

**THE ART OF
CONTROL**

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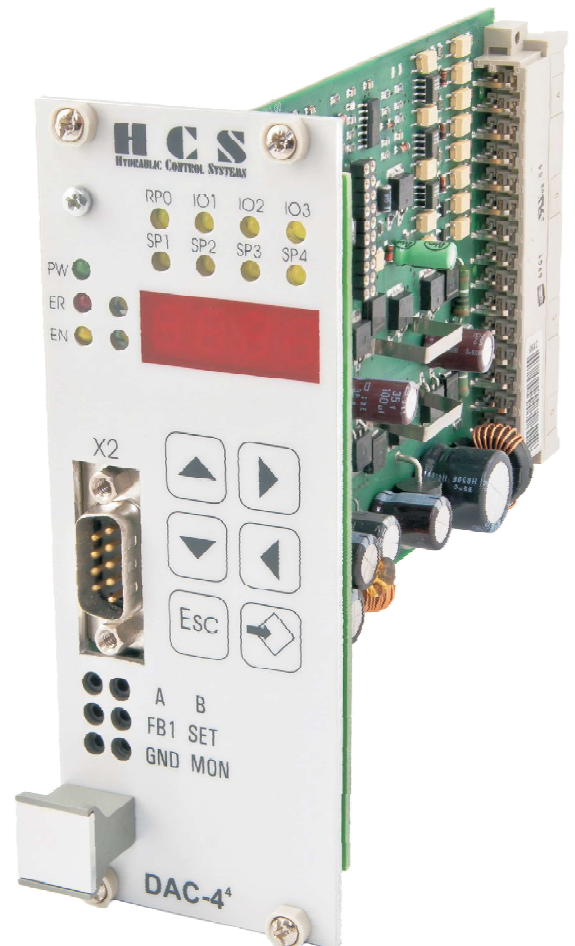


Universal Digital
Amplifier and Controller

DAC-4

**VERSIONS FOR OPEN AND CLOSED LOOP APPLICATIONS
FOR ALL KINDS OF VALVES W/O FEEDBACK SYSTEMS**

- ▶ **Amplifier for 1 or 2 proportional valves with or without feedback**
- ▶ **Full digital P-PID-Controller for 1 or 2 closed loop systems**
- ▶ **Universal usage for hydraulic, pneumatic and other kinds of applications**
- ▶ **Multiple analoge and digital in- and outputs**
- ▶ **Controlling made easy: Position, pressure, velocity, force, rpm, acceleration, temperature, etc.**
- ▶ **Easy usage / operation by means of WINDOWS program **HCSTool****
- ▶ **NEW: Now also with LVDT interface**
- ▶ **NEW: Now also with PROFIBUS interface**



1 BOARD WITH 11 DIFFERENT ARCHITECTURES (OPERATION MODES)
FOR ALL KINDS OF APPLICATIONS IN HYDRAULIC AND
PNEUMATIC AND FOR OTHER AUTOMATION APPLICATIONS

1 Applications and usage

The amplifier and controller boards series DAC-4 are used for:

- Control of proportional valves of all kinds with and without electrical feedback: proportional directional valves, direct and pilot operated; flow control valves; pressure limiting and pressure reduction valves; cartridge- and servovalves
- Control of process values within hydraulic and other machines or systems: position, velocity, pressure, rpm, torque, force or load, temperature, etc.
- Flow and pressure control for pumps (load limiting function and feedback for spool position of control valve optional) on request
- Simultaneous control of two process values: e.g. P/Q-control and pump controller, control of two pressures, control of pilot and mainstage spool position, cascaded controllers, control von process values without usage of valves (subsequent electronics, e.g F/U converters)
- Flexibility due to possible hardware and software extensions and options for customer and application specific requirements (e.g. bus-interface, special output stages, etc.)
- Variable settings for all kinds of solenoid systems and sensor signals
- Change of selected parameters "on-the-fly" without interference or interruption of closed loop system; monitoring of display values via PC and program **HCSTool**
- High resolution and accuracy for analogue set points and feedback signals due to a 14-Bit A/D-converter
- D/A-converter with 2 analog outputs to perform controller functions and / or enable subsequent electronic devices and monitoring (± 10 V, 12 bit resolution) also for ease of commissioning and trouble shooting (monitor signal for internal values)

2 Features

- Fully digitized amplifier and controller
- All adjustments and parameter setting possible by means of keypad and display --> no on-board potentiometers or jumpers)
- Flexible and reliable system; use of a modern 16 Bit CPU with high power reserve
- Flash-EPROM technology for easy software update or modifications from PC via RS232 interface
- Several versions with and without keypad and different functions are available
- All kinds of customer specific adaptations of hardware and software for special applications are possible. Just ask us and we provide the right solution
- **NEW:** now also available with LVDT interface (1 or 2) for special feedback applications
- **NEW:** now also available with PROFIBUS DP interface

3 Technical data


Feature	Range, characteristics
Supply voltage	(12 V DC) ^{*1} 18 ... 30 V DC, residual ripple < 10 % (max. 50 VA power draw)
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
Control voltage for digital inputs	24 V +/- 10 %, residual ripple < 10 %, current draw per input < 20 mA
Ambient temperature	0° C ...50° C (others on request); storage - 20° C ... 60° C
Connector	In accordance with DIN 41612, 48 pol form F gold plated
EMC	In accordance with the applicable industrial standards (CE - conformity) ^{*3}
Dimensions front panel / PCB	50,5 x 128,4 mm; 10TE / 3 HE; 100 x 160 mm euro format
Analogue set values (inputs)	3 inputs with 14 Bit resolution (1 x differential; 2 x single ended; 0 ... 10 V, 0 ... 20 mA)
Analogue feedback U/I	2 inputs with 14 Bit resolution (current and voltage with wide range)
Analogue feedback LVDT ^{*2}	1 or 2 inputs with; detailed information on request
Digital inputs	8 inputs (S1.01 ... S1.04, ENABLE, RAMP 0, DIRECTION +, DIRECTION -)
Solenoid current (output)	2 output stages, each for up to max. 3,5 A (with over-energ. and quick de-energization)
Analogue / monitor output	Each with 12 Bit resolution, 0 ... 10 V
Digital outputs	2 outputs, voltage level 0 V / 24 V, 10 mA (ERROR, COMPARATOR)
Test jacks	Current A and B, sensor 1 (Fb1) set value (S1.06), Monitor and GND
Auxiliary voltage	+/- 10 V, max. Output 10 mA
Optional digital I/O signals	3 for variable usage, voltage level 24 V or 5 V
Interface 1	RS232, 9-pol SUB-D-conncektor at face plate (also available at rear connector)
Interface 2 ^{*2}	PROFIBUS DP; details see next page
Display and keypad ^{*2}	4-digit 7-segment display, 6 keys, status LED's
PWM frequency, cycle times	18 kHz for current controller, inner closed loop 0,22 msec, outer closed loop 0,44 msec

*1: on request

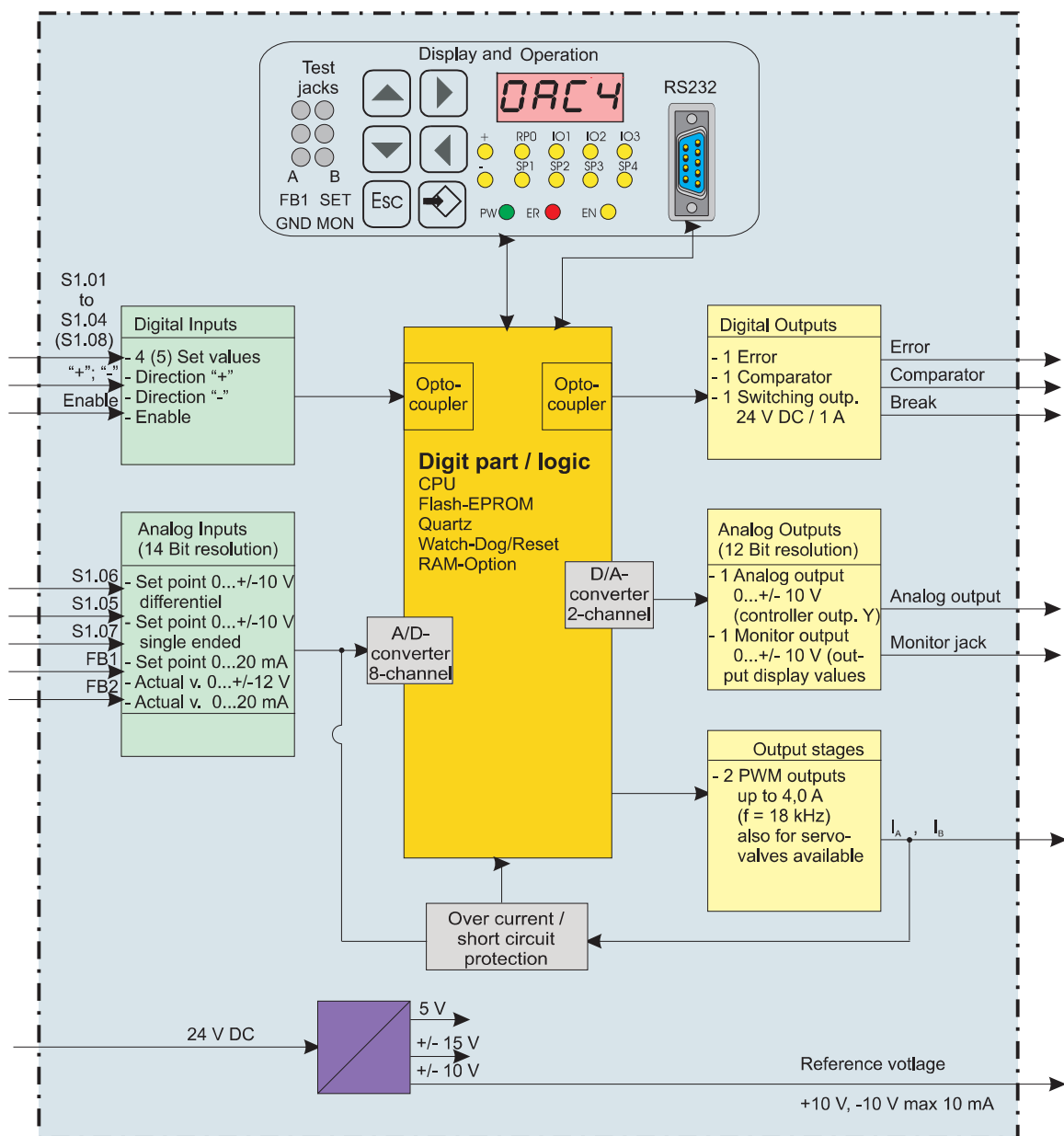
*2: limited to some versions

*3: details on request

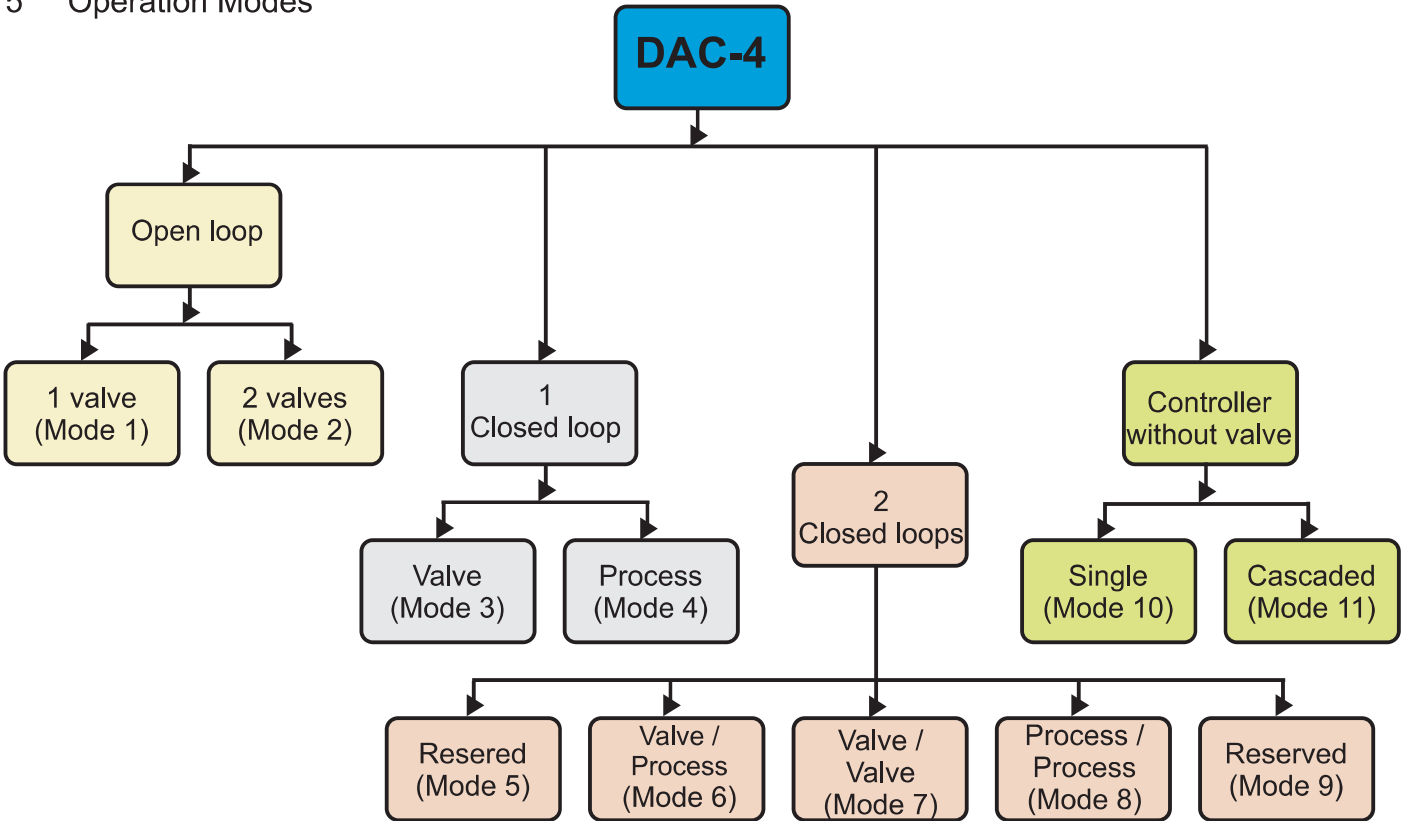
3 Technical data

Feature	Range, characteristics
Supply voltage	Via DAC
Temperature ranges, EMC, Mounting/housing	Refer to page 2
PROFIBUS-DP 	<ul style="list-style-type: none"> - Approved by PNO - Supports PROFIBUS-DP Slave in accordance with IEC 61158 - Supports PROFIBUS DPV1 - Maximum 244 Byte in-/output data - Supports up to 12 Mbaud (autodetect) - Electrical isolated and opto-decoupled
Connection / Type of connector	RS485, Sub-D 9-pole female
Status signals	LED „Buserror“ (red): DAC-4 error LED is used
Address selection	DIP switch 1- 8, each on/off

4 Block diagram Hardware

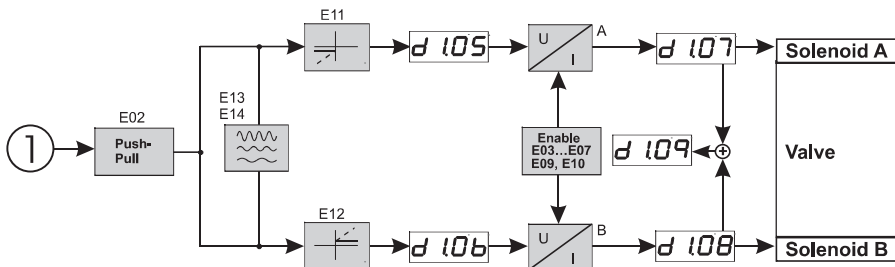
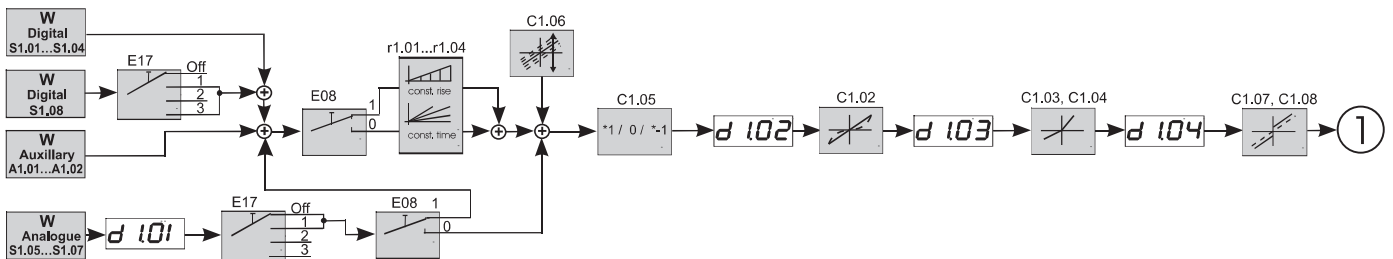


5 Operation Modes

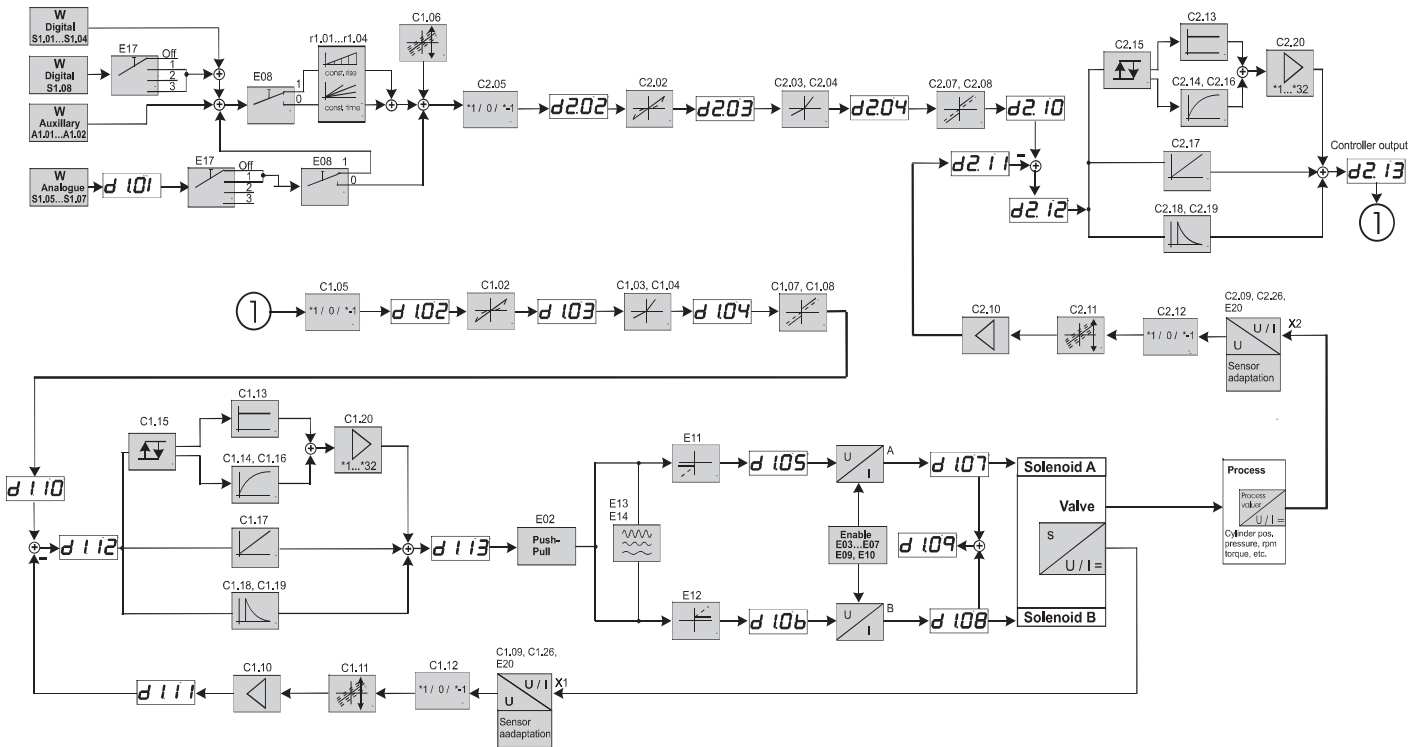


6 Example for Block Diagrams of Software Functions

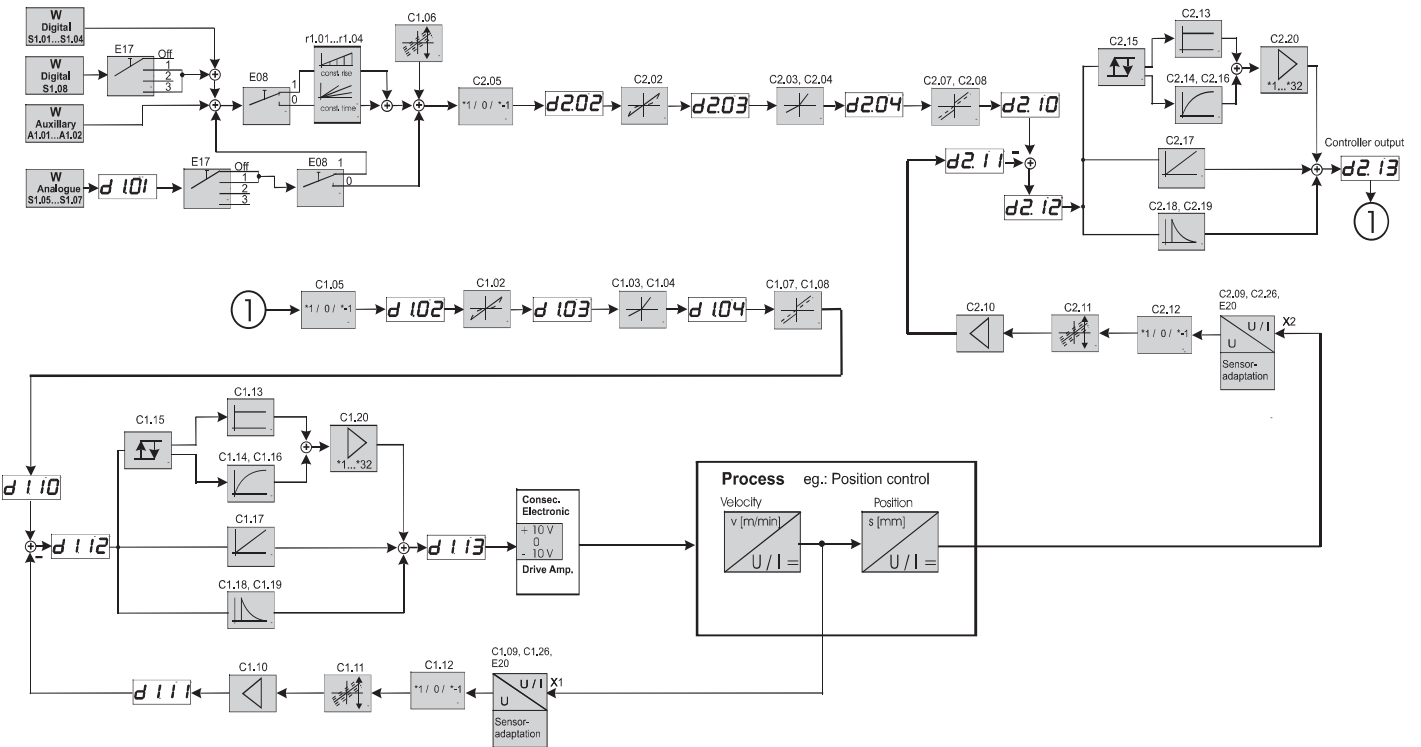
6.1 Operation Mode 1; one valve, open loop



6.2 Operation Mode 6; Valve and process controller

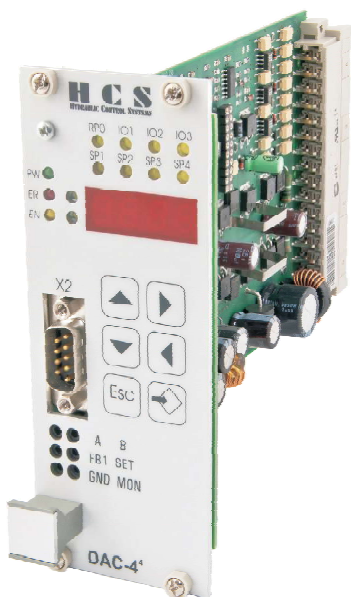


6.3 Operation Mode 11; cascaded controller without valve



7 Board Versions: General Features and Equipment
 For details of hardware features and functions see page 7

DAC-44



DAC-44-XLT



DAC-42-XLT



DAC-44-x-LVDT



DAC-44-x-PBDP



DAC-42-XXLT

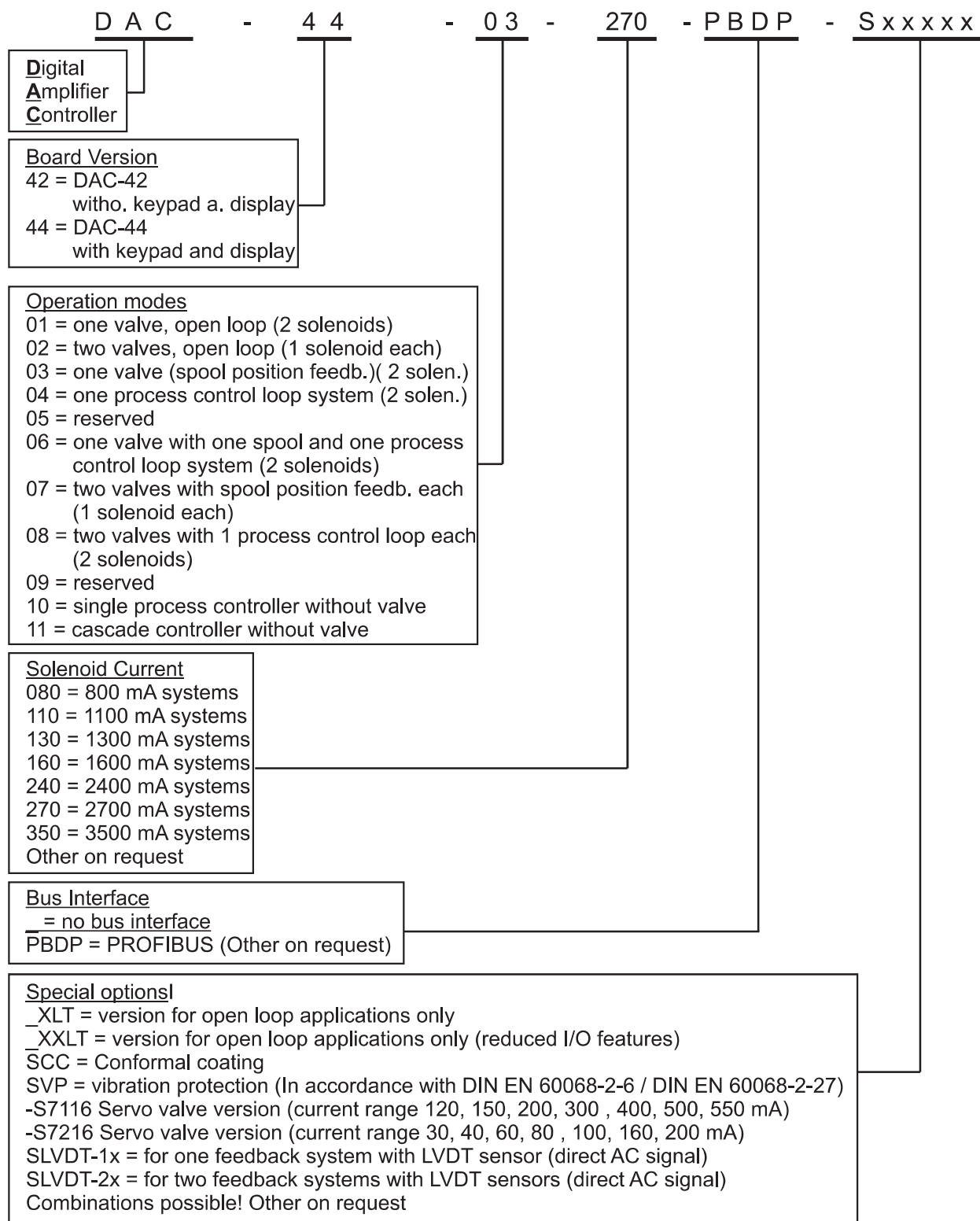


8 Board Versions: Hardware Features and Functions (Features for special versions not included)

Features / Functions	DAC-4 Versions				
	DAC-44 or DAC-42	DAC-44-x- SLVDT-x	DAC-44-x- -PBDB	DAC-44-XLT or DAC-42-XLT	DAC-42 -XXLT
Analogue SW 5	Yes *1	Yes *1	Yes *1	Yes *1	No
Analogue SW 6	Yes	Yes	Yes	Yes	Yes
Analogue SW 7	Yes	Yes	Yes	No	No
Analogue Actual value 1	Yes	No	Yes	No	No
Analogue Actual value 2	Yes	No	Yes	No	No
Analogue Actual value 3	Yes	No	Yes	No	No
LVDT actual value 1	No	Yes	No	No	No
LVDT actual value 1 (only for "-2x")	No	(Yes)	No	No	No
Digital Input +	Yes	Yes	Yes	Yes	No
Digital Input -	Yes	Yes	Yes	Yes	No
Digital Input S1	Yes	Yes	Yes	Yes	No
Digital Input S2	Yes	Yes	Yes	Yes	No
Digital Input S3	Yes	Yes	Yes	Yes	No
Digital Input S4	Yes	Yes	Yes	Yes	No
Digital Input DIO1	Yes	Yes	Yes	No	No
Digital Input DIO 2	Yes	Yes	Yes	No	No
Digital Input DIO 3	Yes	Yes	Yes	No	No
Digital Input Reset Ramp	Yes	Yes	Yes	Yes	No
Digital Input Enable	Yes	Yes	Yes	Yes	Yes
Digital Output Error	Yes	Yes	Yes	Yes	Yes
Digital Output Comparator	Yes	Yes	Yes	No	No
Digital Output Break (24 V max. 1 A)	Yes	Yes	Yes	No	No
5 V Transistor for ABG	Yes	Yes	Yes	No	No
Test Jacks	Yes	Yes	Yes	No	No
Piggy-Back-Connector for options	Yes	Yes	Yes	No	No
Connector for Faceplate	Yes	Yes	Yes	Yes	No
RS232 Interface	Yes	Yes	Yes	Yes	Yes
PPROFIBUS Interface	No	No	Yes	No	No
Ref. Output + - 10 V	Yes	Yes	Yes	Yes	No
Analogue Output	Yes	Yes	Yes	No	No
Monitor Output	Yes	Yes	Yes	No	No
Operation by means of PC	Yes	Yes	Yes	Yes	Yes
Plastic faceplate (3 TE)	No	No	No	No	Yes
Aluminium faceplate only (10 TE)	For DAC-42	No	No	For DAC-42	No
7-Segment-Display / Keypad (10 TE)	For DAC-44	Yes	Yes	For DAC-44	No

*1: Current Input: optional on request

9 Ordering code (not all combinations available!)

**Ordering code examples:**

1.) Version with keypad and display for a closed loop application (process loop control) with 2.7 A solenoid and conformal coating

DAC-44-04-270-SCC



2.) Version without keypad and display for a open loop (only) application 0.8 A solenoid

DAC-42-01-080-XLT

10 Accessories and Options

Name	Description
HCSTool	Software for parameterization, operation, monitoring, storage and documentation of adjustments. With 4-channel oscilloscope function. In E / F/ DE on CD. Download from internet: http://www.h-c-s-gmbh.de/download/
DAC-4-PC-2xDS9F-2m	Interface cable for communication between PC and DAC-4 for Rs232 interface. 2 x Sub-D 9-pole connector female with approx. 2,5 m cable
USB-RS232-DS9F-2,5m	As above but w. USB-adaptor. Sub-D 9-pole connector fem. w. approx. 2,5 m cable
EKB-04	EKB-04 Handheld keypad and display unit for parameter setting and copying
CU/DAC-4	Commissioning unit for DAC-4. For adaptation of one DAC-4 board. For Commissioning, serviceing, testing and trouble shooting etc. at machines, systems, for laboratories and for training. In metal case with handles including power supply
SKT48F	Card holder for mounting of single board; with connector form F, 48-pole
BP48F	Back-Plane for easy and quick wiring; with connector female form F 48-pole For usage in 19"-Rack systems
MR	Modul-Rack for protected mounting of single boards (10TE)
MR/BP48F	Modul-Rack completely mounted with Back-Plane
DAC-4 customer specific and special versions	Brand-Labeling of face plates, special software for application specific functions; special hardware options and versions; on request
Others	Customer specific documentation and program HCSTool; on request

Not to scale!

Card Holder	Back-Plane	Module-Rack	Commissioning Unit
			
EKB-4	Interface Cable	Interface Cable	HCSTool
