

**THE ART OF
CONTROL**

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Universal Digital Amplifier Plug-On Version

DAP-22-01

- Plug-On amplifier for 1 proportional valve with one solenoid without feedback
- Directly plugs on to connector form "A" as per EN 175301-803-A / ISO 4400
- Very high max. output current of 3.5 A
- Fully digital PI current controller
- Supply voltage 12 V / 24 V DC
- Optional with CANopen interface
- Adaptation possible to all kinds of proportional valves from all manufacturers
- Optional increased mounting position for improved mounting options
- Analog input with high resolution and accuracy
- Very short cycle time for best dynamic behaviour (best in class)



Easy usage and operation by means of **WINDOWS** program
HCSTool including oscilloscope function!

1 Applications and usage

The digital plug-on amplifiers "DAP-2" are used for the following applications:

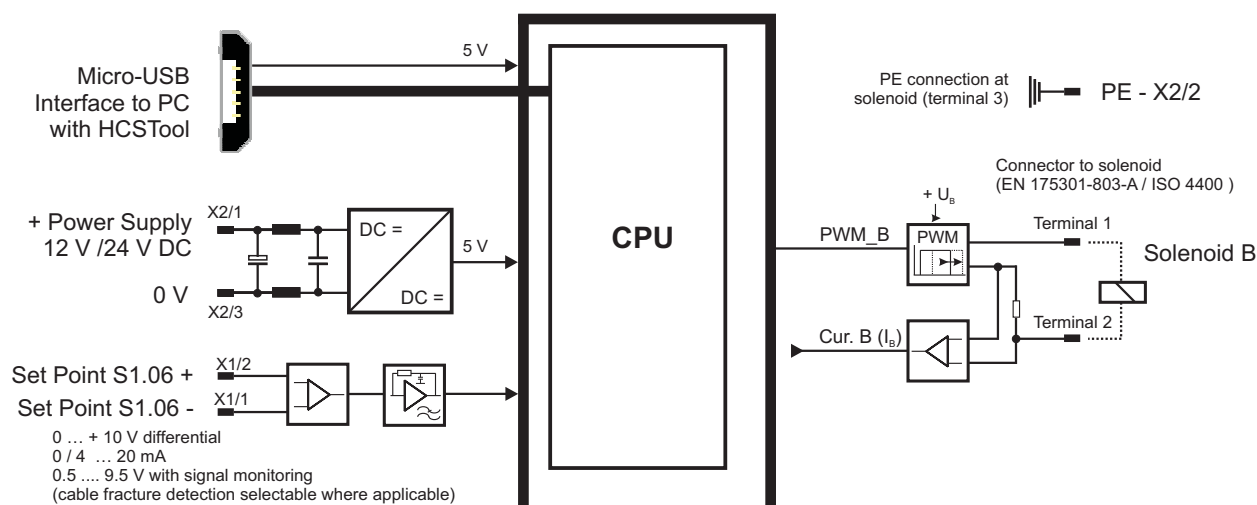
- Controlling of proportional valves (pressure, directional control and flow valves) without feedback.
- To convert set point signals into a current signal to control one proportional solenoid in the aforementioned valves.
- For industrial applications only.

2 Features

- Fully digital plug-on amplifier
- All adjustments and parameter settings possible by means of PC. No on board potentiometers on the unit (user friendly adjustment)
- Flexible and reliable system, use of a modern 16 bit CPU with high power reserve
- Optional available with CANopen bus interface
- Flexibility due to possible software and hardware extensions and options for customer specific requirements
- High reliability and safety through the use of a hardware watch-dog and reset
- Variable settings for all kinds of solenoid systems and max. current adjustable between 0.8 A and 3.5 A
- Fully digital control of output currents with safety monitoring (short & open circuit detection, over current protection)
- Change of selected parameters "on-the-fly" without interference of function; monitoring of display values and 4-channel oscilloscope with **HCSTool** via PC
- High resolution and accuracy for analog set point signal due to a 12-Bit A/D-converter
- Built-in error self resetting and clearing of occurred errors (depending on parameter setting)
- All kinds of customer specific adaptations of hardware and software for specific applications possible. Just ask us and we provide the right solution
- Fast and easy mounting, installation and exchange due to direct mounting on solenoids with connector form "A" as per EN 175301-803-A / ISO 4400
- Additionally (optional) possibility for increased mounting with a 9 mm height adjustment. For challenging space constraints on the valve housing

3 Block diagram hardware

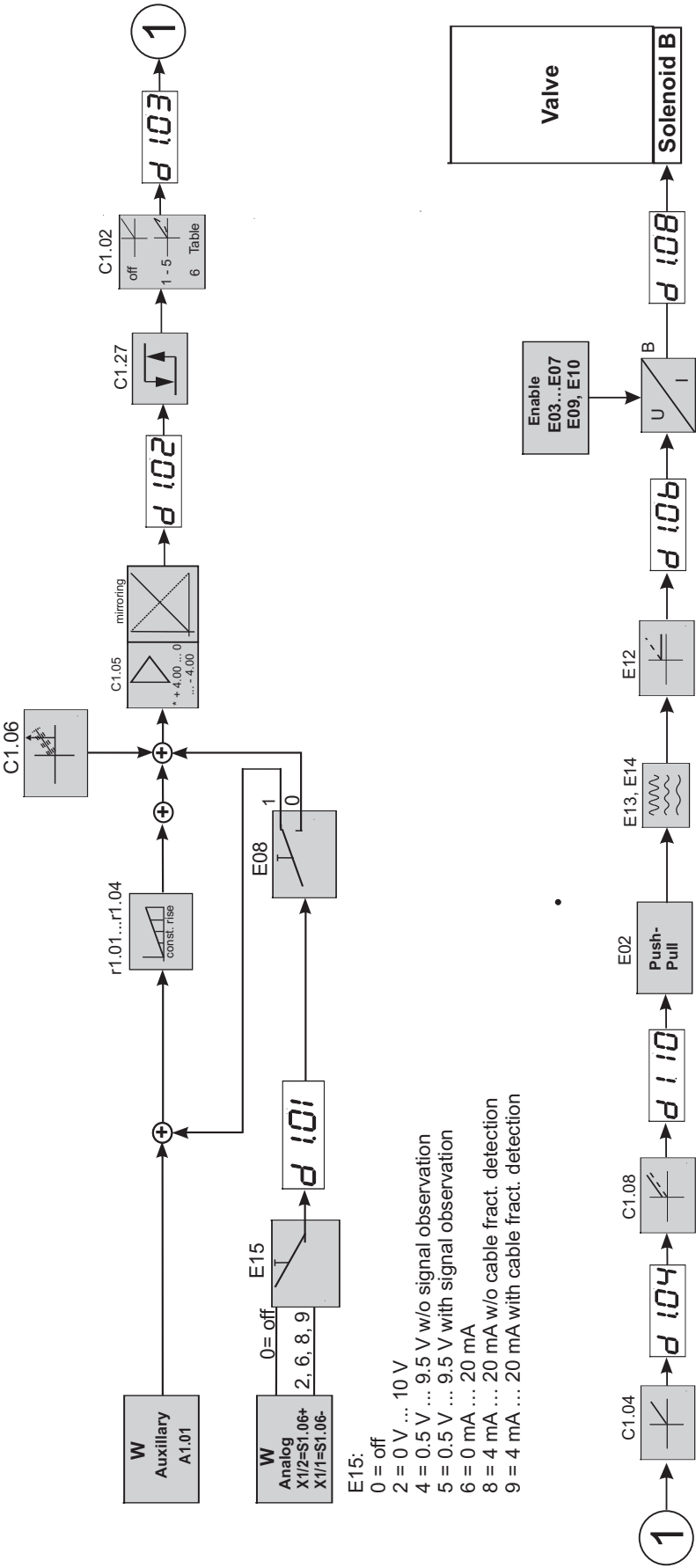
Diagram for version: DAP-22-01-X-S0



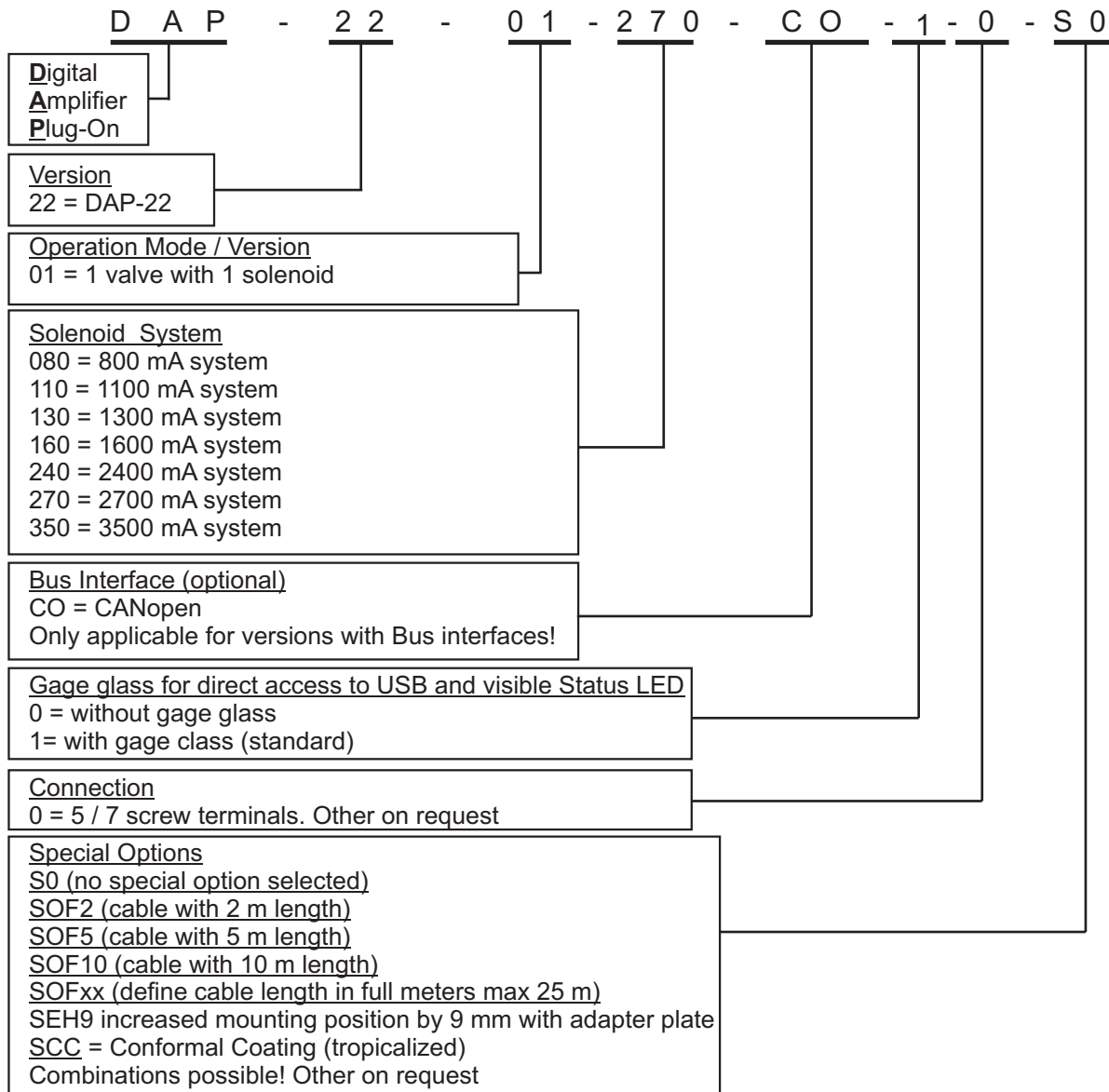
4 Technical data

Feature	Range, characteristics
Supply voltage	12 VDC - 10 %.. 24 VDC + 20 %, residual ripple < 10 % Supply current 10 mA @ 24 VDC (estimated; solenoid deactivated)
Solenoid system selection	0.8 A; 1.1 A; 1.3 A; 1.6 A; 2.4 A; 2.7 A and 3.5 A (intermediate values adjustable)
Power input	Max. 22 VA
Applicable fuse (quick)	2.5 A
Ambiant operating temperature	- 40 °C to + 75 °C for solenoid currents up to 2.7 A and supply voltage full range - 40 °C to + 60 °C for solenoid currents up to 3.5 A and supply voltage $\geq$ 24 V
Humidity (relative air humidity)	max. 95 % non condensing
Max. elevation	2,000 m (mamsl)
Storage temperature	- 45 °C ... 85 °C
IP protection class	IP65
Cable inlet	PG11 cable gland (connectors and other on request)
Connection	Access by removing lid 5 / 7 screw terminals (7 terminals for CANopen version) Insulator: PA 66; color green; Flammability rating: UL94-V0 Metal housing: brass (CuZn); Terminal screw: steel zinc plated "-" slot type Contacts: brass; Current rating: 10 A; Contact resistance: 20 mOhm max UL certified (E315414) and VDE certified (40024437) Solid wire: 26 - 16 AWG / 0.129 - 1.31 mm ² ; Stranded: 26 - 16 AWG / 0.129 - 1.31 mm ² Torque: 3.5 lb/in - 0.4 Nm; Wire stripe length: 5 - 6 mm; Screw: M2.5; Pitch: 5.0 mm Refer also to: https://www.we-online.de/katalog/de/TBL_5_00_213_HORIZONTAL_ENTRY_MODULAR_69121371000X/?sq=691213710003#691213710003
Recommended cable for versions without CANopen	4 strand 0.5 mm ² (max length 20 m) shielded. Lapp cable "ÖLFLEX® CLASSIC 115 CY" article number: 1136754
Recommended cable for versions with CANopen	7 strand 0.5 mm ² (max length 20 m) shielded. Lapp cable "ÖLFLEX® CLASSIC 115 CY" article number: 1136757
EMC	EMC in accordance with EN 61000-6-2: 2019 / EN 55011:2016 + A1:2017 class A and class B. EN 61000-6-4:2007 + A1:2011; EN 61000-6-3:2007 + A1:2011
Housing dimensions	Approx. 104.0 x 44.5 x 59.0 mm (w x h x d) with PG11 cable gland Approx. 78.0 x 44.5 x 59.0 mm (w x h x d) without PG11 cable gland
Housing material	Main housing: PA66-FR in accordance with UL94V0,
Mounting	Housing without ventilation for direct mounting on solenoids with connector form "A" as per EN 175301-803-A / ISO 4400 (ex DIN43650/A), quadratical form Please use attached seal between solenoid and plug-on amplifier
Gage glass for access and indication	Gage glass with G1/4 thread for indication of status by LED Removable for access to USB 2.0 interface
Analog set value (command input)	Selection by means of parameter: 1 differential input, 12 Bit resolution, 0 ... + 10 V; 0.5 V 9.5 V or 0 / 4...20 mA @ 100 Ohm; cable fracture detection selectable where applicable
Solenoid output current	1 output stage for up to 3.5 A; with over-energization
Interface for parameterization	USB 2.0 interface with Micro USB connector
Recommended interface cable	Digitus; USB 2.0, connectors: 1 x USB type A, 1 x USB type micro B, 1.8 m
Bus interface	CANopen
Operation	By means of USB 2.0 and PC with HCSTool Multi color status LED for indication of power and status
PWM Frequency / Cycle time	22 kHz / current controller and analog signal scan time approx. 0.045 msec

5 Block diagram of software functions
Diagram for version: DAP-22-01-X-S0



6 Ordering code

**Ordering code examples:**

Version with CANopen interface for 1.6 A solenoid with gage glass w/o cable:

DAP-22-01-160-CO-1-0-S0

Version w/o bus interface for 0.8 A solenoid w/o gage glass with 18 m cable, extended height (9 mm) and conformal coating:

DAP-22-01-080-0-0-S-OF18-EH9-CC

Remark for cable versions

When selecting cable option the following cable versions are automatically assigned to the version:
 --> For DAP-22 versions without CANopen interface --> 4 strand 0.5 mm² (max length 25 m) shielded. Lapp cable "ÖLFLEX® CLASSIC 115 CY". Lapp article number: 1136754
 --> For DAP-22 versions with CANopen interface --> 7 strand 0.5 mm² (max length 25 m) shielded. Lapp cable "ÖLFLEX® CLASSIC 115 CY". Lapp article number: 1136757

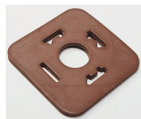
7 DAP-22 with Bus Interface - CANopen features

- Complete CAN-OPEN slave in accordance with standard CIA 301 / V4
- Supports all import Baud rates up to 2 Mbit
- Node number and baud rate by means of vendor specific object
- External bus termination 120 R required
- One receive PDO
- One transmit PDO
- One SDO channel
- Node guarding

8 Accessories and Options

Name	Description
HCSTool	Software for parameterization, operation, monitoring, storage and documentation of adjustments. In English, French and German. Free download: http://www.h-c-s-gmbh.de/download/
DAP-USB-A-USB-Micro-B	Interface cable for communication between PC and DAP-22 for USB interface. 1 x USB type A connector, 1 x USB Micro B connector; approx. 1.8 m cable length
CU/DMA	Commissioning unit for DMA. Can also be used in conjunction with DAP-22. For Commissioning, servicing, testing and trouble shooting etc. at machines, systems, for laboratories and for training
4 Strand Cable 7 Strand Cable	4 / 7 strand 0.5 mm ² (max length 25 m) shielded. Lapp cable ÖLFLEX® CLASSIC 115CY 4 strand for versions w/o CANopen and 7 strand for version with CANopen interface
Gage Glas	G1/4 thread for indication of status by LED
Seal	For connector form "A" (EN 175301-803-A / ISO 4400) quadratical form
Cable Gland	For PG11 thread incl. seal
Lid	For version with gage glas but w/o gage glass
Set of Screws	4 x for lid; 1 x central screw with washer

Not to scale!

Commissioning Unit	DAP-USB-A-USB-Micro	HCSTool
		
4 / 7 strand cable 2; 5; 10; 25 m	Gage Glas	Seal
Picture n/a		
Cable Gland	Lid	Set of Screws
		

9 Our distributors and partners

<https://www.h-c-s-gmbh.de/en/sales-partners>

9 Declaration of conformity

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EC Declaration of Conformity in accordance with EMC Directive 2014/30/EU

**HCS Hydraulic Control Systems GmbH
Neuffener Str. 29
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hereby declares that the product described as follows complies in terms of its design, as well as in the version placed in the stream of commerce by us, with the relevant requirements of the directive. This declaration is void in the event of any change to the product without our written agreement.

Product:	Digital Amplifier Plug-On
Intended use:	Automation systems (industrial applications)
Model:	<u>DAP-22-x</u>
Rated voltage:	24 V DC; SELV
Rated power:	max. 50 VA
Protection class:	III
Protection degree:	IP65 (when plugged-on)
Relevant EU Directive:	EMC Directive 2014/30/EU
Applicable EU Standards:	
Emissions:	EN 55011:2016 + A1:2017 class A and class B EN 61000-6-4:2007 + A1:2011; EN 61000-6-3:2007 + A1:2011
Immunity:	EN 61000-6-2: 2019
Date/manufacturer's signature	
01.01.2024	
Details of signatory:	Dipl.-Ing. (FH) Peter Deuschle (General Manager)

Hydraulic Control Systems GmbH Geschäftsführer / General Manager: Dipl.-Ing. (FH) Peter Deuschle + Dipl.-Ing. (FH) Volker Bremauer
Sitz / Head Quarter: D-72636 Frickenhausen Amstgericht / Register Court: AG Stuttgart HRB 224899