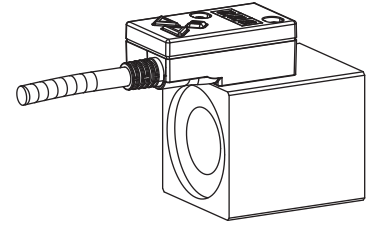## Solenoid coil acc. to VDE 0580
- **With integrated amplifier electronics PD2**
- **Protection class IP 67**

DESCRIPTION

Solenoid coil with integrated amplifier electronics. Protection class is IP67. The electronics are fix mounted on the solenoid coil. The construction corresponds to standard VDE 0580. The steel housing is zinc nickel coated.

FUNCTION

The electronics has a Pulse-Width-Modulated current output. The solenoid output can also be parameterised for switching solenoids. The parameterisation is carried out directly on the device by means of push-buttons and display, or by means of the parameterisation and diagnostics software „PASO" of Wandfluh.

APPLICATION

Due to its water spray resistant execution, the solenoid coil is suitable for most diverse applications.

It can be used on all proprtional valves with 19 mm, 23 mm resp. 31 mm armature tube diameters.

Easy connecting enables assembly and commissioning with conventional tools. All settings can be carried out easily and quickly.

TYPE CODE

M P ☐ - P1 - ☐ - ☐ # ☐

Metal housing square

Integrated amplifier electronics

Coil execution
Square 35 mm	S35/19x50	Square 60 mm	S60/31x72
Square 45 mm	S45/23x50	Square 60 mm	A60/31x72 *

Connection cable
vaway from the solenoid

1-solenoid execution

Nominal voltage U_N
12 VDC	12
24 VDC	24

Analogue input	voltage / current (0...5 V factory preset)	A1
CANopen acc. to DSP-408		C1
with J1939		J1 (on request)

Design index (subject to change)

* only for proportional spool valve NG10

GENERAL SPECIFICATIONS

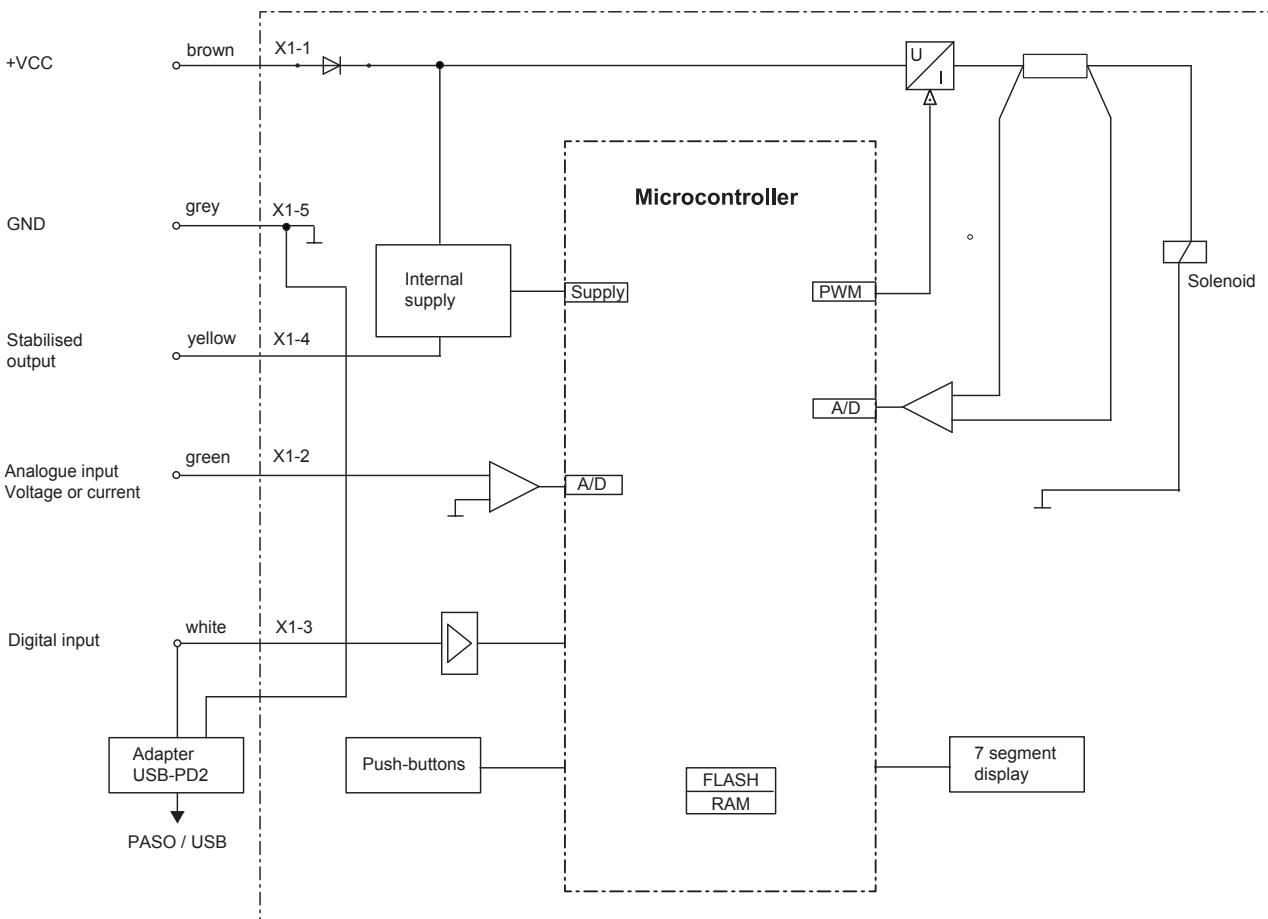|		
Connections	Connection cable	5 x 0,34 mm², Exterior coating PVC length = 1,5 m
	USB interface	via connection «Digital input» requires the Wandfluh USB adapter PD2
Dimensions	See drawing page 3	
Ambient temperature	-20...+85 °C	

SAFE OPERATION

Caution: To avoid overheating the coil may only be energised when mounted on an armature tube and valve.

Note: For maximum power development the coil has to be installed in its preferred direction. A reversed installation can lead to lower hydraulic values.
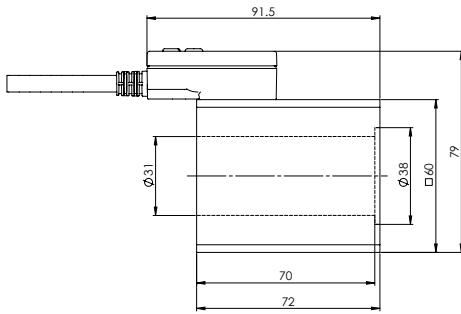
Wandfluh AG	*Tel.* +41 33 672 72 72	*E-mail:* sales@wandfluh.com	*Illustrations not obligatory*	*Data sheet no.*
Postfach	*Fax* +41 33 672 72 12	*Internet: www.wandfluh.com*	*Data subject to change*	**1.1-330E** 1/7
CH-3714 Frutigen			*Edition 21 20*

Amplifier with analogue interface

ELECTRICAL SPECIFICATIONS

Protection class	IP 67 acc. to EN 60 529	Dither	Frequency adjustable 4…500 Hz
Supply voltage	8…32 V		Factory setting 80 Hz
Residual ripple	< +/-5 %		Level adjustable 0…400 mA
Fuse	low		Factory setting 180 mA
No-load current	approx. 20 mA	Temperature drift	<1 % at $\Delta T = 40\,°C$
Max. current		Digital inputs	1 input high-active, no pull-up/down
consumption	No-load current + 2,5 A per solenoid		Switching threshold high 6...32 VDC
Analogue input	1 input non-differential		Switching threshold low 0…1 VDC
	Voltage / current (switchable by means of parameter)		Usable as frequency input
	0...+/- 10V or 0/4...20mA		(frequency 5...5000 Hz) and as PWM input
Resolution	10-Bit		(automatic frequency recognition)
Input resistance	Voltage input >100 kΩ	Ramps	Adjustable 0…500 s
	(Input current < 5 mA)	USB interface	Via digital input
	Load for current input = 124 Ω		Requires the Wandfluh USB adapter
Stabilised output	5 VDC	EMV	
voltage	max. load 20 mA	Immunity	EN 61 000-6-2
		Emission	EN 61 000-6-4

Solenoid current:

- Minimal current I_{min} Adjustable 0…I_{max} mA
  Factory setting 30 mA

- Maximal current I_{max} Adjustable I_{min}…2450 mA
  MP35/19x50-..-12, Factory setting 1360 mA
  MP35/19x50-..-24, Factory setting 680 mA
  MP45/23x50-..-12, Factory setting 1490 mA
  MP45/23x50-..-24, Factory setting 780 mA
  MPS60/31x72-..-12, Factory setting 2290 mA
  MPA60/31x72-..-12, Factory setting 2290 mA
  MPS60/31x72-..-24, Factory setting 1140 mA
  MPA60/31x72-..-24, Factory setting 1140 mA

BLOCK DIAGRAM

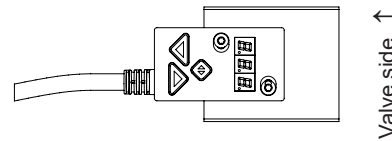|				
Wandfluh AG	*Tel.* +41 33 672 72 72	*E-mail:* sales@wandfluh.com	*Illustrations not obligatory*	*Data sheet no.*
Postfach	*Fax* +41 33 672 72 12	*Internet:* www.wandfluh.com	*Data subject to change*	**1.1-330E** 2/7
CH-3714 Frutigen				*Edition 21 20*

ABMESSUNGEN
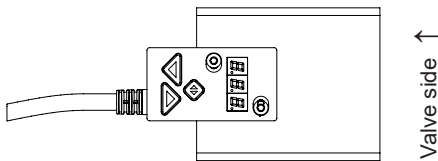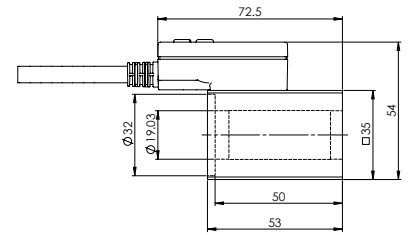
MP.60/31x72

MPS45/23x50
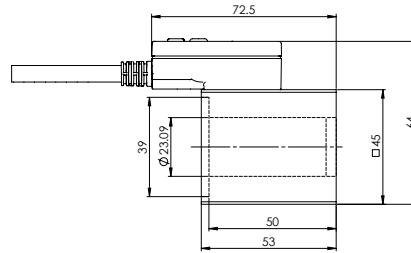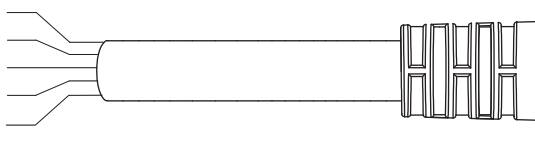

MPS35/19x50
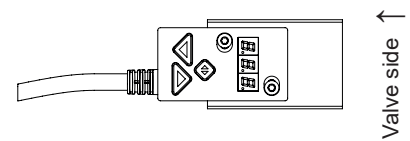
CONNECTOR ASSIGNMENT

Connection cable

1 brown
2 green
3 white
4 yellow
5 grey

1 = + VCC
2 = Command value
3 = Dig Inp
4 = Stab out
5 = GND

START-UP

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

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

Free-of-charge download:
• «PASO-PD2» Parameterisation software
• Operating instruction (*.pdf)

ADDITIONAL INFORMATION

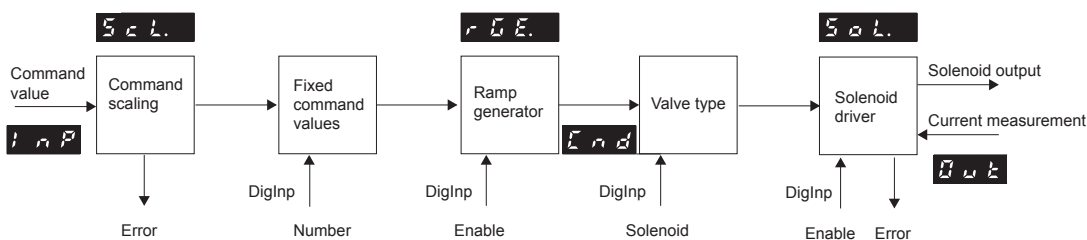|	Wandfluh documentation-
Wandfluh electronics general	register 1.13
Proportional spool valve	register 1.10
Proportional pressure valves	register 2.3
Proportional flow control valves	register 2.6

ACCESSORIES

USB-adapter PD2   Article no. 726.9900
incl. USB-cable type A-B, 1,8 m
(for parameterisation via PASO)

PARAMETER SETTINGS

The PD2 electronics have push-buttons and a 7 segment display which enable setting the most important parameters. In addition, the digital input can be used as a communication interface, through which, by means of the parameterisation software „PASO-PD2", the complete parameterisation and diagnostics can be carried out. For this, the Wandfluh USB-PD2 adapter is required. (not included in the delivery)

Attention: During the communication, the digital input cannot be used.

FUNCTION DESCRIPTION

Wandfluh AG   Tel.   +41 33 672 72 72   E-mail: sales@wandfluh.com   *Illustrations not obligatory*   Data sheet no.
Postfach   Fax   +41 33 672 72 12   Internet: www.wandfluh.com   *Data subject to change*   ***1.1-330E*** 3/7
CH-3714 Frutigen   *Edition 21 20*

PD2-AMPLIFIER WITH ANALOGUE INTERFACE

Command value scaling
The command value can be applied as a voltage, current, digital, frequency or PWM signal. The scaling takes place via the parameter "Interface". Furthermore, the command value can be monitored for a cable break. A dead band can also be set.

Fixed command value
There is 1 fixed command value available, which can be selected via the digital input. This function has to be configured before in PASO.
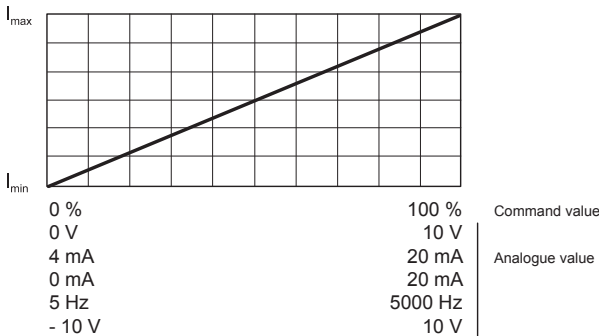
Ramp generator
Two linear ramps for up and down are available which can be adjusted separately.

Valve type
Adjustment possibilities: switching solenoid or proportional solenoid.

Mode of operation „Command value unipolar/bipolar (1-Sol)
Dependent on a command value signal (voltage, current, digital, frequency or PWM), the solenoid is driven (e.g. 0….10V correspond to 0….100 % command value, 0….+100 % command value correspond to Imin….Imax solenoid driver)

I_{max}		
I_{min}		

0 %	100 %	Command value
0 V	10 V	
4 mA	20 mA	Analogue value
0 mA	20 mA	
5 Hz	5000 Hz	
- 10 V	10 V	

Signal recording
Furthermore, the „PD2" amplifier electronics have a signal recording function. This, by means of PASO, enables the recording of various system signals, such as command value, solenoid current, etc., which can be represented on a common time axis.

Solenoid driver
A Pulse-Width-Modulated current output is available. A dither signal is superimposed, whereby the dither frequency and the dither level are separately adjustable. The minimum (Imin) and maximum (Imax) current can be adjusted. The solenoid output can also be configured as switching solenoid output. In this case, a power reduction can be adjusted.
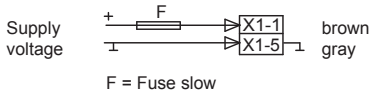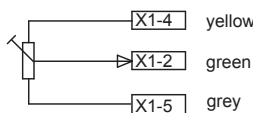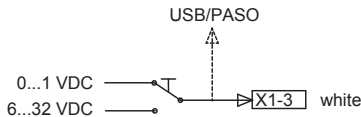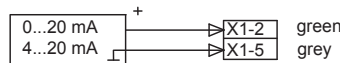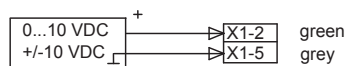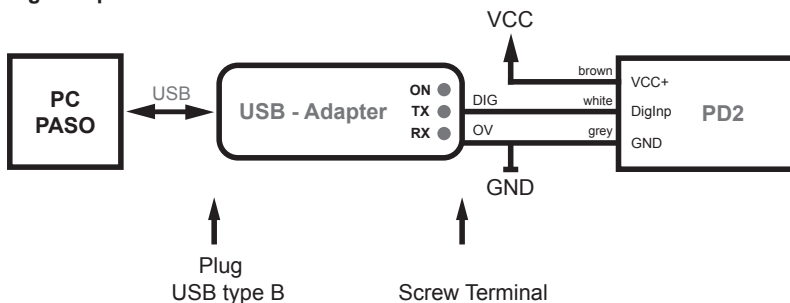
Optimisation of characteristic curve
An adjustable characteristic curve „Command value input – solenoid current output" enables an optimised (e.g. linearised) characteristic of the hydraulic system.

Channel enabling
As per factory setting, the device is enabled („on"). This „enable channel" can be set to „on", „off" or „external" (digital input) via PASO or via menu item.

Hints:
Digital input: if not wired, the state of the digital input is not defined
Analogue input: if not wired, the voltage input will read 1.11 V constantly.

CONNECTION EXAMPLES

Supply voltage

Supply voltage
X1-1 brown
X1-5 gray
F = Fuse slow

Digital input as function input

USB/PASO
0...1 VDC
6...32 VDC
X1-3 white

Analogue input with potentiometer

X1-4 yellow
X1-2 green
X1-5 grey

Analogue input current with external current source

0...20 mA
4...20 mA
X1-2 green
X1-5 grey

Analogue input voltage with external voltage source

0...10 VDC
+/-10 VDC
X1-2 green
X1-5 grey

Digital input as USB interface

VCC

PC PASO — USB — USB - Adapter

ON		
TX	DIG	white
RX	OV	grey

brown — VCC+
DigInp — PD2
GND

GND

Plug USB type B   Screw Terminal

Amplifier with CANopen interface

ELECTRICAL SPECIFICATIONS

Protection class	IP 67 acc. to EN 60 529	Dither	Frequency adjustable 4…500 Hz
Supply voltage	8…32 V		Factory setting 80 Hz
Residual ripple	< +/-5 %		Level adjustable 0…400 mA
Fuse	low		Factory setting 180 mA
No-load current	approx. 20 mA	Temperature drift	<1 % at ΔT = 40 °C
Max. current		Digital inputs	1 input high-active, no pull-up/down
consumption	No-load current + 2,5 A per solenoid		Switching threshold high 6...32 VDC
			Switching threshold low 0…1 VDC

Solenoid current:
- Minimal current I_{min} Adjustable 0…I_{max} mA
  Factory setting 30 mA
- Maximal current I_{max} Adjustable I_{min}…2450 mA
  MP35/19x50-..-12, Factory setting 1360 mA
  MP35/19x50-..-24, Factory setting 680 mA
  MP45/23x50-..-12, Factory setting 1490 mA
  MP45/23x50-..-24, Factory setting 780 mA
  MPS60/31x72-..-12, Factory setting 2290 mA
  MPA60/31x72-..-12, Factory setting 2290 mA
  MPS60/31x72-..-24, Factory setting 1140 mA
  MPA60/31x72-..-24, Factory setting 1140 mA

Usable as frequency input
(frequency 5...5000 Hz) and as PWM
input (automatic frequency recognition)

USB interface	Via digital input
	Requires the Wandfluh USB adapter
EMV	
Immunity	EN 61 000-6-2
Emission	EN 61 000-6-4

BLOCK DIAGRAM

Wandfluh AG	Tel. +41 33 672 72 72	E-mail: sales@wandfluh.com	*Illustrations not obligatory*	*Data sheet no.*
Postfach	Fax +41 33 672 72 12	Internet: www.wandfluh.com	*Data subject to change*	**1.1-330E** 5/7
CH-3714 Frutigen				*Edition 21 20*

DIMENSIONS

MP.60/31x72

91.5
Ø31 Ø38 □60 79
70
72

MPS45/23x50

72.5
39 Ø23.09 □45 64
50
53

MPS35/19x50

72.5
Ø32 Ø19.03 □35 54
50
53

Valve side

ANSCHLUSSBELEGUNG

Anschlusskabel

1 brown
2 green
3 white
4 yellow
5 grey
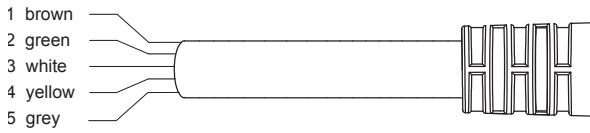
1 = + VCC
2 = CAN-Low
3 = Dig Inp
4 = CAN-High
5 = GND

START-UP

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

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

Free-of-charge download:
• «PASO-PD2» Parameterisation software
• Operating instruction (*.pdf)

ADDITIONAL INFORMATION

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

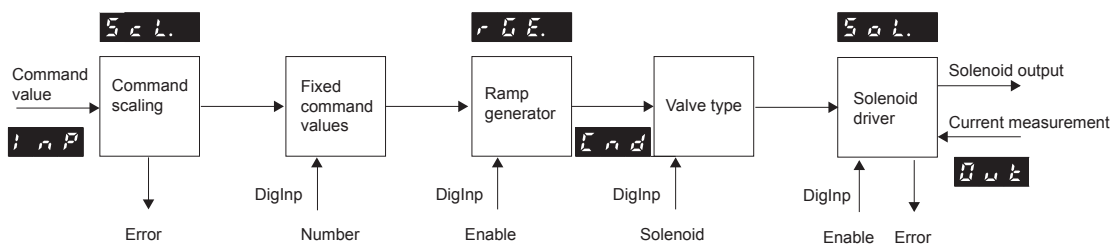## ACCESSORIES

USB-adapter PD2   Article no. 726.9900
incl. USB-cable type A-B, 1,8 m
(for parameterisation via PASO)

PARAMETER SETTINGS

The PD2 electronics have push-buttons and a 7 segment display which enable setting the most important parameters. In addition, the digital input can be used as a communication interface, through which, by means of the parameterisation software „PASO-PD2", the complete para-meterisation and diagnostics can be carried out. For this, the Wandfluh USB-PD2 adapter is required. (not included in the delivery)

Attention: During the communication, the digital input cannot be used.

FUNCTION DESCRIPTION

ScL.

rGE.

SoL.

Command value
InP

Command scaling → Fixed command values → Ramp generator → Valve type → Solenoid driver

Solenoid output
Current measurement
Out

Cnd

Error   Number   Enable   Solenoid   Enable   Error
DigInp   DigInp   DigInp   DigInp

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Postfach   Fax   +41 33 672 72 12   Internet: www.wandfluh.com   *Data subject to change*   **1.1-330E** 6/7
CH-3714 Frutigen   *Edition 21 20*

PD2-AMPLIFIER WITH CANopen INTERFACE

Command value scaling
The command value can be applied as a CAN-bus, digital, frequency or PWM signal. The scaling takes place via the parameter „Interface". Furthermore, the command value can be monitored for a cable break. A dead band can also be set.

Fixed command value
There is 1 fixed command value available, which can be selected via the digital input. This function has to be configured before in PASO.
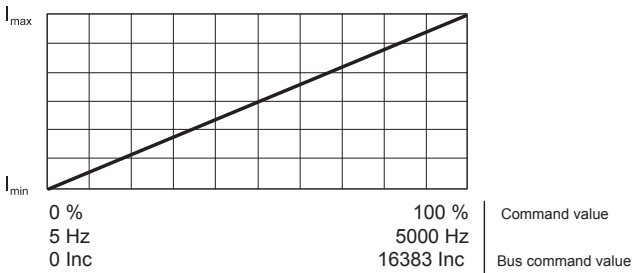
Ramp generator
Two linear ramps for up and down are available which can be adjusted separately.

Valve type
Adjustment possibilities: switching solenoid or proportional solenoid.

Mode of operation „Command value unipolar/bipolar (1-Sol)
Dependent on a command value signal (CAN-bus, digital, frequency or PWM), the solenoid is driven (e.g. 0…16383 CAN-command correspond to 0...100 % command value, 0….+100 % command value correspond to Imin...Imax solenoid driver)

Signal recording
Furthermore, the „PD2" amplifier electronics have a signal recording function. This, by means of PASO, enables the recording of various system signals, such as command value, solenoid current, etc., which can be represented on a common time axis.

Solenoid driver
A Pulse-Width-Modulated current output is available. A dither signal is superimposed, whereby the dither frequency and the dither level are separately adjustable. The minimum (Imin) and maximum (Imax) current can be adjusted. The solenoid output can also be configured as switching solenoid output. In this case, a power reduction can be adjusted.

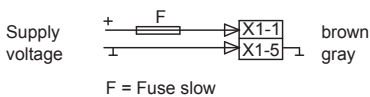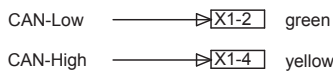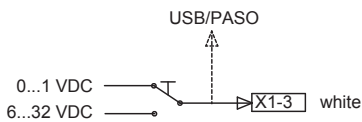### Optimisation of characteristic curve
An adjustable characteristic curve „Command value input – solenoid current output" enables an optimised (e.g. linearised) characteristic of the hydraulic system.

Channel enabling
As per factory setting, the device can be enabled via CAN-bus. This „enable channel" can be set to „bus", „on", „off" or „external" (digital input) via PASO or via menu item.

Hint:
Digital input   if not wired, the state of the digital input is not defined

0 %	100 %	Command value
5 Hz	5000 Hz	
0 Inc	16383 Inc	Bus command value

CONNECTION EXAMPLES

Supply voltage

Supply voltage

X1-1 brown
X1-5 gray

F = Fuse slow

CAN connection

CAN-Low ⟶ X1-2 green

CAN-High ⟶ X1-4 yellow

Digital input as function input

USB/PASO

0...1 VDC
6...32 VDC
X1-3 white

Digital input as USB interface

VCC

PC PASO — USB — USB - Adapter
ON / TX / RX
DIG / OV
brown / white / grey
VCC+ / DigInp / GND — PD2

GND

USB type B   Screwterminal