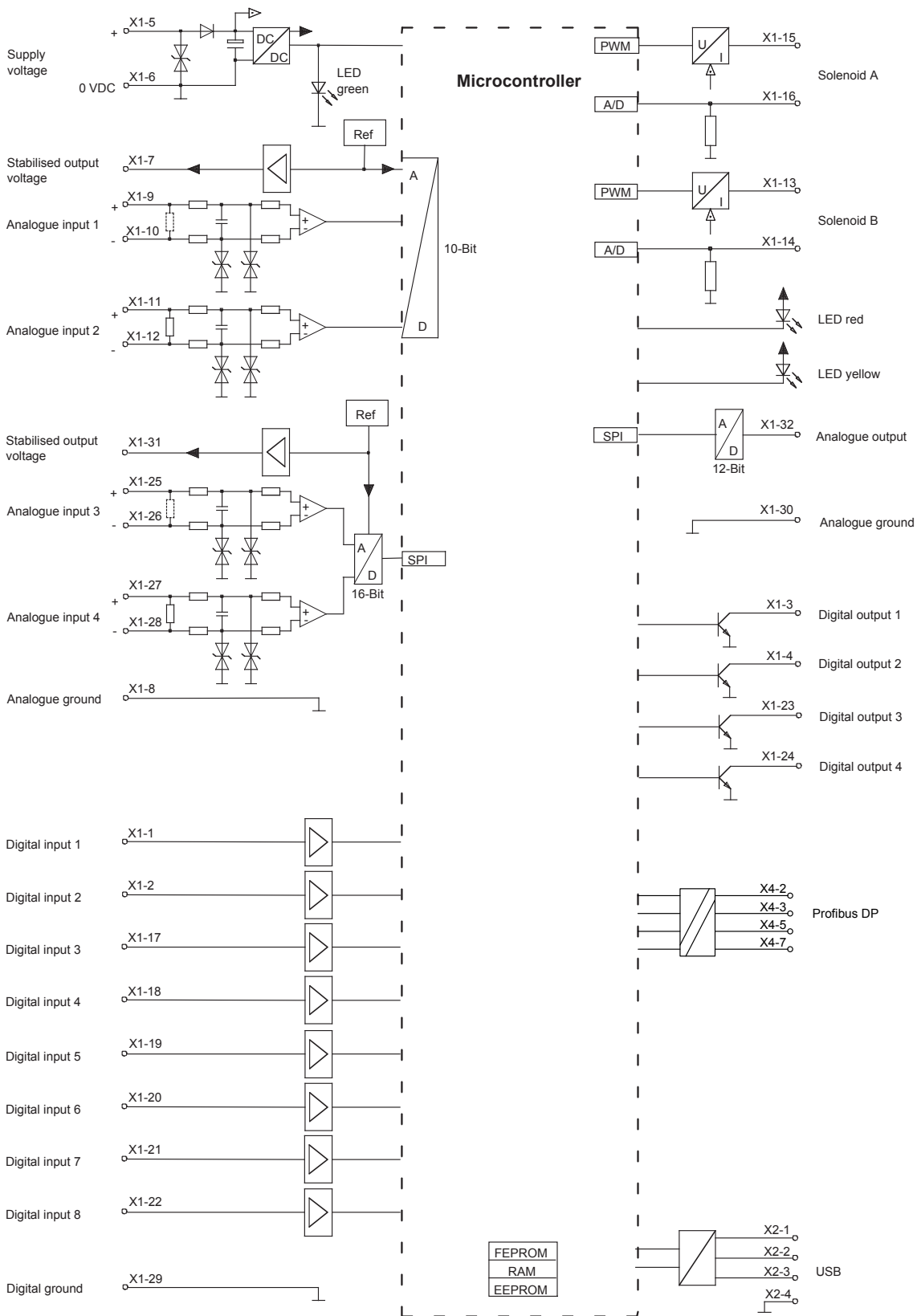
Enhanced amplifier with Profibus DP interface

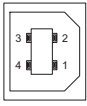
ELECTRICAL SPECIFICATIONS

Protection class Device receptacle Profibus (female) Mating connector Supply voltage <i>Voltage range:</i> • 24 VDC • 12 VDC Residual ripple Fuse <i>Current consumption:</i> • Non-load current • Maximum current consumption Command value signal: Resolution Input resistance Analogue output Stabilised output voltage Bus topology Potential separation <i>Solenoid current:</i>	IP 30 acc. to EN 60 529 DSUB, 9-pole Plug (male), DSUB, 9-pole 24 VDC or 12 VDC 21...30 V 10,5...15 V <10% low approx. 40 mA non-load current + 1,8 A per solenoid (with 24 VDC) non-load current + 2,3 A per solenoid (with 12 VDC) Selectable with software Diff. inputs not galvanically separated, for ground potential differences up to 1,5 V 4...+20 mA/0...+20 mA 0...+10 V (1- or 2-solenoid version) -10...+10 V (only 2-solenoid version) 10-Bit (Analogue inputs 1 and 2) 16-Bit (Analogue inputs 3 and 4) Voltage input >18 kΩ Load for current input = 250 Ω Voltage output ± 10 VDC max. current output ± 3 mA 10 VDC (with 24 VDC) 8 VDC (with 12 VDC) max. load 30 mA Line, differential signal transmission Profibus to «SD7» electronics 500 VDC	• Minimal current I_{min} • Maximal current I_{max} • Accumulated current limitation Dither Temperature drift Digital inputs Digital outputs Ramps adjustable Serial interface EMV Immunity Emission	Adjustable 0...950 mA Factory setting 150 mA Adjustable I_{min} ...1,8A (with 24 VDC) I_{min} ...2,3A (with 12 VDC) Factory setting 700 mA The accumulated current of the simultaneously powered solenoids depends on the ambient temperature. Further information can be found in the operating instructions. Frequency adjustable 20...500 Hz Factory setting 100 Hz Level adjustable 0...400 mA Factory setting 100 mA <1% at $\Delta T = 40^\circ C$ Switching threshold high 6...30 VDC Switching threshold low 0...1 VDC Digital input 5-7 can be used as frequency input (frequencies 0...5 kHz) and as PWM input (automatic frequency recognition) Low-Side-Switch: $U_{max} = 40$ VDC $I_{max} = -700$ mA 0...500 s USB (receptacle type B) EN 61 000-6-2 EN 61 000-6-4
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DIMENSIONS


BLOCK DIAGRAM

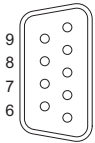


CONNECTOR WIRING DIAGRAM / PIN ASSIGNMENT
USB interface, USB Type B X2


- 1 = VBUS
- 2 = D -
- 3 = D +
- 4 = GND

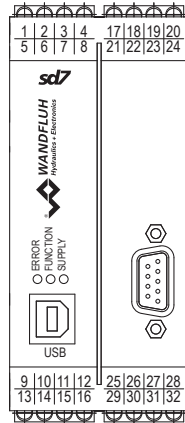

REMARK!

The parameterisation cable is not part of the scope of supply (commercially available USB-cable, plug type A to plug type B)

Device receptacle Profibus DP (female) X4

PROFIBUS

- 1 = Reserved
- 2 = Reserved
- 3 = RxD/TxD-P
- 4 = Reserved
- 5 = DGND
- 6 = VP
- 7 = Reserved
- 8 = RxD/TxD-N
- 9 = Reserved

The mating connector (plug male, DSUB, 9-pole) is not included in the delivery.

PIN Assignment X1


- 1 = Digital input 1
- 2 = Digital input 2
- 3 = Digital output 1
- 4 = Digital output 2
- 5 = Supply Analogue input +
- 6 = Supply voltage 0 VDC
- 7 = Stabilised output voltage
- 8 = Analog ground
- 9 = Analogue input 1 +
- 10 = Analogue input 1 -
- 11 = Analogue input 2 +
- 12 = Analogue input 2 -
- 13 = Output solenoid 2 +
- 14 = Output solenoid 2 -
- 15 = Output solenoid 1 +
- 16 = Output solenoid 1 -
- 17 = Digital input 3
- 18 = Digital input 4
- 19 = Digital input 5
- 20 = Digital input 6
- 21 = Digital input 7
- 22 = Digital input 8
- 23 = Digital output 3
- 24 = Digital output 4
- 25 = Analogue input 3 +
- 26 = Analogue input 3 -
- 27 = Analogue input 4 +
- 28 = Analogue input 4 -
- 29 = Digital ground
- 30 = Analogue ground
- 31 = Stabilised output voltage
- 32 = Analogue output

Configuration Analogue input

Type description	Analogue inputs			
	No. 1	No. 2	No. 3	No. 4
SD7362Dx4-BP	Voltage	Current	Voltage	Current
SD7362Dx5-BP	Voltage	Voltage	Voltage	Voltage
SD7362Dx6-BP	Current	Current	Current	Current
SD7362Dx7-BP	Voltage	Voltage	Current	Current
SD7362Dx8-BP	Current	Current	Voltage	Voltage

START-UP

Information regarding installation and commissioning are contained in the information leaflet supplied with the amplifier module and in the operating instructions.

Additional information can be found on our website:
www.wandfluh.com

Free-of-charge download:

- «PASO-SD7» Parameterisation software
- Operating instructions (*.pdf)
- GSD-file «WAGOB8E.gsd»

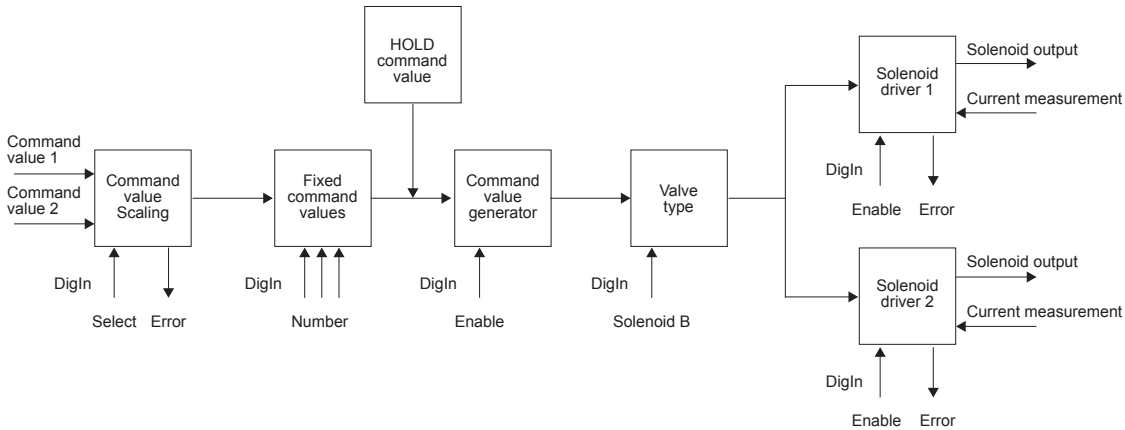
ADDITIONAL INFORMATION

Wandfluh electronics general	Wandfluh documentation register	1.13
Proportional directional valves	register	1.10
Proportional pressure valves	register	2.3
Proportional flow control valves	register	2.6

DESIGN

The amplifier module can be parameterised by means of the parameterisation software «PASO-SD7» through the USB-interface. In addition, the parameterisation software makes a data analysis possible. The software «PASO-SD7» is supported by Windows 2000 and Windows XP, Vista and Windows 7 with 32/64-Bit. The device control

(enable, etc.) as well as the command value setting can be preset via the Profibus DP or locally via digital, resp. analogue inputs. Furthermore the parameterisation as well as an analysis/diagnostic are possible via the Profibus DP.

FUNCTION DESCRIPTION

SD7 ENHANCED AMPLIFIER WITH PROFIBUS DP INTERFACE
Command value scaling

The command value can be applied via the Profibus DP or as a voltage, current, digital, frequency or PWM signal. For every command value, the input utilised can be selected. The scaling takes place via the parameters „Interface“ and „Reference“. Furthermore every command value can be monitored for a cable break (except for Profibus DP, voltage or digital signal). For every command value a dead band can also be set. Optionally one can operate with two command values. The characteristic of these command values can be adjusted.

Fixed command values

There are 7 fixed command values available, which can be selected via 3 digital inputs.

Command value generator

For each solenoid output two linear ramps for up and down are available which can be adjusted separately.

HOLD command value

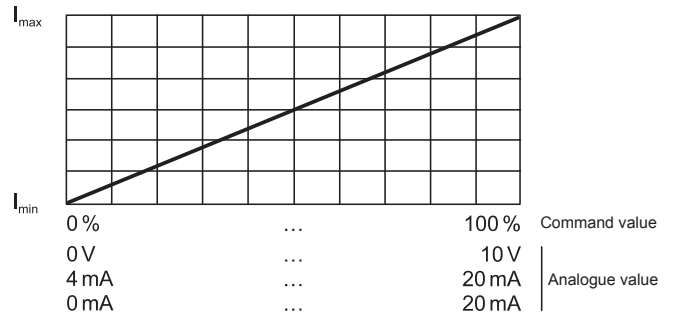
If via Profibus DP the device is put into the “HOLD” condition, the respective command value is activated.

Valve type

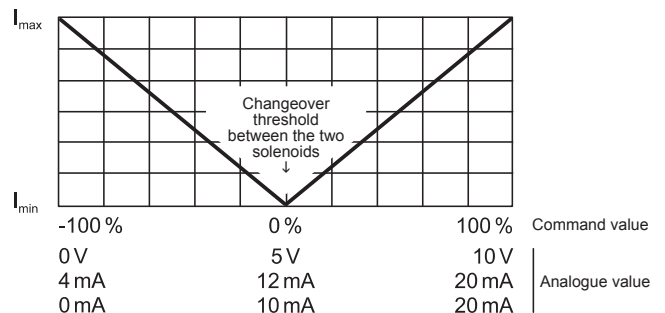
Here the operating mode is set. In addition it can be selected whether proportional or switching solenoids are driven.

Mode of operation „Command value unipolar (1-Sol)“

Dependent on a unipolar command value signal (voltage, current, frequency or PWM), the solenoid is driven (e.g. 0...10V correspond to 0...100% command value, 0...100% command value correspond to I_{min} ... I_{max} solenoid driver 1).

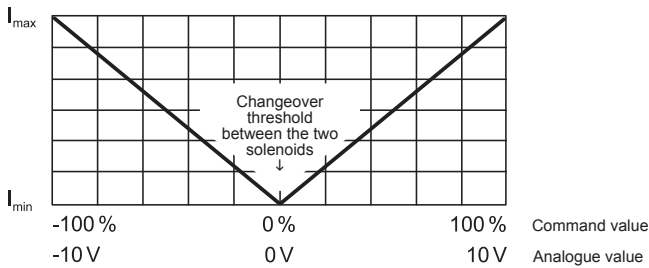

Mode of operation „Command value unipolar (2-Sol)“

Dependent on a unipolar command value signal (voltage, current, frequency or PWM), one of the two solenoids is driven, acc. to the signal level. The changeover threshold between the two solenoids as standard is in the middle of the values range of the command value signal. (e.g. 0...10V correspond to -100...+100% command value, -100...0% command value correspond to I_{min} ... I_{max} solenoid driver 2, 0...+100% command value correspond to I_{min} ... I_{max} solenoid driver 1).



Mode of operation „Command value bipolar (2-Sol)“

Dependent on a bipolar command value signal (voltage), one of the two solenoids is driven, acc. to the signal level. The changeover threshold between the two solenoids as standard is at 0V (e.g. -10....+10V correspond to -100....+100% command value, -100....0% command value correspond to I_{min} I_{max} solenoid driver 2, 0....+100% command value correspond to I_{min} I_{max} solenoid driver 1).


Solenoid driver

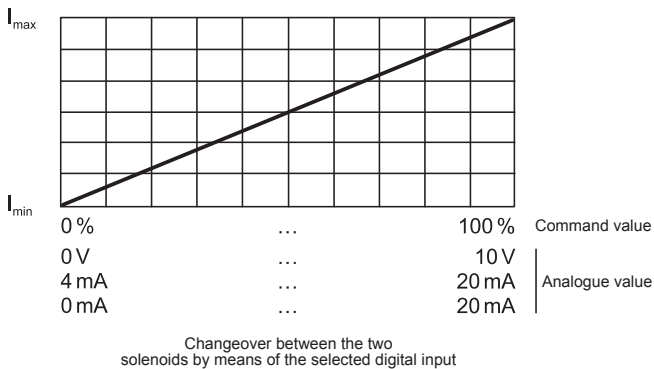
Two Pulse-Width-Modulated current outputs are available. To each output, a dither signal is superimposed, whereas dither frequency and dither level can be adjusted separately. For each output, the minimum (I_{min}) and maximum (I_{max}) current can be adjusted separately. The solenoid outputs can also be configured as switching outputs. Therewith for each output a power reduction can be adjusted separately.

Optimisation of characteristic curve

A characteristic curve adjustable per solenoid „Command value input – solenoid current output“ enables an optimised (e.g., linearised) characteristic of the hydraulic system.

Mode of operation „Command value unipolar (2-Sol with DigiIn)“

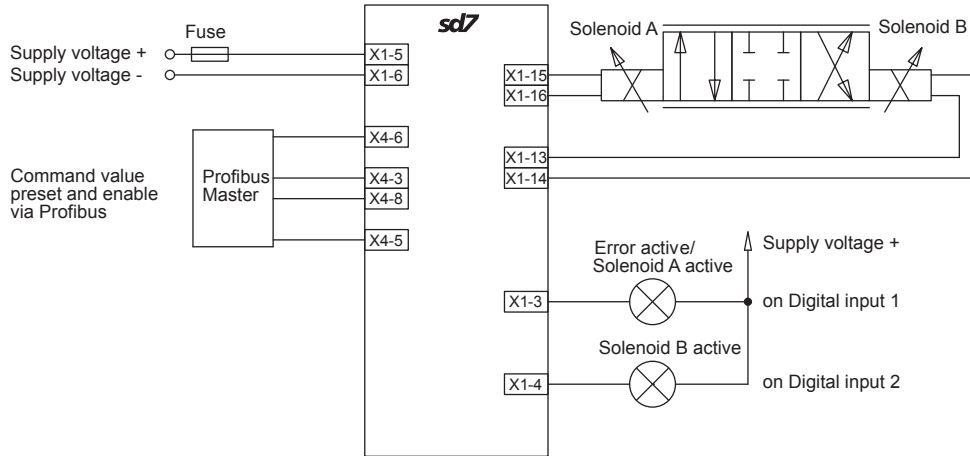
Dependent on a unipolar command value signal (voltage, current, frequency or PWM), the solenoid is driven by solenoid driver 1, when the selected digital input is „not activated“, resp. the solenoid by the solenoid driver 2, when the selected digital input is „activated“ (e.g. 0....10V correspond to 0....100% command value, 0....100% command value correspond to I_{min} I_{max} solenoid driver 1 or 2).


Signal recording

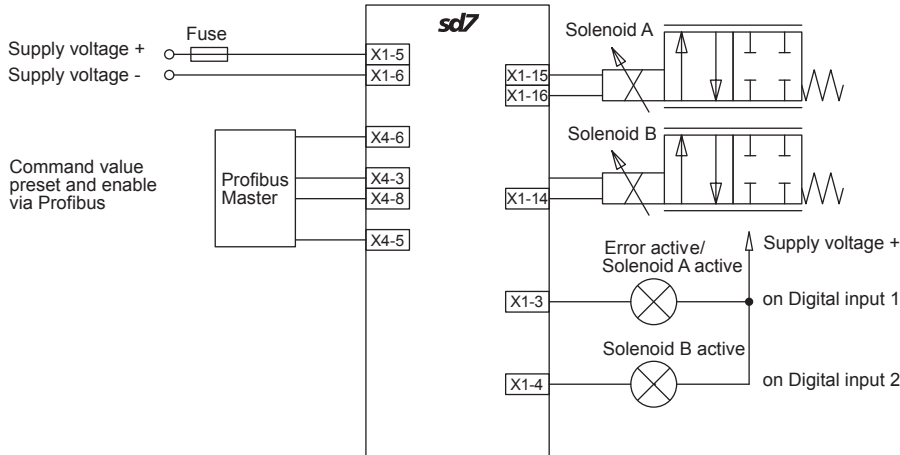
The SD7 amplifier module has a signal recording function. This, by means of PASO, enables the recording of various system signals, such as command value, solenoid currents, etc., which can be represented on a common time axis.

CONNECTION EXAMPLE

Mode of operation „command value unipolar (2-Sol)“ or „command value unipolar (2-Sol with DigIn)“



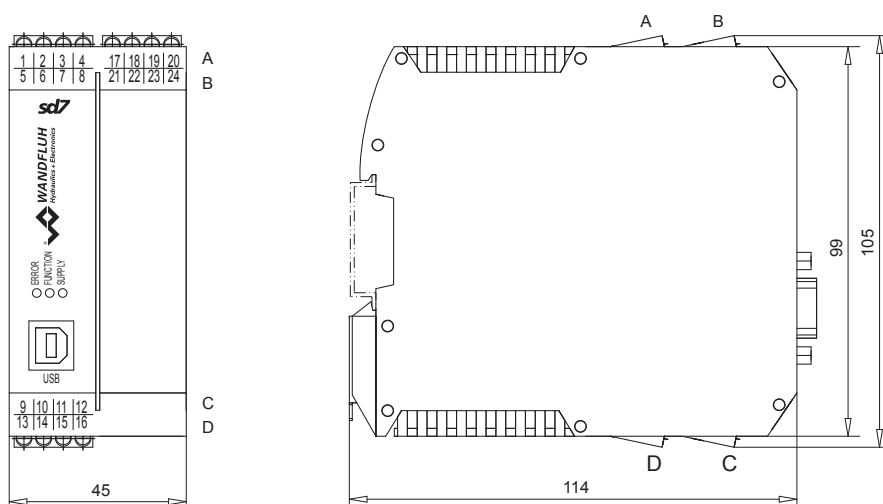
Mode of operation „command value unipolar (1-Sol)“



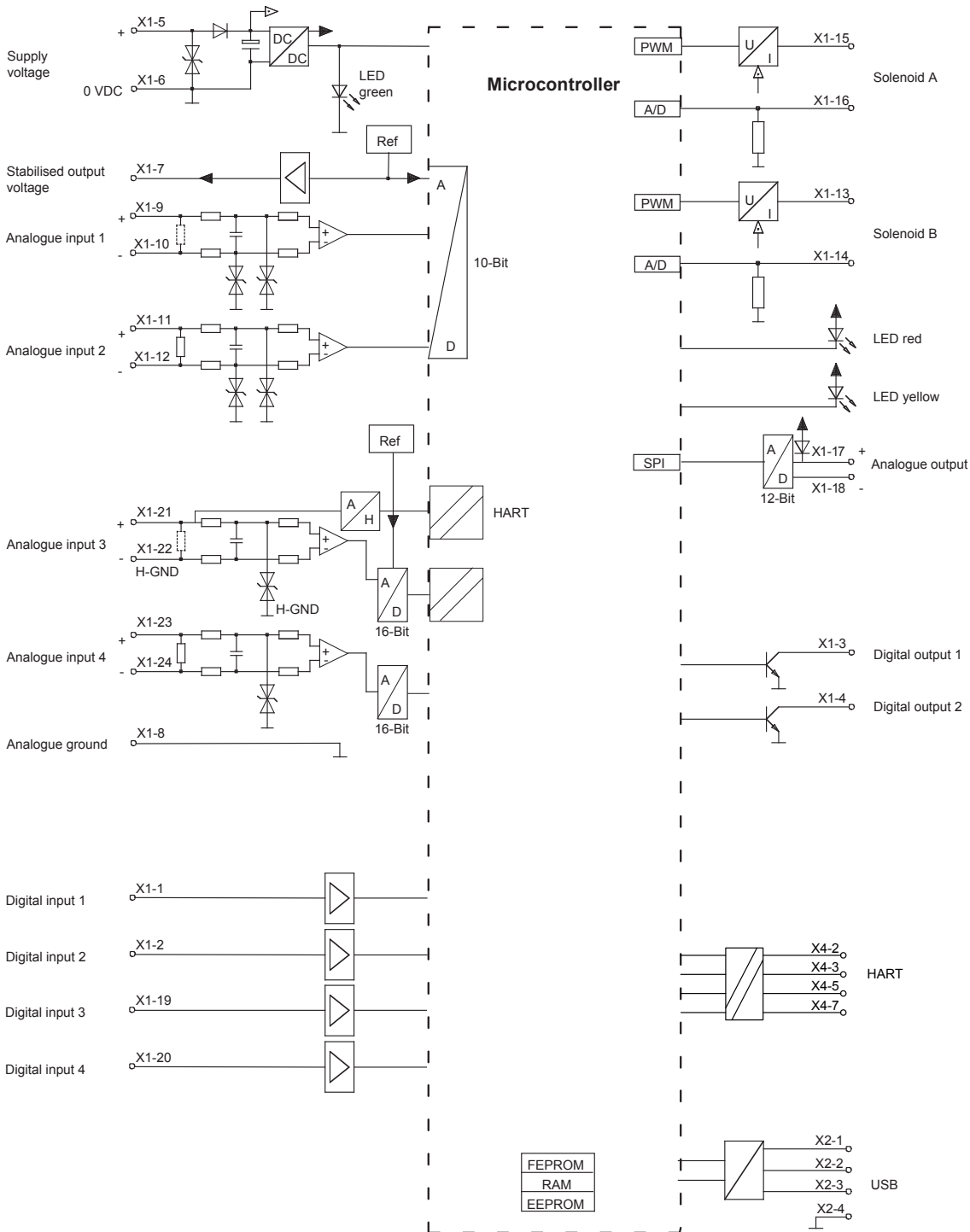
Enhanced amplifier with HART interface

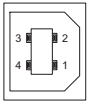
ELECTRICAL SPECIFICATIONS

<p>Protection class IP 30 acc. to EN 60 529</p> <p>Supply voltage 24 VDC or 12 VDC</p> <p>Voltage range:</p> <ul style="list-style-type: none"> • 24 VDC 21,0...30,0 VDC • 12 VDC 10,5...15,0 VDC <p>Residual ripple <10 %</p> <p>Fuse low</p> <p>Current consumption:</p> <ul style="list-style-type: none"> • Non-load current approx. 40 mA • Maximum current consumption non-load current + 1,8 A per solenoid (with 24 VDC) non-load current + 2,3 A per solenoid (with 12 VDC) <p>Analogue inputs: Selectable with software Input 1, 2 and 4: Diff. inputs not galvanically separated, for ground potential differences up to 1,5 V 4...+20 mA/0...+20 mA 0...+10 V (1- or 2-solenoid version) -10...+10 V (only 2-solenoid version) Input 3: galvanically separated for HART Signal 4...+20 mA/0...+20 mA</p> <p>Resolution 10-Bit (Analogue inputs 1 and 2) 16-Bit (Analogue inputs 3 and 4)</p> <p>Input resistance Voltage input >18 kΩ</p> <p>Analogue output Load for current input = 250 Ω Current output 0...20 mA max. Voltage output 12 V</p> <p>Stabilised output voltage 10 VDC (with 24 VDC) 8 VDC (with 12 VDC) max. load 30 mA</p> <p>HART interface via analogue input 3</p>	<p>Solenoid current:</p> <ul style="list-style-type: none"> • Minimal current I_{min} Adjustable 0...950 mA Factory setting 150 mA • Maximal current I_{max} Adjustable $I_{min} \dots 1,8A$ (with 24 VDC) $I_{min} \dots 2,3A$ (with 12 VDC) Factory setting 700 mA • Accumulated current limitation The accumulated current of the simultaneously powered solenoids depends on the ambient temperature. Further information can be found in the operating instructions.. Frequency adjustable 2...500 Hz Factory setting 100 Hz Level adjustable 0...400 mA Factory setting 100 mA <1 % at $\Delta T = 40^\circ C$ <p>Dither Switching threshold high 6...30 VDC Switching threshold low 0...1 VDC</p> <p>Digital outputs Low-Side-Switch: $U_{max} = 40$ VDC $I_{max} = -700$ mA Adjustable 0...500 s USB (receptacle type B)</p> <p>Ramps adjustable</p> <p>Serial interface EMV</p> <ul style="list-style-type: none"> • Immunity EN 61 000-6-2 • Emission EN 61 000-6-4
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DIMENSIONS


BLOCK DIAGRAM

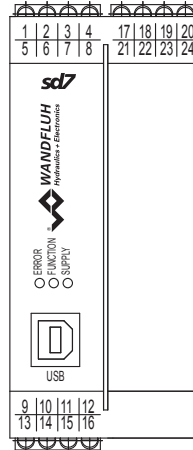


CONNECTOR WIRING DIAGRAM / PIN ASSIGNMENT
USB interface, USB Type B X2


- 1 = VBUS
- 2 = D -
- 3 = D +
- 4 = GND


REMARK!

The parameterisation cable is not part of the scope of supply (commercially available USB-cable, plug type A to plug type B)

PIN Assignment X1


- 1 = Digital input 1
- 2 = Digital input 2
- 3 = Digital output 1
- 4 = Digital output 2
- 5 = Supply Analogue input +
- 6 = Supply voltage 0 VDC
- 7 = Stabilised output voltage
- 8 = Analogue ground
- 9 = Analogue input 1 +
- 10 = Analogue input 1 -
- 11 = Analogue input 2 +
- 12 = Analogue input 2 -
- 13 = Output solenoid B -
- 14 = Output solenoid B +
- 15 = Output solenoid A -
- 16 = Output solenoid A +
- 17 = Analogue output +
- 18 = Analogue output -
- 19 = Digital input 3
- 20 = Digital input 4
- 21 = Analogue input 3 + HART
- 22 = Analogue input 3 - HART
- 23 = Analogue input 4 +
- 24 = Analogue input 4 -

Configuration Analogue input

Type description	Analogue inputs			
	No. 1	No. 2	No. 3	No. 4
SD7362Dx4-BH	Voltage	Current	Current	Current
SD7362Dx5-BH	Voltage	Voltage	Current	Voltage
SD7362Dx6-BH	Current	Current	Current	Current
SD7362Dx7-BH	Voltage	Voltage	Current	Current
SD7362Dx8-BH	Current	Current	Current	Voltage

START-UP

Information regarding installation and commissioning are contained in the information leaflet supplied with the amplifier module and in the operating instructions.

Additional information can be found on our website:
www.wandfluh.com

Free-of-charge download:

- «PASO-SD7» Parametriersoftware
- Operating instructions (*.pdf)
- EDD-file «WAGSD7.ddl»

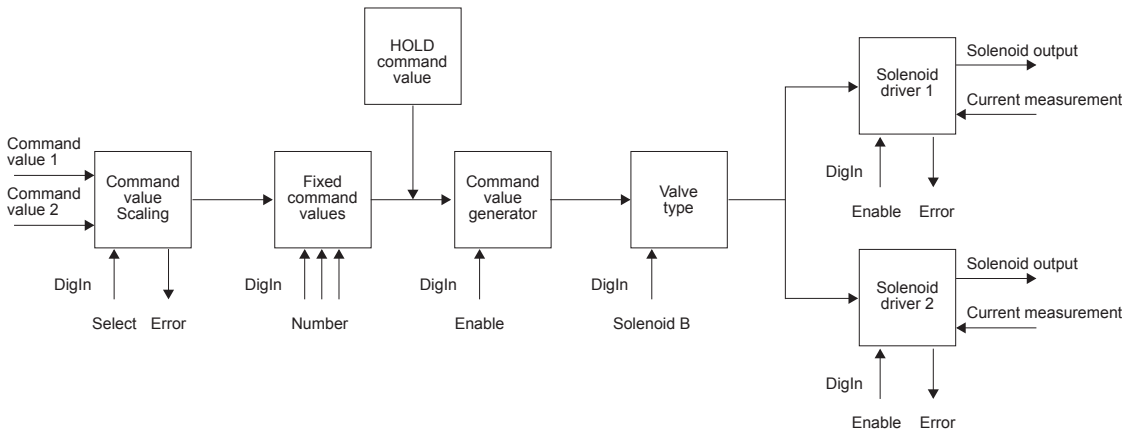
ADDITIONAL INFORMATION

	Wandfluh documentation	
Wandfluh electronics general	register	1.13
Proportional directional valves	register	1.10
Proportional pressure valves	register	2.3
Proportional flow control valves	register	2.6

DESIGN

The amplifier module can be parameterised by means of the parameterisation software «PASO-SD7» through the USB-interface. In addition, the parameterisation software makes a data analysis possible. The software «PASO-SD7» is supported by Windows 2000 and Win-

dows XP, Vista and Windows 7 with 32/64-Bit. The device control (enable, etc.) as well as the command value setting can be preset via HART or locally via digital, resp. analogue inputs. Furthermore the parameterisation as well as an analysis/diagnostic are possible via HART.

FUNCTION DESCRIPTION

SD7 ENHANCED AMPLIFIER WITH HART INTERFACE
Command value scaling

The command value can be applied via HART or as a voltage, current or digital signal. For every command value, the input utilised can be selected. The scaling takes place via the parameters „Interface“ and „Reference“. Furthermore every command value can be monitored for a cable break (except for HART, voltage or digital signal). For every command value a dead band can also be set. Optionally one can operate with two command values. The characteristic of these command values can be adjusted.

Fixed command values

There are 7 fixed command values available, which can be selected via 3 digital inputs.

Command value generator

For each solenoid output two linear ramps for up and down are available which can be adjusted separately.

HOLD command value

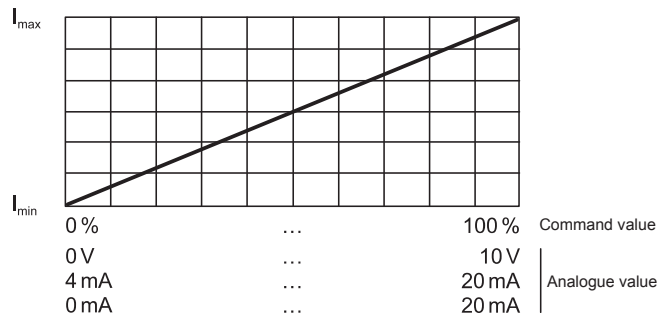
If via CANopen/J1939 the device is put into the „HOLD“ condition, the respective command value is activated.

Valve type

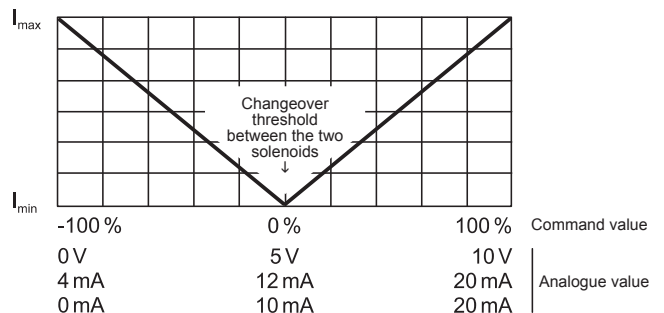
Here the operating mode is set. In addition it can be selected whether proportional or switching solenoids are driven.

Mode of operation „Command value unipolar (1-Sol)“

Dependent on a unipolar command value signal (voltage, current, frequency or PWM), the solenoid is driven (e.g. 0...10V correspond to 0...100% command value, 0...100% command value correspond to I_{min} ... I_{max} solenoid driver 1).

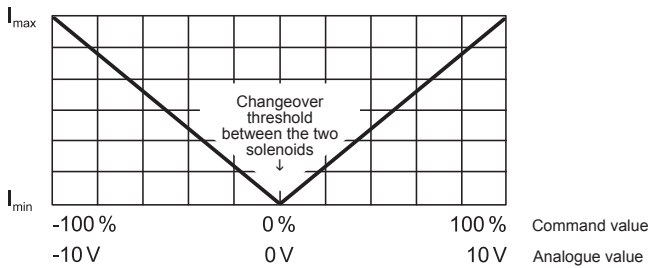

Mode of operation „Command value unipolar (2-Sol)“

Dependent on a unipolar command value signal (voltage, current), one of the two solenoids is driven, acc. to the signal level. The changeover threshold between the two solenoids as standard is in the middle of the values range of the command value signal. (e.g. 0...10V correspond to -100...+100% command value, -100...0% command value correspond to I_{min} ... I_{max} solenoid driver 2, 0...+100% command value correspond to I_{min} ... I_{max} solenoid driver 1).



Mode of operation „Command value bipolar (2-Sol)“

Dependent on a bipolar command value signal (voltage), one of the two solenoids is driven, acc. to the signal level. The changeover threshold between the two solenoids as standard is at 0V (e.g. -10....+10V correspond to -100....+100% command value, -100....0% command value correspond to I_{min} I_{max} solenoid driver 2, 0....+100% command value correspond to I_{min} I_{max} solenoid driver 1).


Solenoid driver

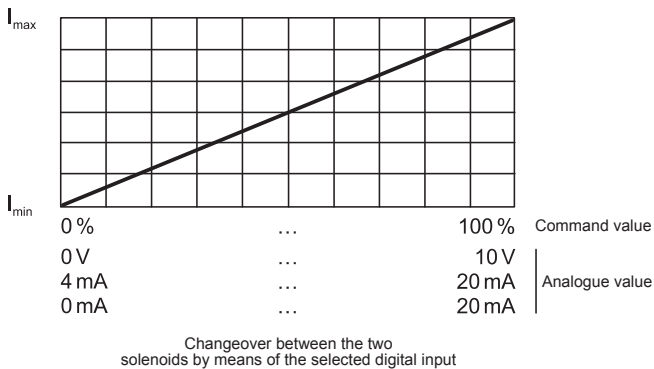
Two Pulse-Width-Modulated current outputs are available. To each output, a dither signal is superimposed, whereas dither frequency and dither level can be adjusted separately. For each output, the minimum (I_{min}) and maximum (I_{max}) current can be adjusted separately. The solenoid outputs can also be configured as switching outputs. Therewith for each output a power reduction can be adjusted separately.

Optimisation of characteristic curve

A characteristic curve adjustable per solenoid „Command value input – solenoid current output“ enables an optimised (e.g., linearised) characteristic of the hydraulic system.

Mode of operation „Command value unipolar (2-Sol with DigIn)“

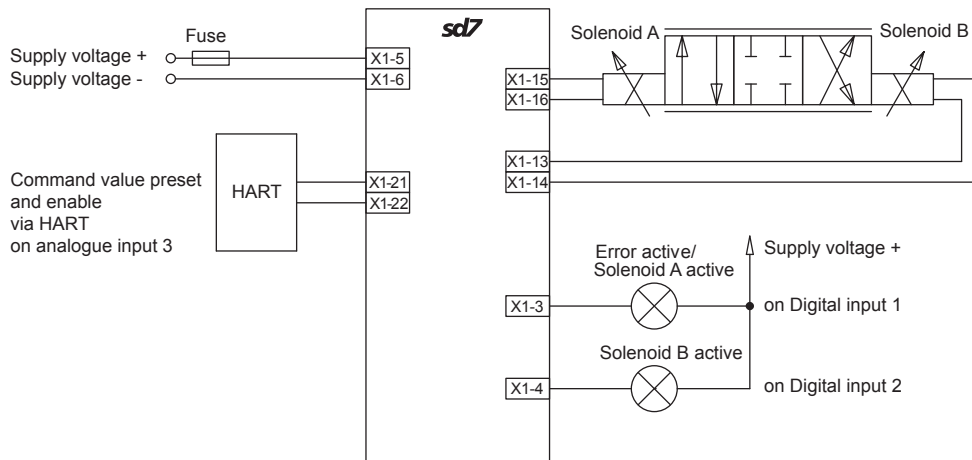
Dependent on a unipolar command value signal (voltage, current), the solenoid is driven by solenoid driver 1, when the selected digital input is „not activated“, resp. the solenoid by the solenoid driver 2, when the selected digital input is „activated“ (e.g. 0....10V correspond to 0....100% command value, 0....100% command value correspond to I_{min} I_{max} solenoid driver 1 or 2).


Signal recording

The SD7 amplifier module has a signal recording function. This, by means of PASO, enables the recording of various system signals, such as command value, solenoid currents, etc., which can be represented on a common time axis.

CONNECTION EXAMPLE

Mode of operation „command value unipolar (2-Sol)“ or „command value unipolar (2-Sol with DigIn)“



Mode of operation „command value unipolar (1-Sol)“

