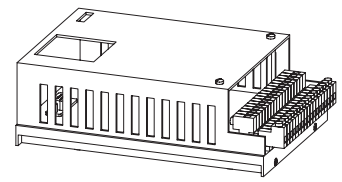# WANDFLUH
Hydraulics + Electronics

Digital amplifier / controller card SD1
• for 1 or 2 proportional solenoids
• 4 analogue inputs, of which 2 for differential inputs
• 8 digital inputs
• Card setting via PC or multi-function terminal MTG02 / TESO
• for snapping onto dome-rails

DESCRIPTION

The proportional card in Europacard format for snapping onto dome-rails is available as well as an amplifier (basic card) as a pressure-, volume flow- and position controller. The amplifier serves for controlling proportional valves with one or two solenoids. The digital controller serves to control a preset pressure, volume flow or a position. The parametering is carried out by means of a menu-driven parametering- and diagnostics software PASO of Wandfluh (serial interface RS232) or hand terminal. 4 analogue inputs (of which 2 for differential inputs) and 8 digital inputs are available. The hardware and the software can each be expanded and adapted to customer-specific requirements.

FUNCTION

The regulator card works with constant current control. Dither frequency and amplitude are adjustable independently. Solenoid outputs are made short-circuit proof. Preset value inputs and feedback value inputs 0…10 VDC or ±10 VDC may be connected. As an option analogue inputs can be used as current inputs 0…20 mA or 4…20 mA. Detailed description of the individual functions: see page 5 «Additional descriptions».

APPLICATION

The amplifier / controller in Eurocard format is used mainly in industrial applications. All modules can be mounted on dome-rails. The connections by means of screw terminals enables commissioning in a short time without any requirements for special tools. The controller card is well suited in systems with requirements for additional functions like ramps, preset values etc. Customer specific whishes can easily be implemented.

CONTENTS

TYPE CODE

S D1 ☐ ☐ 2 D2 0 ☐ ☐ ☐ # ☐

Module for electrical control cubicle

Digital

Parameters to be set with:
• Multi-function term. MTG02/TESO — 1
• PC-Software «PASO» — 3

Software configuration (function of card):
• Amplifier basic card — 0
• Pressure- and flow controller — 2
• Position controller PLUS — 4

2-solenoid version

24 VDC supply voltage

Preset value input selection

Feedback signal input — 0 (not possible with amplifier basic card)

Hardware configuration:
• 10-Bit resolution — A
• 12-Bit resolution;
  without galvanic separation — B (not possible with amplifier basic card)
  with galvanic separation — C (not possible with amplifier basic card)

Option fieldbus:
• without bus — A
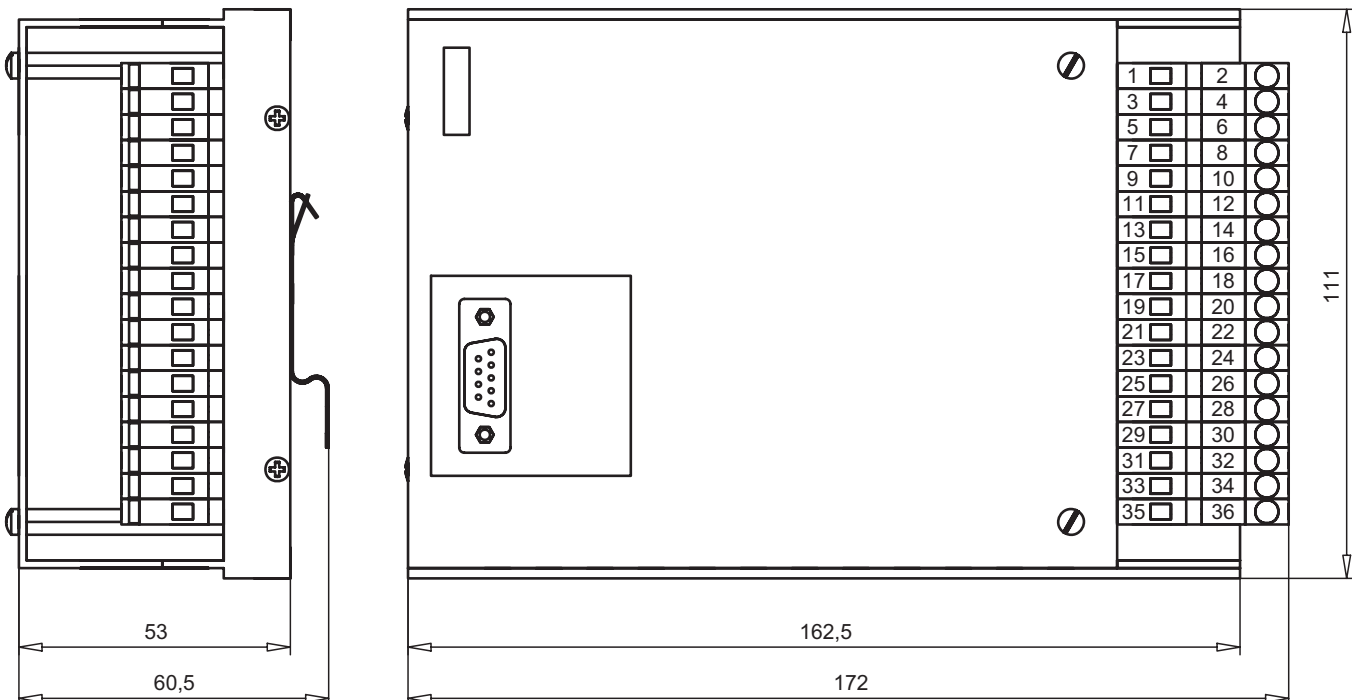• with profibus DP — B (only position controller PLUS)
• with CAN-bus — C (on request)

Design-Index (Subject to change)
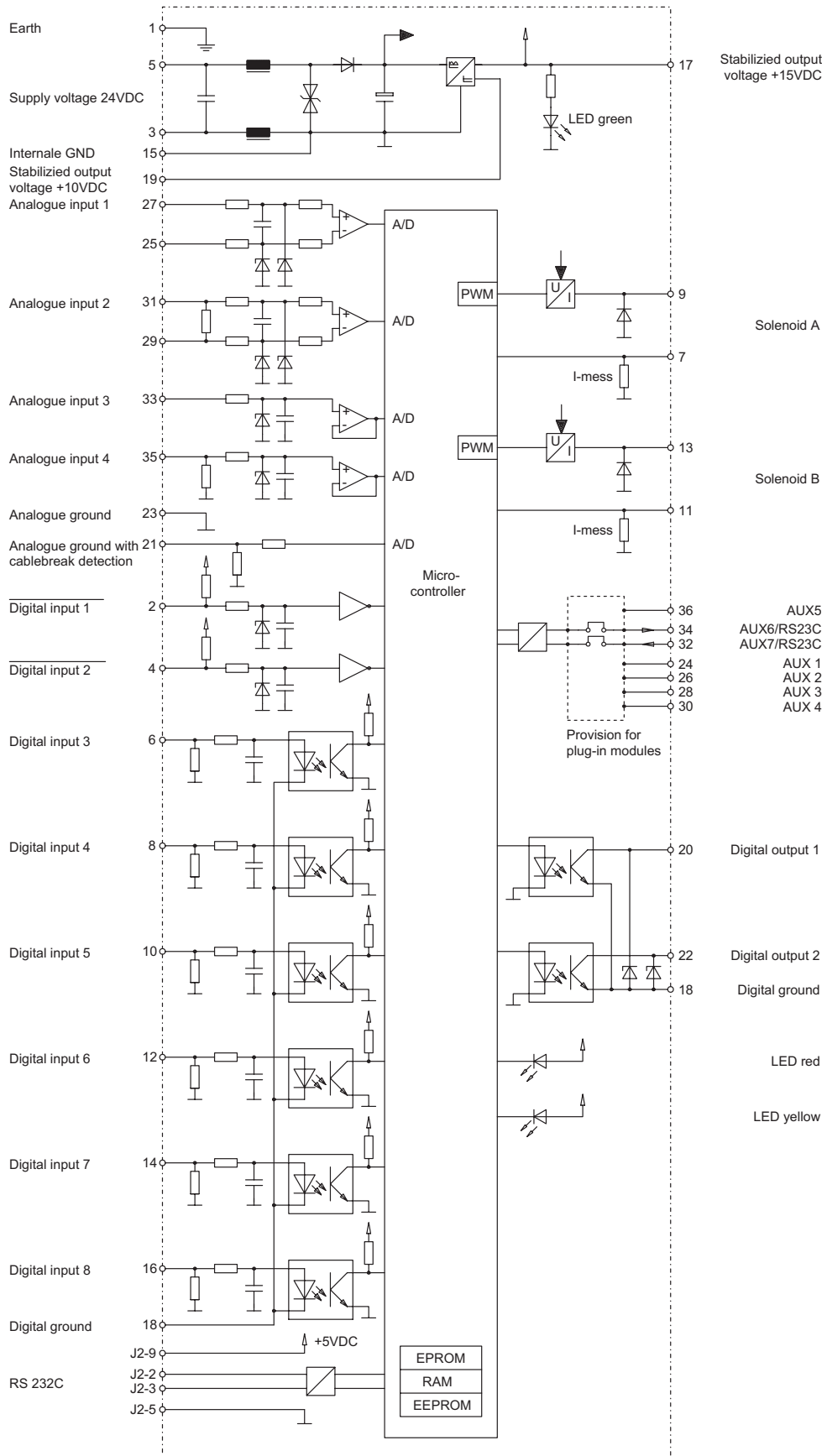
GENERAL SPECIFICATIONS

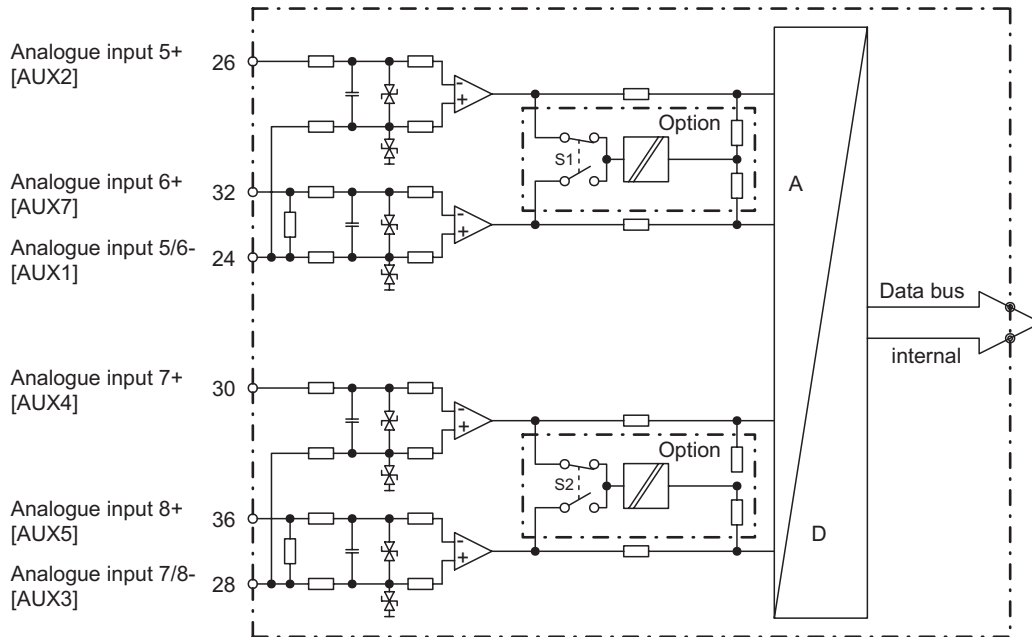|			
Execution	Module for electrical control cubicle, housing made of alu	Weight	450 g
Dimensions	172 x 111 x 60,5 mm (L x B x H with housing) Print plate: Eurocard 160 x 100 mm	Connections	Screw-on / plug-in connector strip: CAMDEN rising clamp plug-in, max. cable size 4 mm²
Installations	with combined snap-on base for 35 mm dome-rail to DIN 46 277	Ambient temperatur	-20…+60 °C

ELECTRICAL SPECIFICATIONS

Supply voltage	24 VDC	Stabilised output voltage	1 output 15 VDC, tolerance ±1,5 % max. load 100 mA
Voltage range	21…30 V		
Ripple on supply voltage	±10 %		1 output 10 VDC, tolerance ±2 % max. load 10 mA
Fuse	Customer must integrate fuse into his electrical system	Solenoid output	Short circuit proof With negative surge suppression diode
Temperature drift	<1 % with ∆T = 40 °C		
No load power	1,2 W	Solenoid current	Min. current I_{min} adjustable 0…950 mA
Analogue inputs	2 differential inputs 0…10 VDC		Max. current I_{max} adjustable I_{min}…1800 mA
	2 inputs ±10 VDC	Dither	Frequency adjustable 20…250 Hz
	As option all inputs may be used as current inputs		Amplitude adjustable 0…200 mA
		Digital outputs	2 outputs optically de coupled: open collector connected to «digital ground»;
Input resistance	>100 kOhm Differential inputs >27 kΩ Burden for current input = 250 Ω		U_{max} = 50 V, I_{max} = 15 mA
Digital inputs	2 inputs active-low 6 inputs active-high Switching threshold high 12…30 VDC Switching threshold low 0…4 VDC	Free pins	4 pins AUX1–AUX4 reserved for customer specific adaptations on plug-in modules
		Status indication by LED's	
		LED green	Supply voltage
		LED yellow	Function
Serial interface	1 interface D-SUB 9-pin socket (female) 1 interface screw-on / plug-in connector strip (optional)	LED red	Error
		EMV	
		Immunity	EN 61 000-6-2
		Emission	EN 61 000-6-4

DIMENSIONS

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BLOCK DIAGRAM BASIC CARD

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BLOCK DIAGRAM 12-BIT ADDITIONAL PRINT (as a plug-in module)

Analogue input 5+ [AUX2]   26

Analogue input 6+ [AUX7]   32

Analogue input 5/6- [AUX1]   24

Analogue input 7+ [AUX4]   30

Analogue input 8+ [AUX5]   36

Analogue input 7/8- [AUX3]   28

Option

S1

A

Data bus

internal

Option

S2

D

START-UP

The information required for connection and start-up are included with each proportional amplifier.
The information may also be ordered separately:
• Operating instruction SD1

Free-of-charge download of the «PASO»-software

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

ADDITIONAL INFORMATION

	Wandfluh-Documentation
Wandfluh-electronics in general	register 1.13
Accessories	register 1.13
Proportional directional control valves	register 1.10
Proportional pressure control valves	register 2.3
Proportional flow control valves	register 2.6

DESCRIPTION OF SD1X02D20-AA (AMPLIFIER BASIC CARD)

Construction

Version SD1102D20-AA with RS-232 (serial) interface, via which the operating mode and parameters have to be set and diagnostics may be carried out using a multi-function terminal (MTG02/TESO see data sheet 1.13-525).

Version SD1302D20-AA with RS-232 (serial) interface, via which the operating mode and parameters have to be set and diagnostics may be carried out using the PC software «PASO» (based on Windows).

Function

The amplifier serves for controlling proportional valves with one or two solenoids and includes constant current control. Dither frequency and amplitude are adjustable independently. Solenoid outputs are made short-circuit proof. Preset value inputs and feedback value inputs 0…10 VDC or ±10 VDC may be connected. As an option analog inputs may be used as current inputs 0…20 mA or 4…20 mA. By selecting one of the 4 operation modes the amplifier may be adapted to all common input signal types. Further, two independently working control loops are selectable. Amended parameters can be stored in a nonvolatile memory to have them available when the control system is switched on again.

Analogue inputs

The applied analogue signal will be digitised by a 10-Bit A/D converter. For the input range 0…10 V or 0…20 mA, the resolution is 10-Bits.
Note: For input range 0…+8 V, 0…+5 V or 4…20 mA, the resolution will be <10-Bits!

Differential inputs

Differential inputs must be used if the ground potential of the external preset value encoder does not match with the analogue ground on the amplifier card. If it is intended to use the differential input like an analogue input against analogue ground, the minus side of the differential input must be wired to analogue ground.

Analogue input with cable break detection

The preset value must be a current preset value 4…+20 mA, or a voltage preset value from a potentiometer. If a potentiometer is used, its ground connection must be wired to the «analogue ground with cable break detection» terminal.

Analogue input 1 (for differential voltage preset value)

input voltage range: 0…+10 V / 0…+8 V / 0…+5 V

Analogue input 2 (for differential current preset value)

input current range: 0…+20 mA / 4…+20 mA

Analogue input 3 (for voltage preset value against analogue ground)

input voltage range: 0…±10 V / 0…±8 V / 0…±5 V

Analogue input 4 (for current preset value against analogue ground)

input current range: 0…+20 mA / 4…+20 mA

Analogue input with inversion

At 100 % preset value = minimum solenoid current.
At 0 % preset value = maximum solenoid current.

Digital inputs

Digital inputs 1 and 2 are active low (see electrical specifications) and not galvanically separated. Digital inputs 3 to 8 are active high (see electrical specifications) and galvanically separated via optical couplers.

Digital input 1 (disable solenoid A)

If the input is set, solenoid output A is disabled.

Digital input 2 (disable solenoid B)

If the input is set, solenoid output B is disabled.

Digital input 3 (enable control)

If the input is set, the solenoid outputs are enabled, if not, they are disabled.

Digital input 4 (solenoid B active)

If a directional valve is commanded by a voltage preset value 0… +10 V or a current preset value, digital input 4 must be set to activate solenoid output B.

Digital input 5 (ramp off)

The ramp can be temporarily switched off by setting this input. If the ramp is never required, this input needs not to be set since the ramp time is set to 0 seconds.

Digital inputs 6 to 8 (fixed preset values)

Seven fixed preset values, selectable in binary form, are available. When a fixed preset value is selected via digital inputs 6 to 8, the external preset value is ineffective.

Outputs

Proportional solenoid outputs A and B

The two solenoid outputs have a current output **p**ulse-**w**idth-**m**odulated at 1000 Hz with superimposed dither. The polarity of the connected solenoids is irrelevant. The outputs are short-circuit-proof and may be loaded up to 1800 mA (see electrical specifications).

Digital outputs (error/solenoid B active)

These outputs are optically decoupled open collector outputs, which are active if a fault occurs or if solenoid B is triggered. The load (relay, lamp, resistor, etc.) is switched between the output and a positive supply (see electrical specifications).

Status indication

Green, yellow, red LEDs

LED green: Supply voltage present if active
LED yellow: Solenoid output B selected if active
LED red: Error present if active

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Menu settings

The **operating mode** and **parameters** may be set and **diagnostics** be carried out via the menu. For version SD1102D20-AA, a multi-function terminal (MTG02/TESO see data sheet 1.13-525) is required. For version SD1302D20-AA, the PC software «PASO» is required.

Operation mode 1 (with connection example)

For a directional valve, solenoids A and B are controlled using an analogue input (voltage or current) and digital input 4 (solenoid B active).
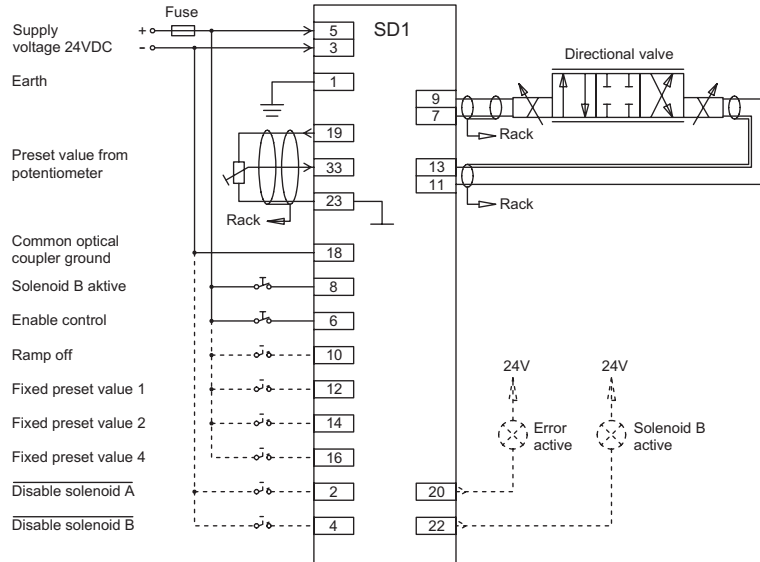
Operation mode 2

For a directional valve, solenoids A and B are controlled using an analogue input (voltage or current):
0…50 % preset value $\Rightarrow$ solenoid B / 50…100 % preset value $\Rightarrow$ solenoid A

Operation mode 3

For a directional valve, with voltage preset value 0…±100 % at analogue input 3, solenoid A is controlled by the positive voltage range and solenoid B by the negative voltage range.

Operation mode 4 (with connection example)

In this operation mode, one or two solenoids can be controlled independently from each other. With two solenoids, each is controlled by a separate voltage or current input.
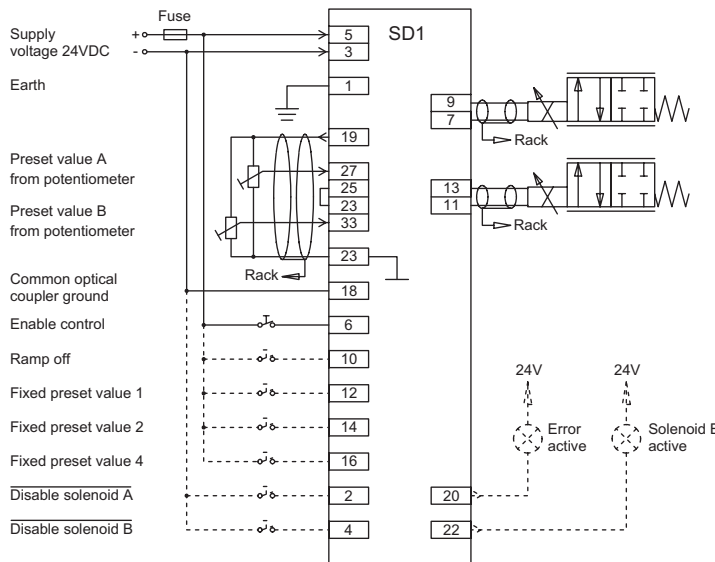
Parameter settings

- Window and offset to analogue inputs
- Fixed preset values 1 to 7 individually for solenoid A or B
- Ramp steepness adjustable separately for up and down per solenoid output (A/B)
- Minimum and maximum current per solenoid output

- Dither frequency and dither level
- The set parameters can be stored as working data.
  If PASO software operates the amplifier, the menu offers additional functions for parameter handling.

DESCRIPTION OF SD1X22D200XA (PRESSURE- AND FLOW CONTROLLER WITH INTEGRATED AMPLIFIER)

Construction

Version SD1122D200XA with RS-232 (serial) interface, via which the operating mode and parameters have to be set and diagnostics may be carried out using a multi-function terminal (MTG02 / TESO see data sheet 1.13-525).

Version SD1322D200XA with RS-232 (serial) interface, via which the operating mode and parameters have to be set and diagnostics may be carried out using the PC software «PASO» (based on Windows).

Function

Integrated in the card is beside the pressure / flow controller also the amplifier for direct operating proportional valves. The preset pressure / flow is given as an electrical signal (preset value) on the pressure / flow controller. A sensor is measuring the real pressure / flow and this signal is given also as an electrical signal (actual value) on the pressure / flow controller. Corresponding to the control deviation (preset value - actual value) an operating signal (solenoid current) will be output. The preset value may also be input in the form of a fixed preset pressure / flow and selected digitally. By linking multiple profiles a pressure / flow profile may be preset (not with the controller type «Pressure reducing control with throttle valve for clamping function»). Therewith, it's possible to set a stop time (for waiting after reached the preset position) for each profile. By scaling the preset and actual values, it is possible to make the following adjustments in e.g. bar.

If the preset pressure / flow is reached, the controller outputs a digital signal. The changing of the preset pressure / flow may be smoothened by varying ramp time. The control characteristic can be adjusted to the respective control system by means of various parameters. The controller is built as a PID-controller. It is also possible to switch off the control system completely for carrying out tests or setting procedures.

In the controller type «Pressure reducing control with throttle valve for clamping function», there is an additional clamping function integrated. The clamping function has a non regulated forward movement for a clamping cylinder, until a pressure threshold is reached and the pressure regulation is switched on. With another signal the cylinder can move backward unregulated. Amended parameters can be stored in a non volatile memory to have them available when the control system is switched on again.

Inputs

Analogue inputs

The applied analogue signal is digitised by the version SD1X42D200-**B**A by a 12-Bit A/D converter, by the version SD1X42D200**A**A by the 10-Bit A/D converter.

For the input range 0…10 V or 0…20 mA, the resolution is 12-Bits resp. 10-Bit.

Note: For input range 0…+8 V, 0…+5 V or 4…20 mA, the resolution will be <12-Bit resp. 10-Bit!

Differential analogue inputs

Differential inputs must be used if the ground potential of the preset value generator does not match with the analogue ground on the amplifier card.

If the differential input is used like an analogue input to analogue ground, the minus side of the differential input must be wired to analogue ground.

Galvanic separation of analogue inputs (option)

(only 12-Bit version)

Two of the four analogue inputs (selectable) may be separated or insulated galvanically on the controller card.

Analogue input with cable break detection

The preset value must be a current preset value 4…+20 mA, or a voltage preset value from a potentiometer. If a potentiometer is used, its ground connection must be wired to the «analogue ground with cable break detection» terminal.

Analogue input 1 (for differential voltage preset value)
(only 10-Bit version)
input voltage range: 0…+10 V / 0…+8 V / 0…+5 V

Analogue input 2 (for differential current preset value)
(only 10-Bit version)
input current range: 0…+20 mA / 4…+20 mA

Analogue input 3 (for voltage preset value against analogue ground)
(only 10-Bit version)
input voltage range: 0…+10 V / 0…+8 V / 0…+5 V

Analogue input 4 (for current preset value against analogue ground)
(only 10-Bit version)
input current range: 0…+20 mA / 4…+20 mA

Analogue input 5 [AUX2] (for differential voltage preset value)
(only 12-Bit version)
input voltage range: 0…+10V / 0…+8V / 0…+5V

Analogue input 6 [AUX7] (for differential current preset value)
(only 12-Bit version)
input current range: 0...+20mA / 4...+20mA

Analogue input 7 [AUX4] (for differential voltage preset value)
(only 12-Bit version)
input voltage range: 0…+10V / 0…+8V / 0…+5V

Analogue input 8 [AUX5] (for differential current preset value)
(only 12-Bit version)
input current range: 0…+20mA / 4…+20mA

Digital inputs

The digital inputs 3 to 8 are high active (see electrical specifications) and are galvanically isolated by means of an optical isolator.

Digital input 3 (enable control)
If the input is set, the solenoid outputs are enabled, if not, it is disabled.

Digital input 4 (controller off)
If the input is set, the regulation function is disabled, if not, it is enabled.

Digital input 5 (ramp off)
The ramp can be temporarily switched off by setting this input. If the ramp is never required, this input needs not to be connected, since the ramp time is set to 0 seconds.

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DESCRIPTION OF SD1X22D200XA (PRESSURE- AND FLOW CONTROLLER WITH INTEGRATED AMPLIFIER)

Digital input 6 – 8
(Profile selection resp. backward/forward, active-high)
The allocation of the digital inputs 6 – 8 depends of the selected controller types (refer to page 10ff).

Controller type:
«Pressure reducing control with throttle valves for clamping function»

Digital input 6 (Profile selection, active-high)
There is 1 profile available, selectable in binary form. When a fixed preset value is selected via the digital input 6 and the digital input 1 «Start» is activated, the external preset value is ineffective.

Digital input 7 (forward, active-high)
If this input is set, the solenoid of the unloading valve will be operated direct with a current. This current is adjustable with the parameter «Current backward». The control is switched off. This stage is active until the digital input «forward» is set to not active.

Digital input 8 (forward, active-high)
If this input is set, the solenoid of the unloading valve will be operated direct with a current. This current is adjustable with the parameter «Current forward». The control is switched off. This stage is active until the actual value has reached an pressure / flow threshold (adjustable with the parameter «Pressure threshold»). At this moment, the control will switch on and the card is working as a standard pressure / flow controller.

Controller type:
All, except «Pressure reducing control with throttle valves for clamping function»

Digital input 6 – 8 (Profil selection, active-high)
7 profiles, selectable in binary form, are available. When a fixed preset value is selected via the digital inputs 6 – 8 and the digital input 1 «Start» is activated, the external preset value is ineffective.

Outputs

Proportional solenoid outputs A and B
The two solenoid outputs have a current output **p**ulse-**w**idth-**m**odulated at 1000 Hz with superimposed dither. The polarity of the connected solenoids is irrelevant. The outputs are short-circuit-proof and may be loaded up to 1800 mA (see electrical specifications).

Digital output 1 (Error)
This output will be active if an error (eg. cable brake) has been detected.

Digital output 2 (Pressure / flow reached)
This output will be active if the preset pressure resp. preset flow is reached. Precise detection is achieved by means of an adjustable window, which compares the difference between preset value and actual value. As long the difference is smaller than the window the output will stay active.

Status indication

Green, yellow, red LEDs
LED green: Supply voltage present if active
LED yellow: Pressure / flow reached
LED red: Error present if active

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Menu settings

The operating mode and parameters have to be set and diagnostics may be carried out via the menu. For version SD1122D200AA, a multi-function terminal (MTG02 / TESO see data sheet 1.13-525) is required. For version SD1322D200AA the PC software «PASO» is required.
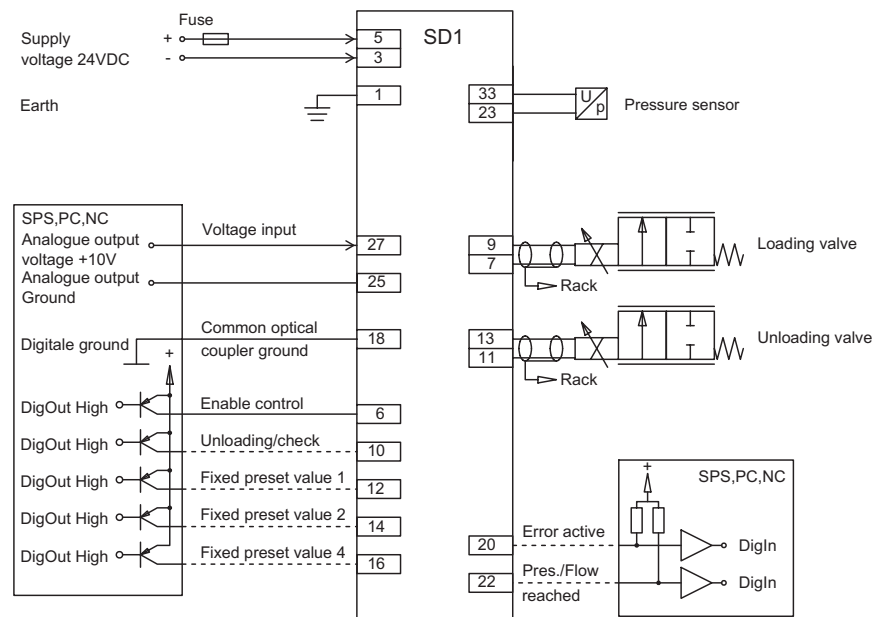
Parameter settings

• Selection of analogue inputs and their working range
• Fixed preset values 1 to 7 to preset fixed preset pressures resp. fixed preset flows
• Stop time, resp. waiting time after reaching the fixed preset value until the control will switch to the next fixed preset value.
• Ramp steepness

• Minimum and maximum current per solenoid output
• Dither frequency and dither level
• Adjusting the controller to the control loop.
• The set parameters can be stored as working data is operated with PASO software the controller, the menu offers additional functions for parameter handling.

Connection example

The example shows the controller as a pressure relief control with throttle valve with 10-Bit analogue inputs (1-solenoid application). The preset value is issued by the PLC as a voltage signal. The actual value is fed back to the controller in the forme of a voltage signal of corresponding size.
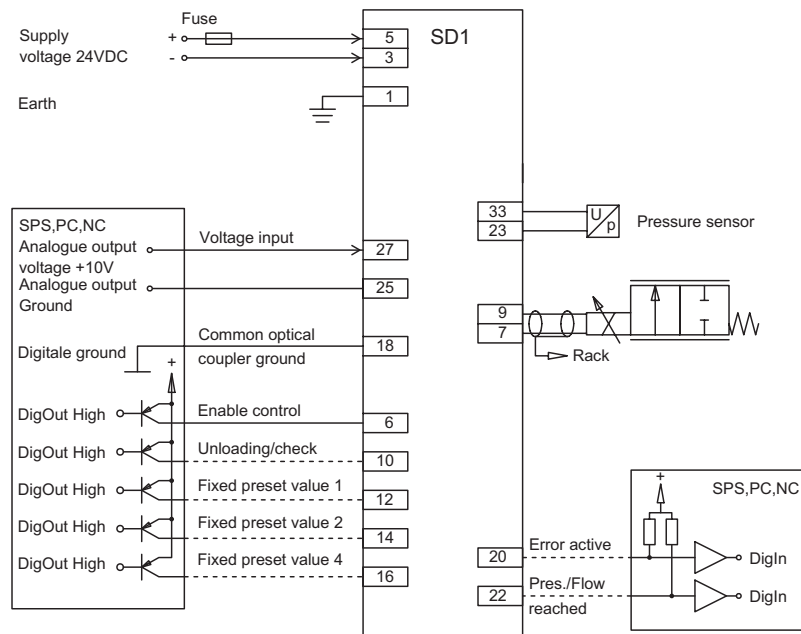

The example shows the controller as a pressure reducing control with throttle valves with 10-Bit analogue inputs (2-solenoid application). The preset value is issued by the PLC as a voltage signal. The actual value is fed back to the controller in the forme of a voltage signal of corresponding size.

CONTROLLER TYPES

Pressure relief control with throttle valve (1-solenoid application)

p = constant
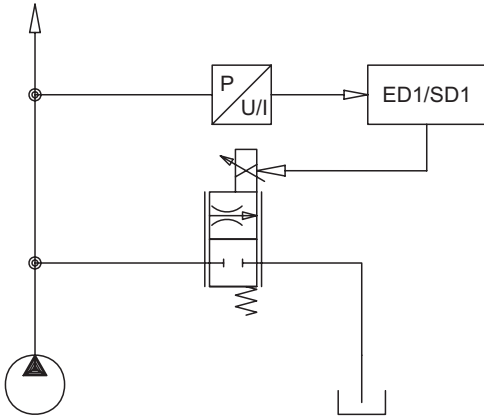
With this system, high dynamic and static requests can be performed. Any proportional valve with one active control edge can be used.

Control characteristic («+» and «++» recommended valves)

Valves	dynamic	static	data sheet
DNPPM18	+	++	2.6-510
DOPPM18	+	++	2.6-510
DNPPM22	+	++	2.6-530
DOPPM22	+	++	2.6-530
DNPPM33	o	++	2.6-550

Pressure reducing control with throttle valves (2-solenoid application)
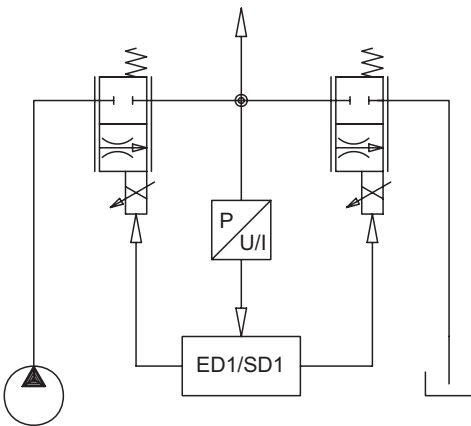
p = constant

With this system, high dynamic and static requests can be performed. Any proportional valve with one active control edge can be used.

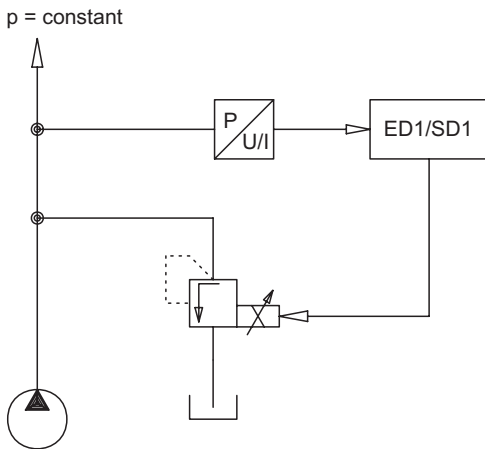**Control characteristic** («+» and «++» recommended valves)

Valves	dynamic	static	data sheet
DNPPM18	+	++	2.6-510
DOPPM18	+	++	2.6-510
DNPPM22	+	++	2.6-530
DOPPM22	+	++	2.6-530
DNPPM33	o	++	2.6-550

Pressure reducing control with throttle valves for clamping function (2-solenoid application)
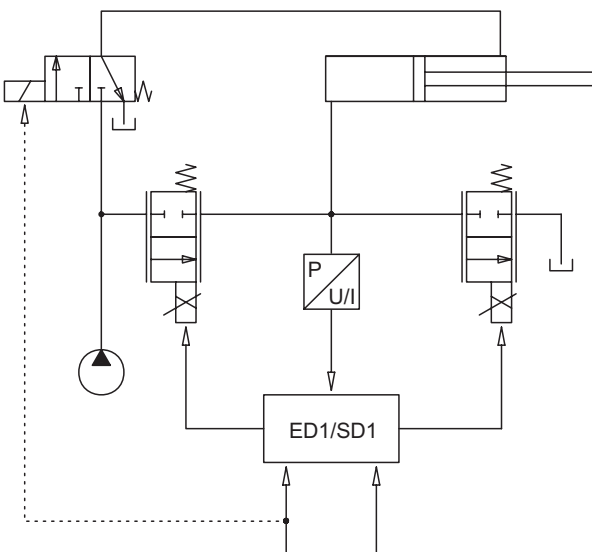
This system corresponds to the pressure reducing with throttle valves function. There is an additional clamping function integrated. In the clamping function, with setting the digital input «Forward», the solenoid of the loading valve will be operated direct with a adjustable current. The control is switched off. This stage is active until the actual value has reached an adjustable pressure / flow threshold. At this moment, the control will switch on and the card is working as a standard pressure / flow controller. If the digital input «Backward» is set, the solenoid of the unloading valve will be operated direct with a adjustable current. The control is switched off. If the digital input «Backward» is set to not active, the loading- and unloading valve will stay in the basic state until the whole procedure will be restarted by resetting.

Control characteristic («+» and «++» recommended valves)

Valves	dynamic	static	data sheet
DNPPM18	+	++	2.6-510
DOPPM18	+	++	2.6-510
DNPPM22	+	++	2.6-530
DOPPM22	+	++	2.6-530
DNPPM33	o	++	2.6-550

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CONTROLLER TYPES

Pressure relief control with pressure relief valve
(1-solenoid application)

p = constant

This system is actually only a electronically preset value re-lead. The problem is that the pressure already is mechanical controlled inside the valve. Because this mechanical control is very slow, the electronically control must be made slow artificially (cascade control: the exterior loop must be slower than the interior loop). With such a system, good static requests can be performed. However, dynamic requests can be badly performed.
Any proportional pressure relief valve can be used.

Control characteristic («+» and «++» recommended valves)

Valves	dynamic	static	data sheet
BVPPM18	–	+	2.3-510
BDPPM18	–	+	2.3-520
BVPPM22	–	+	2.3-530
BVPPM33	–	+	2.3-550

Pressure reducing control with pressure reducing valves
(1-solenoid application)
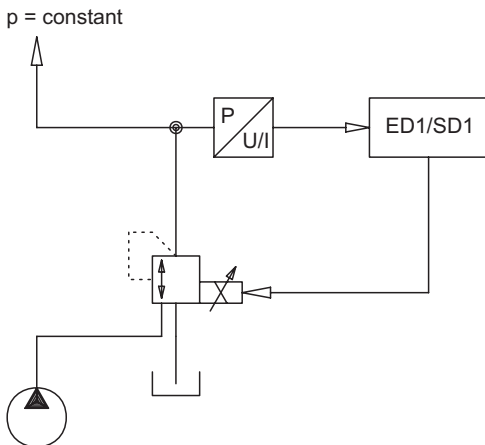
p = constant

This system is actually only a electronically preset value re-lead. The problem is that the pressure already is mechanical controlled inside the valve. Because this mechanical control is very slow, the electronically control must be made slow artificially (cascade control: the exterior loop must be slower than the interior loop). With such a system, good static requests can be performed. However, dynamic requests can be badly performed.
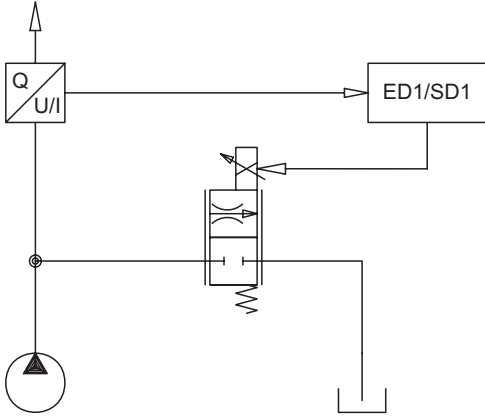Any proportional pressure reducing valve can be used.

Control characteristic («+» and «++» recommended valves)

Valves	dynamic	static	data sheet
MVPPM18	–	+	2.3-610
MVPPM22	–	+	2.3-630
MQPPM22	–	+	2.3-640
MVPPM33	–	+	2.3-650

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CONTROLLER TYPES

3-way flow control with throttle valve (1-solenoid application)

Q = constant

With this system, high dynamic and static requests can be performed. Any proportional valve with one active control edge can be used.

Control characteristic (recommended valves)

Valves	dynamic	static	data sheet
DNPPM18	+	++	2.6-510
DOPPM18	+	++	2.6-510
DNPPM22	+	++	2.6-530
DOPPM22	+	++	2.6-530
DNPPM33	o	++	2.6-550

2-way flow control with throttle valve (1-solenoid application)
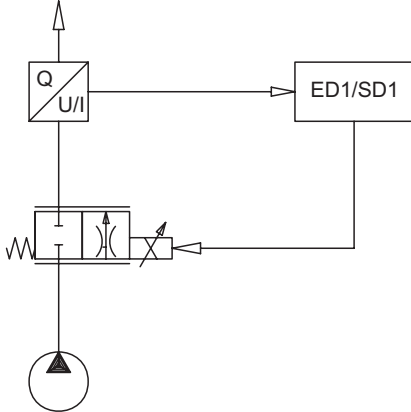
Q = constant

With this system, high dynamic and static requests can be performed. Any proportional valve with one active control edge can be used.

Control characteristic (recommended valves)

Valves	dynamic	static	data sheet
DNPPM18	+	++	2.6-510
DOPPM18	+	++	2.6-510
DNPPM22	+	++	2.6-530
DOPPM22	+	++	2.6-530
DNPPM33	o	++	2.6-550

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DESCRIPTION OF SD1X42D200XA (POSITION CONTROLLER PLUS WITH INTEGRATED AMPLIFIER)

Construction

Version SD1142D200XA with RS-232 (serial) interface, via which the operating mode and parameters have to be set and diagnostics may be carried out using a multi-function terminal (MTG02 / TESO see data sheet 1.13-525).

Version SD1342D200XA with RS-232 (serial) interface, via which the operating mode and parameters have to be set and diagnostics may be carried out using the PC software «PASO» (based on Windows).

Function

Integrated in the card are controller and amplifier to operate a 4 / 3-way proportional valve. The higher-level computer is used to input a position in the form of an analogue preset signal into the control system. The preset value may also be input in the form of a fixed preset value and selected digitally.

By linking multiple fixed target positions a travel profile may be preset. Therewith, it is possible to set a travel speed and a stop time (for waiting after reached the preset position) for each fixed target position.

By scaling the preset and actual values, it is possible to make the following adjustments in e.g. inches.

The preselected preset value corresponds to a position the cylinder moves to by means of the position controller. If the cylinder reaches position, the control outputs a digital signal. Start and stop of the cylinder may be smoothened by varying ramp time. The control characteristic can be adjusted to the respective control system by means of various parameters. It is also possible to switch off the control system completely for carrying out tests or setting procedures. Amended parameters can be stored in a non-volatile memory to have them available when the control system is switched on again.

Inputs

Analogue inputs

The applied analogue signal is digitised by the version SD1X42D200-**B**A by a 12-Bit A/D converter, by the version SD1X42D200**A**A by the 10-Bit A / D converter.

For the input range 0…10 V or 0…20 mA, the resolution is 12-Bits resp. 10-Bit.

Note: For input range 0…8 V, 0…5 V or 4…20 mA, the resolution will be <12-Bit resp. 10-Bit!

Differential analogue inputs

Differential inputs must be used if the ground potential of the preset value generator does not match with the analogue ground on the amplifier card.

If the differential input is used like an analogue input to analogue ground, the minus side of the differential input must be wired to analogue ground.

Galvanic separation of analogue inputs (option)

(only 12-Bit version)

Two of the four analogue inputs (selectable) may be separated or insulated galvanically on the controller card.

Analogue input with cable break detection

The preset value must be a current preset value 4…+20 mA, or a voltage preset value from a potentiometer. If a potentiometer is used, its ground connection must be wired to the «analogue ground with cable break detection» terminal.

Analogue input 1 (for differential voltage preset value)

(only 10-Bit version)

input voltage range: 0…+10 V / 0…+8 V / 0…+5 V

Analogue input 2 (for differential current preset value)

(only 10-Bit version)

input current range: 0…+20 mA / 4…+20 mA

Analogue input 3 (for voltage preset value against analogue ground)

(only 10-Bit version)

input voltage range: 0…+10 V / 0…+8 V / 0…+5 V

Analogue input 4 (for current preset value against analogue ground)

(only 10-Bit version)

input current range: 0…+20 mA / 4…+20 mA

Analogue input 5 [AUX2] (for differential voltage preset value)

(only 12-Bit version)

input voltage range: 0…+10 V / 0…+8 V / 0…+5 V

Analogue input 6 [AUX7] (for differential current preset value)

(only 12-Bit version)

input current range: 0...+20 mA / 4...+20 mA

Analogue input 7 [AUX4] (for differential voltage preset value)

(only 12-Bit version)

input voltage range: 0…+10 V / 0…+8 V / 0…+5 V

Analogue input 8 [AUX5] (for differential current preset value)

(only 12-Bit version)

input current range: 0…+20 mA / 4…+20 mA

Digital inputs

The digital inputs 3 to 8 are high active (see electrical specifications) and are galvanically isolated by means of an optical isolator.

Digital input 3 (enable control)

If the input is set, the solenoid outputs are enabled, if not, they are disabled.

Digital input 4 (regulator off)

If the input is set, the regulation function is disabled, if not, they are enabled.

Digital input 5 (ramp off)

The ramp can be temporarily switched off by setting this input. If the ramp is never required, this input needs not to be connected, since the ramp time is set to 0 seconds.

Digital inputs 6 – 8 (Fixed preset values)

Seven fixed preset values, selectable in binary form, are available. These preset values allow to set up to 7 positions (e.g. cylinder positions). After the settings have been made the positions are selectable digitally. When a fixed preset value is selected via digital inputs 6 to 8, the external preset value is ineffective.

Outputs

Proportional solenoid outputs A and B

The two solenoid outputs have a current output **p**ulse-**w**idth-**m**odulated at 1000Hz with superimposed dither. The polarity of the connected solenoids is irrelevant. The outputs are short-circuit-proof and may be loaded up to 1800mA (see electrical specifications).

Digital output 1 (Error)

This output will be active if an error (e.g. cable brake) has been detected.

Digital output 2 (cylinder in position)

This output will be active if the cylinder is in position. Precise detection is achieved by means of an adjustable window, which compares the difference between preset value and actual value. As long the difference is smaller than the window the output will stay active.

Status indication

Green, yellow, red LEDs

LED green: Supply voltage present if active
LED yellow: Cylinder in position if active
LED red: Error present if active

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Menu settings

The operating mode and parameters have to be set and diagnostics may be carried out via the menu. For version SD1142D200AA, a multi-function terminal (MTG02 / TESO see data sheet 1.13-525) is required. For version SD1342D200AA the PC software «PASO» is required.

Parameter settings

- Selection of analogue inputs and their working range
- Fixed preset values 1 to 7 to preset fixed preset pressures resp. fixed preset flows
- Ramp steepness adjustable separately to move in and aut a cylinder
- Stop time resp. waiting time for the axis after reaching a fixed preset position until the control will switch to the next fixed preset position.

- Ramp steepness
- Minimum and maximum current per solenoid output
- Dither frequency and dither level
- Adjusting the controller to the control loop.
- The set parameters can be stored as working data. If PASO software operates the controller, the menu offers additional functions for parameter handling.

Connection example

The example shows the controller with 12-Bit analogue inputs connected to a PLC. The programed position is issued by the PLC as a voltage signal. The cylinder (actual position) is fed back to the controller in the form of a voltage signal of corresponding size.
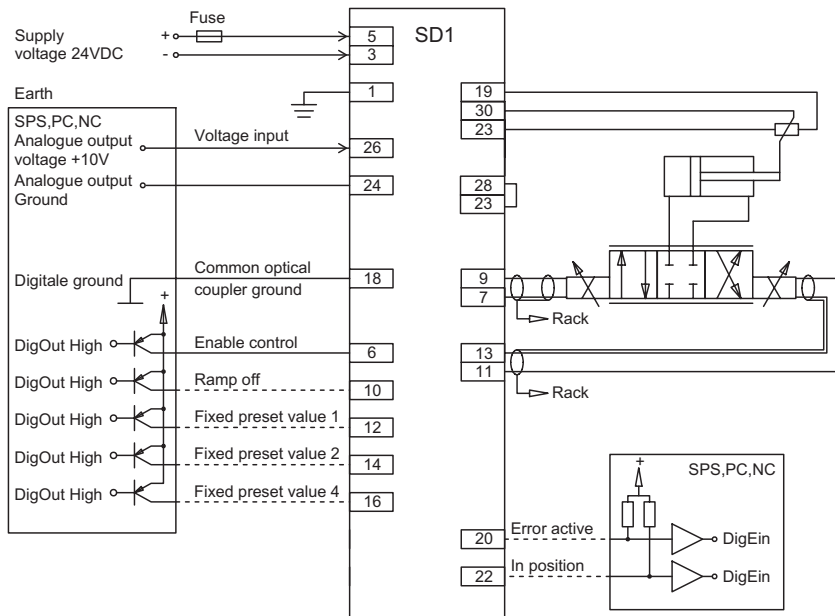
The example shows the controller with 10-Bit analogue inputs connected to a PLC. The programed position is issued by the PLC as a voltage signal. The cylinder actual position is fed back to the controller in the form of a voltage signal of corresponding size.