

**THE ART OF
CONTROL**

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HCS
HYDRAULIC CONTROL SYSTEMS

Universal Digital Module Amplifier
for DIN Mounting Rail (Top-Hat Rail)

DMA-22-01/02

VERSIONS FOR OPEN LOOP APPLICATIONS

- ◆ Amplifier module for 1 or 2 proportional valves without feedback
- ◆ Both output stages individually controllable by means of two independent analogue inputs (version dependent)
- ◆ Optional with bus interface (PROFIBUS, PROFINET, ETHERNET/IP, CANopen) multi module configurations available
- ◆ Adaptation possible to all kinds of proportional valves from all manufacturers
- ◆ Full digital PI current controller for both output stages
- ◆ Universal usage for hydraulic, pneumatic and other applications
- ◆ Analogue inputs with high resolution and accuracy
- ◆ Extreme short cycle time for best dynamic behaviour (best in class)
- ◆ Easy usage and operation by means of WINDOWS program **HCSTool**
NEW: Now including oscilloscope function!
- ◆ **NEW:** Low cost version available (DMA-SXXLT)
- ◆ **NEW:** Version for On/Off valves available (DMA-SOnOff)

PROFI[®]
BUS **PROFI[®]**
NET



1 Applications and usage

The amplifier modules DMA-2 are used for:

Control of proportional valves of all kinds (only without feedback): proportional directional (direct and pilot operated), flow control, pressure limiting and pressure reduction valves, cartridge and servo valves (with torque motor on request)

2 Features

- Fully digitized amplifier module
- All adjustments and parameter settings possible by means of PC. No on board potentiometers on the module (user friendly adjustment)
- Flexible and reliable system, use of a modern 16 bit CPU with high power reserve
- Optional available with several bus interfaces
- Flexibility due to possible software and hardware extensions and options for customer specific requirements
- Flash-EPROM technology for easy software update or modifications from PC via RS232 interface
- Variable settings for all kinds of solenoid systems
- 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 analogue set point signal due to a 12-Bit A/D-converter
- Two output stages can be used either for one proportional valve with two solenoids or for two valves with one solenoid each due to two independent analogue inputs
- 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 top-hat rail (DIN mounting rail) in accordance with EN50022 and connectors with screw terminals or optional cage clamp technology system COMBICON
- Version for servo valves with torque-motors available
Current ranges from 50 - 230 mA

New versions available:

- Low cost version without digital inputs as driver amplifier e.g. for multi-module bus versions or where only limited input functionality is requested.

other than that full functionality from DMA still available with command input voltage or current selectable

--> Version DMA-22-01-x-SXXLT

- Version for applications with On/Off valves
Controlling on&off valves with the full performance and monitoring features of a fully digital amplifier unit.



- --> Version DMA-22-01-x-SOn/Off

Key advantages:

- - Full digital control of output currents with safety monitoring (short & open circuit detection, over current protection)
- Max. current adjustable between 0.8 A and 3.5 A
- Peak and constant current can be defined independantly
- Transition between peak and constant current adjustable
- Pre-energization adjustable
- Universal usable for 1 valve with two coils or two valves with one coil each
- **Can be combined with all HCS Bus interfaces**
--> **PROFIBUS, PROFINET, ETHERNET/IP, CANopen**
for full control and monitoring possibilities.

On/Off valves go IOT!

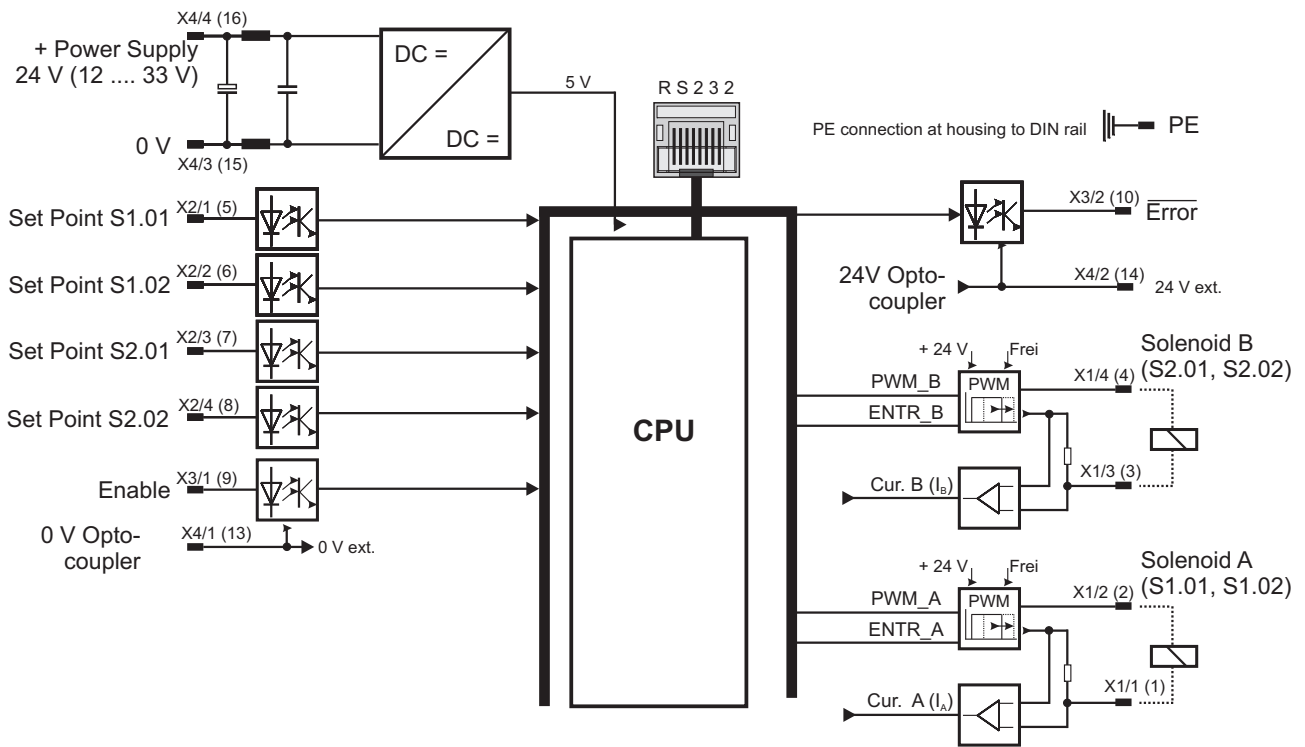
3 Technical data (deviations depending on versions possible)

Feature	Range, characteristics
Supply voltage	Unom = 24 V (12 ... 33V) DC, residual ripple < 10 % (max. 50 VA power draw) The modul can also be used on supply voltage of Unominel = 12 V (> 9,5 V)
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)
Control voltage for digital inputs	(12) 24 V +/- 10 %, residual ripple < 10 %, current draw per input < 20 mA
Temperature ranges	Ambient: 0° C ... 50° C (other on request) storage - 20° C ... 60° C
Connection	16 pole (4 x 4); screw terminals for 0.2 - 2.5 mm ² (AWG 24 -12) or cage clamps; for detailed technical data refer to Phoenix Contact Combicon Product Catalog
Type of connector	Phoenix Combicon connector with screw terminals, type: MSTBT 2,5/ 4-ST Also available on request: terminals with cage clamp, type: FKCT 2,5/4-ST
EMC	EN 61000-6-2: 2005 / EN 61000-6-3:2007 + A1:2011; EN 61000-6-4:2007 + A1:2011. Germanischer Lloyd VI-7-2 (EN 60945) on request
Analogue set value (input)	DMA-22-01: 1 differential input, 12 bit resolution, 0 ... +/- 10 V / 0 ... 20 mA / 4 ... 20 mA DMA-22-02: 2 differential inputs, 12 bit resolution, 0 ... +/- 10 V / 0 ... 20 mA / 4 ... 20 mA
Digital inputs (version dependant)	Version DMA-22-01: 5 inputs, opto-coupled (S1.01, S1.02, S1.03, S1.04, ENABLE) Version DMA-22-02: 3 inputs, opto-coupled (S1.01, S2.01, ENABLE)
Solenoid current (output)	2 output stages, each for up to max. 3,5 A (with over-energ. and quick de-energization); max. combined current = 4,5 A
Digital outputs	1 output opto-coupled, voltage level 0 V / 24 V, 10 mA (ERROR)
Reference output (optional)	1 Reference output 10 V (max. 20 mA), short circuit protected; e.g. supply for joystick
Interface 1	RS232, 6-pole female RJ45/6 connector
Interface 2 *1 (only one available per module) Versions with Bus-Interface only!	PROFIBUS-DP: RS485, Sub-D 9-pole female PROFINET (in/out): 2 x RJ45 (integrated switch) ETHERNET/IP: RJ45 CANopen: Sub-D 9-pole male  
Status signals	3 status LED's at front (Run/OK; Enable, Error)
PWM frequency, cycle times	Approx. 22 kHz PWM frequency, cycle time max. 0,17 msec
Mounting/housing	Mounting: top-hat rail (mounting rail) in accord. with EN50022 with integrated PE contact Housing configuration: ventilated (IP20) Material: PA 66 - FR (blue); flammability in accordance with UL94V0 Dimensions approx.: (w x h x d) 22,5 x 100 x 114 mm Bus single module version: dimensions approx.: (w x h x d) 45 x 100 x 114 mm Bus multi module version: dimensions approx.: (w x h x d) ((n+1)x22,5) x 100 x 114 mm; n = number of slaves (modules)

*1: For more detailed information regarding DMA with bus-interfaces please refer to the accoding data sheet!

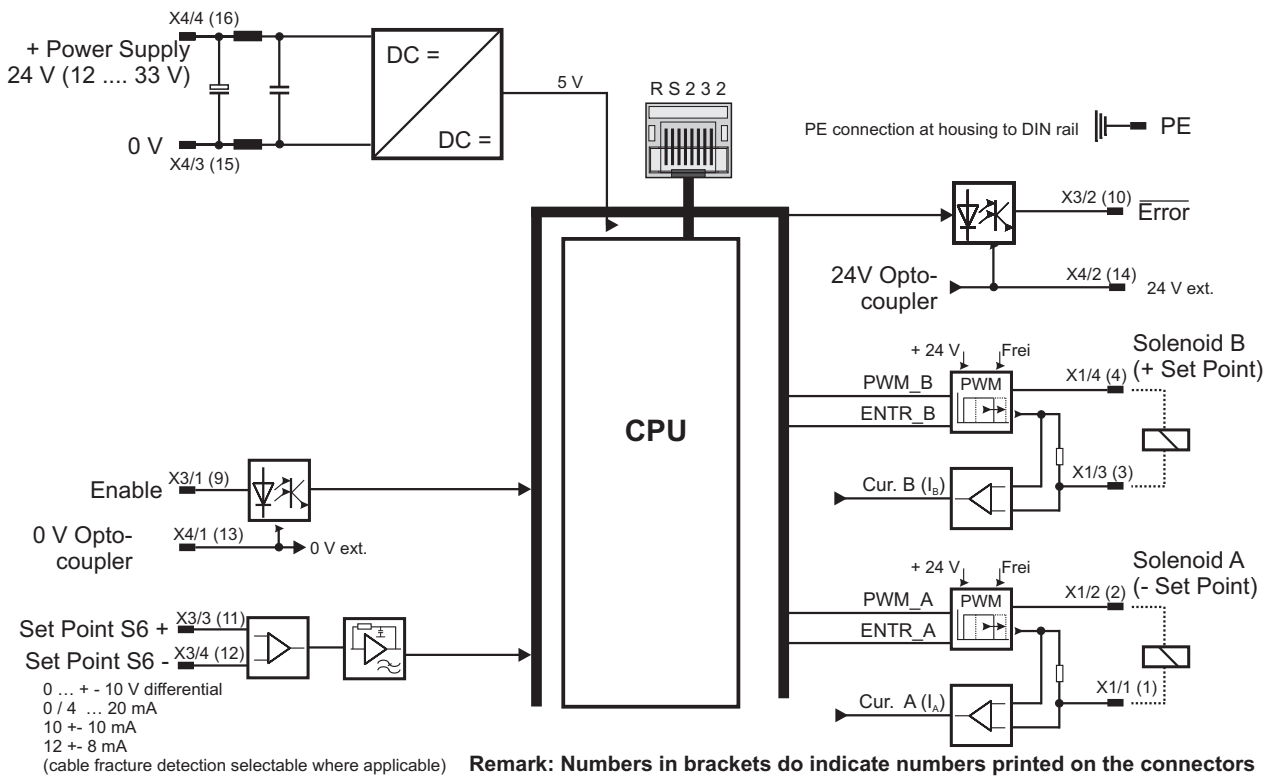
4 Block diagram hardware

Diagram for version: DMA-22-02-xxx-SOnOff; Operation Mode: 01



Remark: Numbers in brackets do indicate numbers printed on the connectors

Diagram for version: DMA-22-01-xxx-SXXLT; Operation Mode: 01



Remark: Numbers in brackets do indicate numbers printed on the connectors

4 Block diagram hardware

Diagram for version: DMA-22-01-xxx-S0; Operation Mode: 01

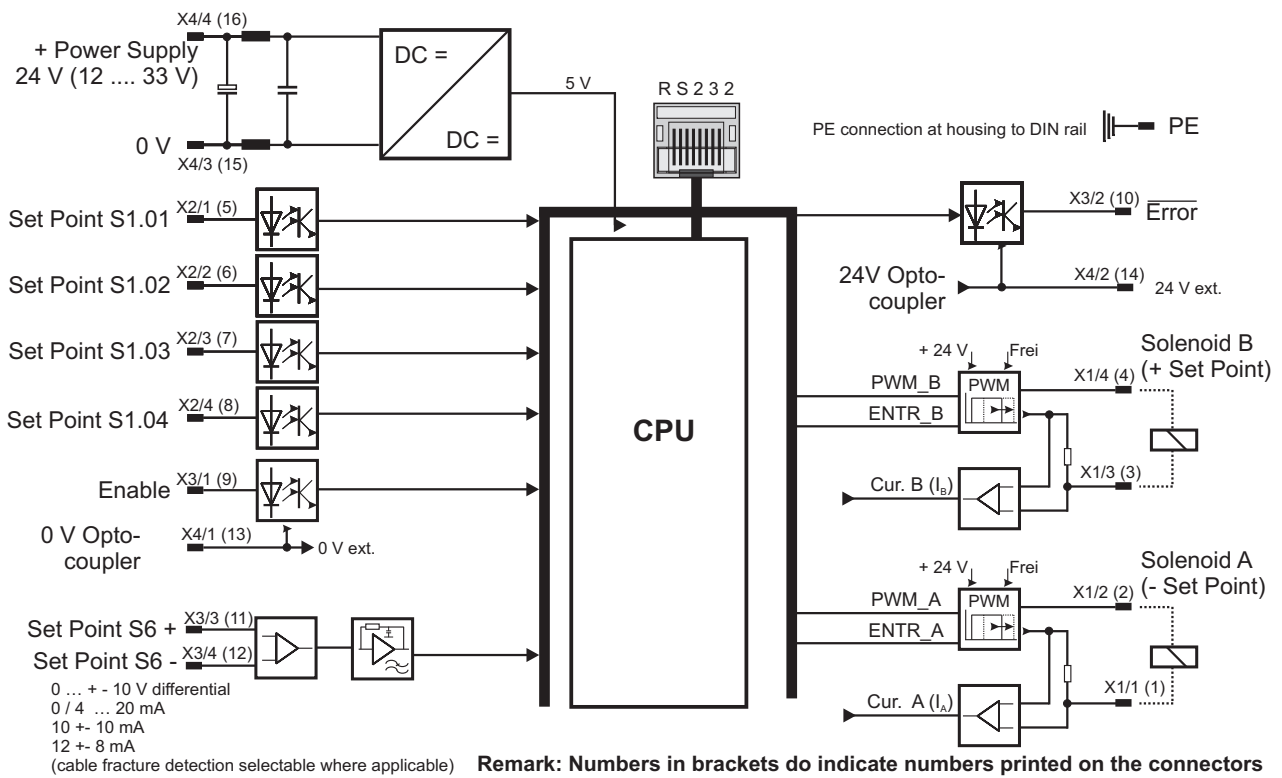
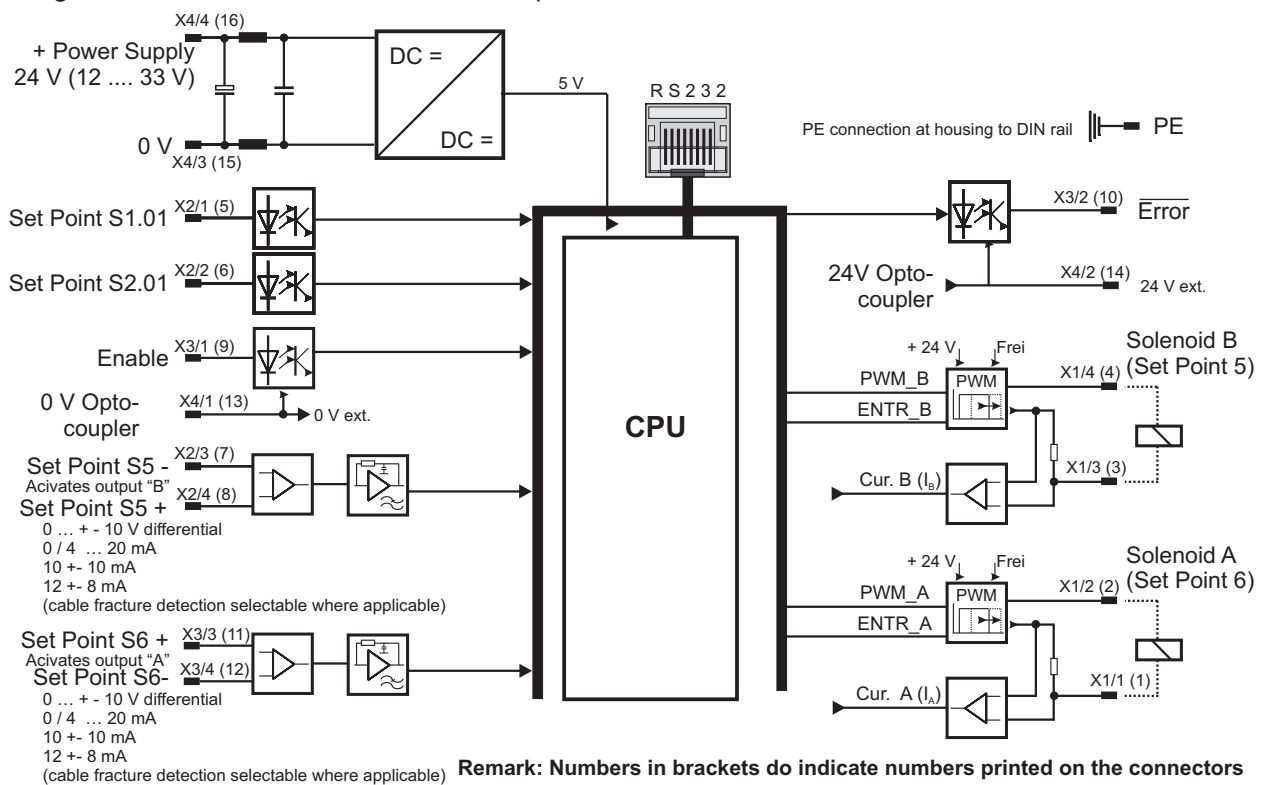


Diagram for version: DMA-22-02-xxx-S0; Operation Mode: 02



4 Block diagram hardware

Diagram for version: DMA-22-01-xxx-S10VRef; Operation Mode: 01

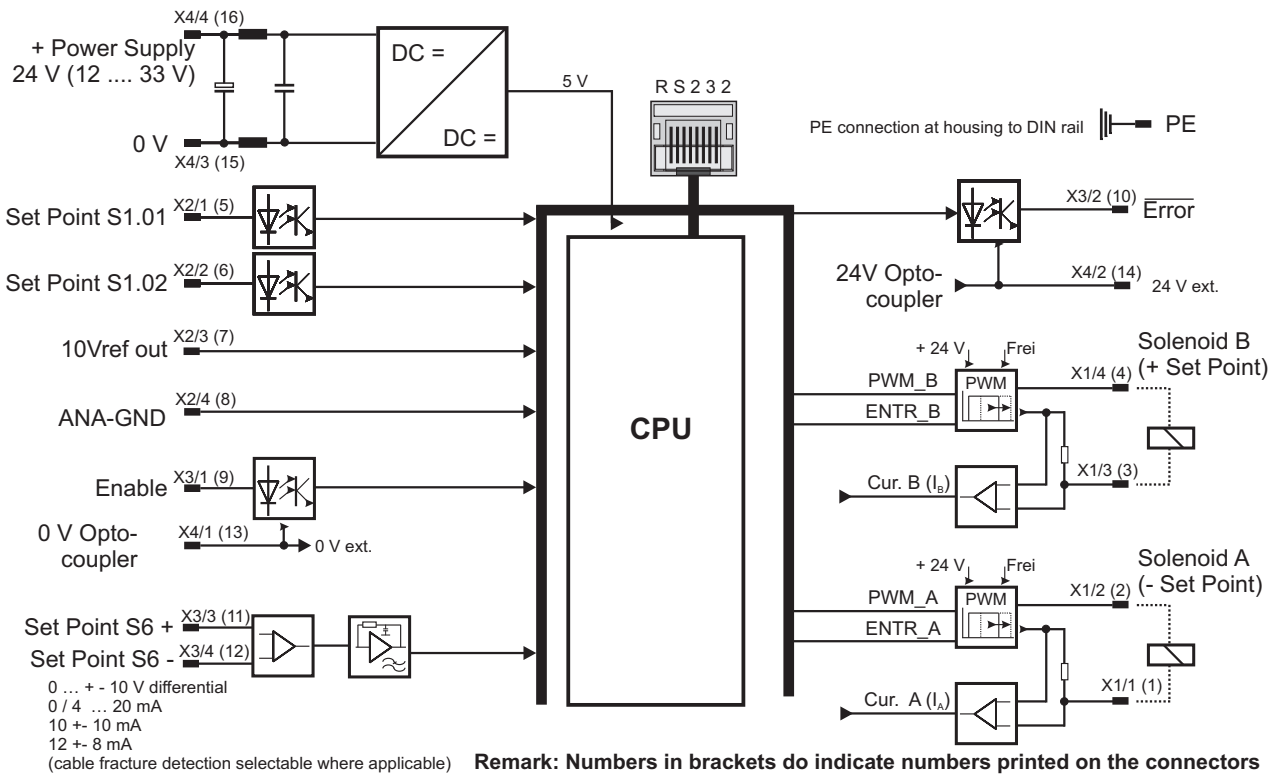
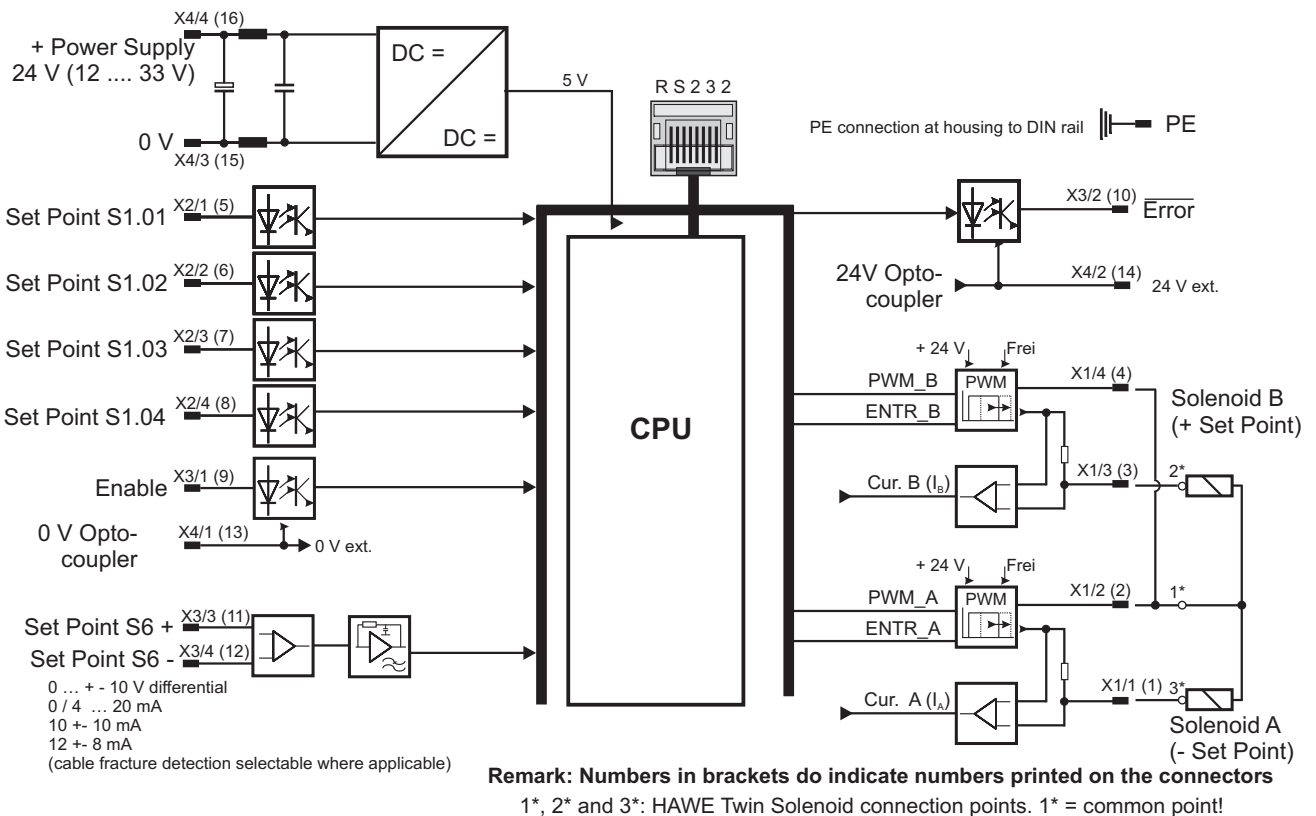
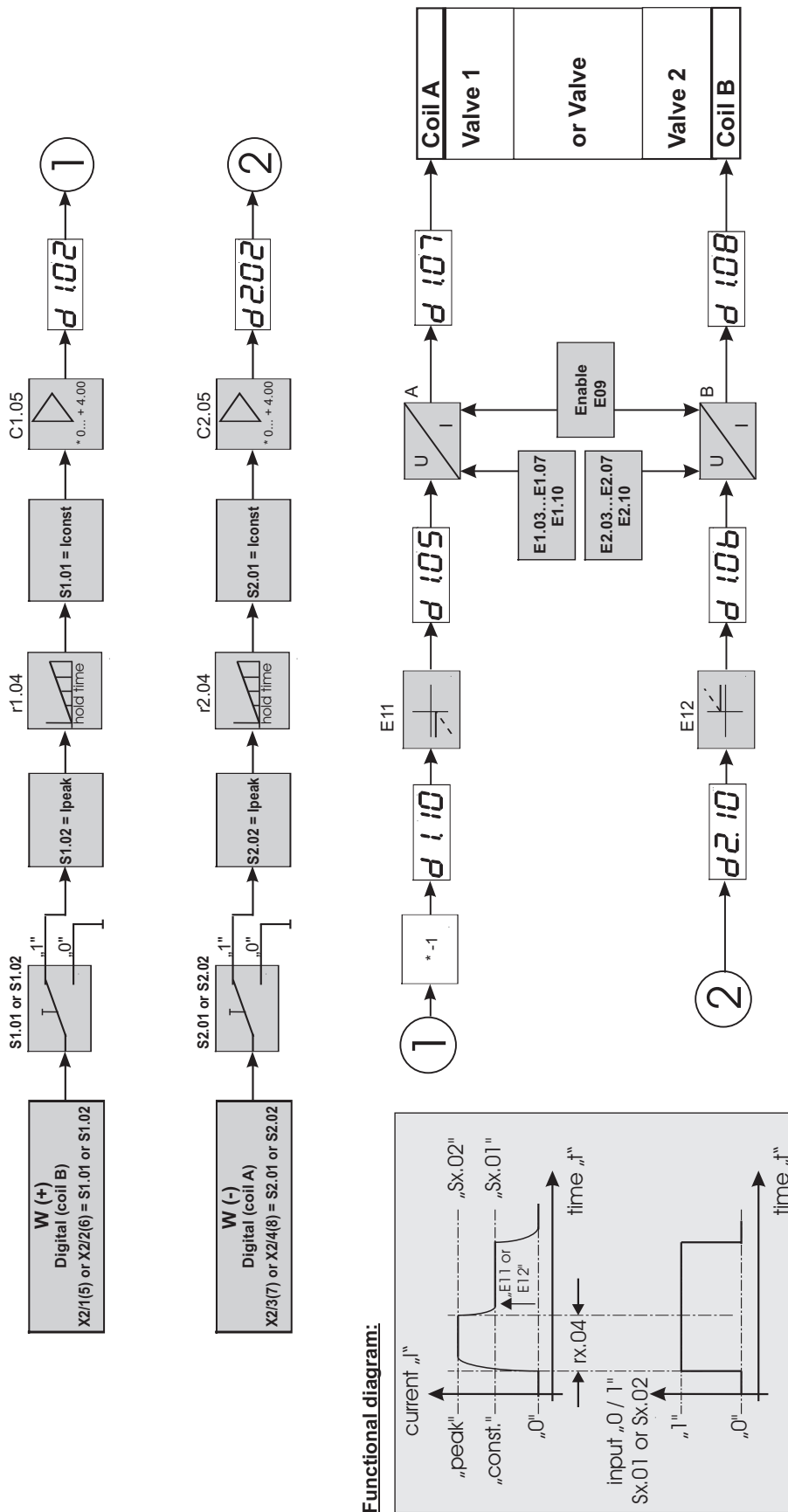


Diagram for version: DMA-22-01-xxx-SHAWE/SHPR; Operation Mode: 01



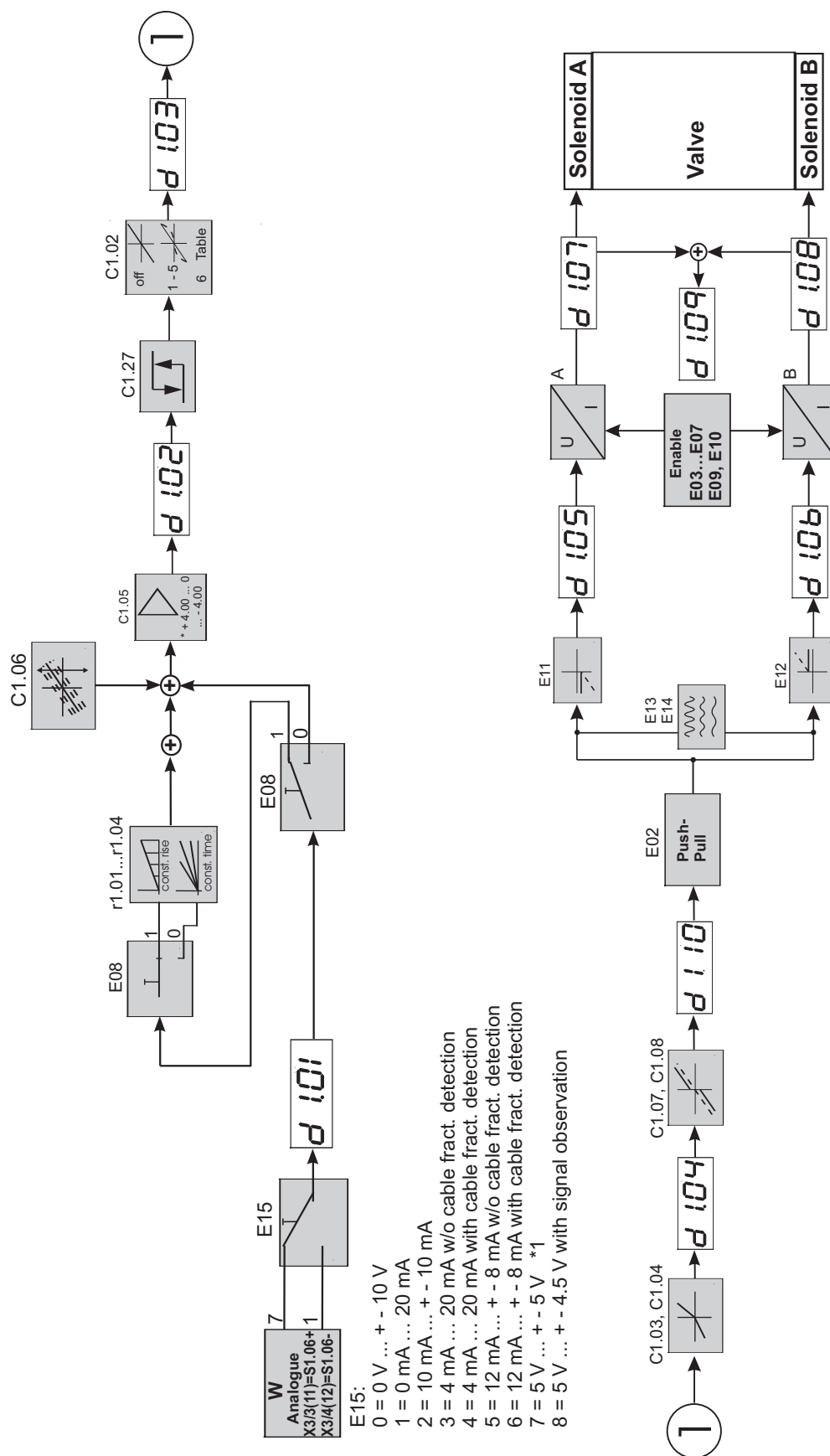
5 Block diagram of software functions

Version: DMA-22-01-xxx-SOnOff / Operation Mode: 01 ; 1 On/Off valve with 2 solenoids



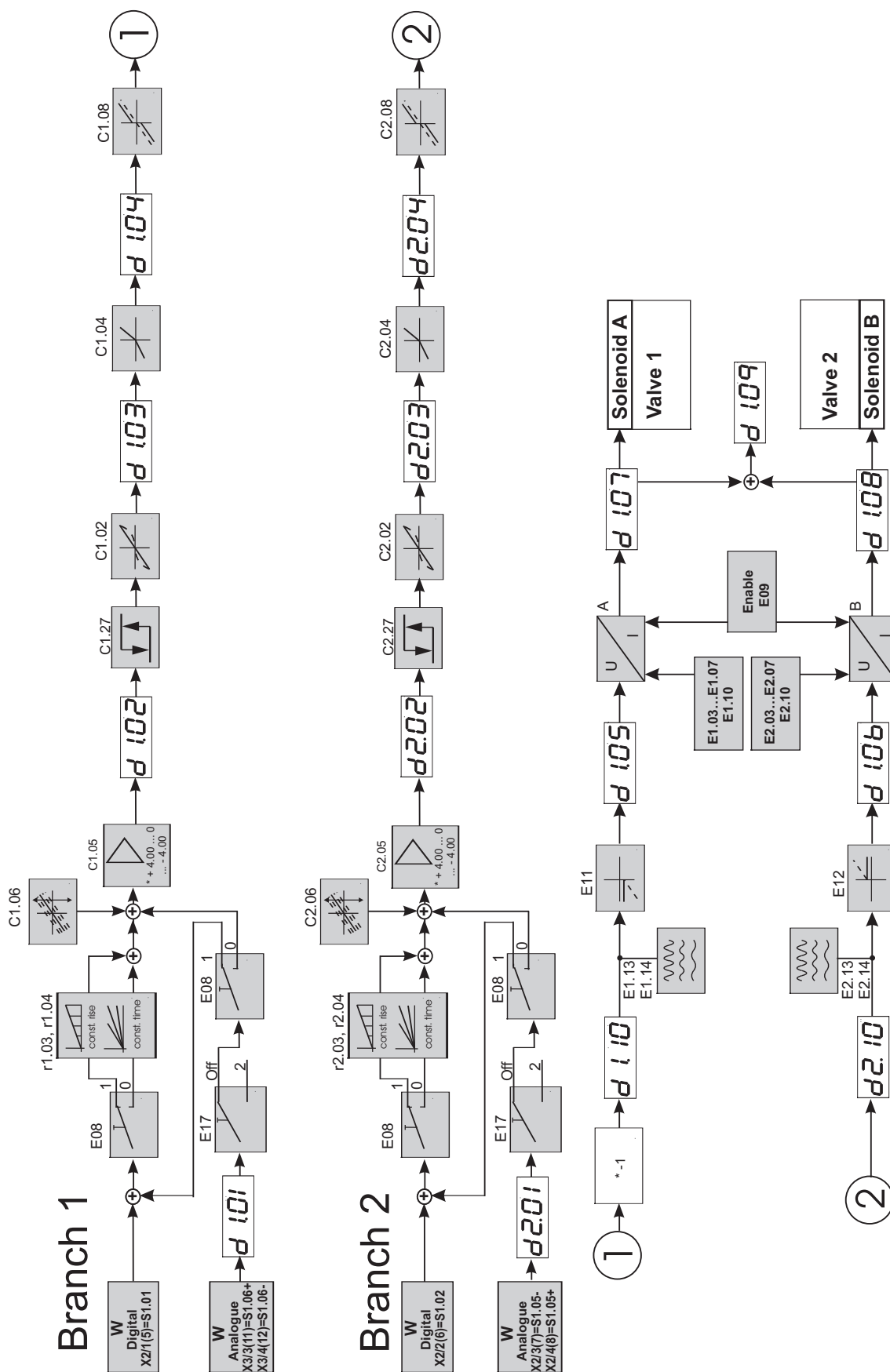
5 Block diagram of software functions

Version: DMA-22-01-xxx-SXXLT / Operation Mode: 01 ; 1 valve (open loop) with 2 solenoids



6 Block diagram of software functions

Version: DMA-22-02-xxx-S0 / Operation Mode: 02 ; 2 valves (open loop) with 1 solenoid each



7 DMA with Bus Interfaces

a) PROFIBUS. Features:

- 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



Approved by PNO!
Certificate no.: Z01871

b) PROFINET. Features:

- Meets the standard IEC 61158 and IEC 61784
- LAN 10/100Base-T(X)
- 2 x RJ-45 LAN (Daisy Chain)
- Cycling data exchange RT and IRT with ProfiNet IO-Controller
- Sending and receiving of diagnostic- and process alarms
- I&M0...4-data available
- Supporting of PROFINET Naming (device name) and TCP/IP addressing
- Fast Startup functionality supported
- Shared Device supported
- Media Redundancy Protocol (MRP) supported
- Electrical isolated interface



Approved by PNO!
Certificate no.: Z10981

c) ETHERNET I/P. Features:

- Supports ETHERNET I/P
- Maximum 32 Byte in-/output data
- Supports 10 and 100 MBit/s (autodetect)
- IP address setting by means of parameter
- Electrical isolated interface
- Software update of Ethernet node via DMA serial interface
- Supports assembly instances 100 and 101
- Additional assembly instances 200, 201, 210, 211 to directly communicate with multi fold modules


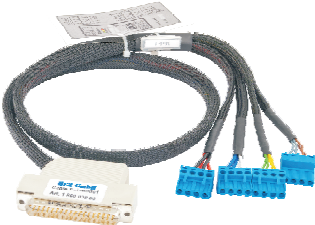




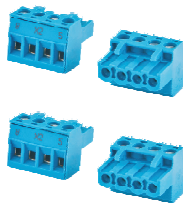
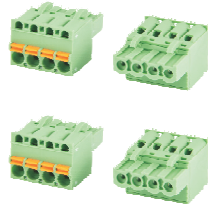
d) CAN-OPEN. Features:

- 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

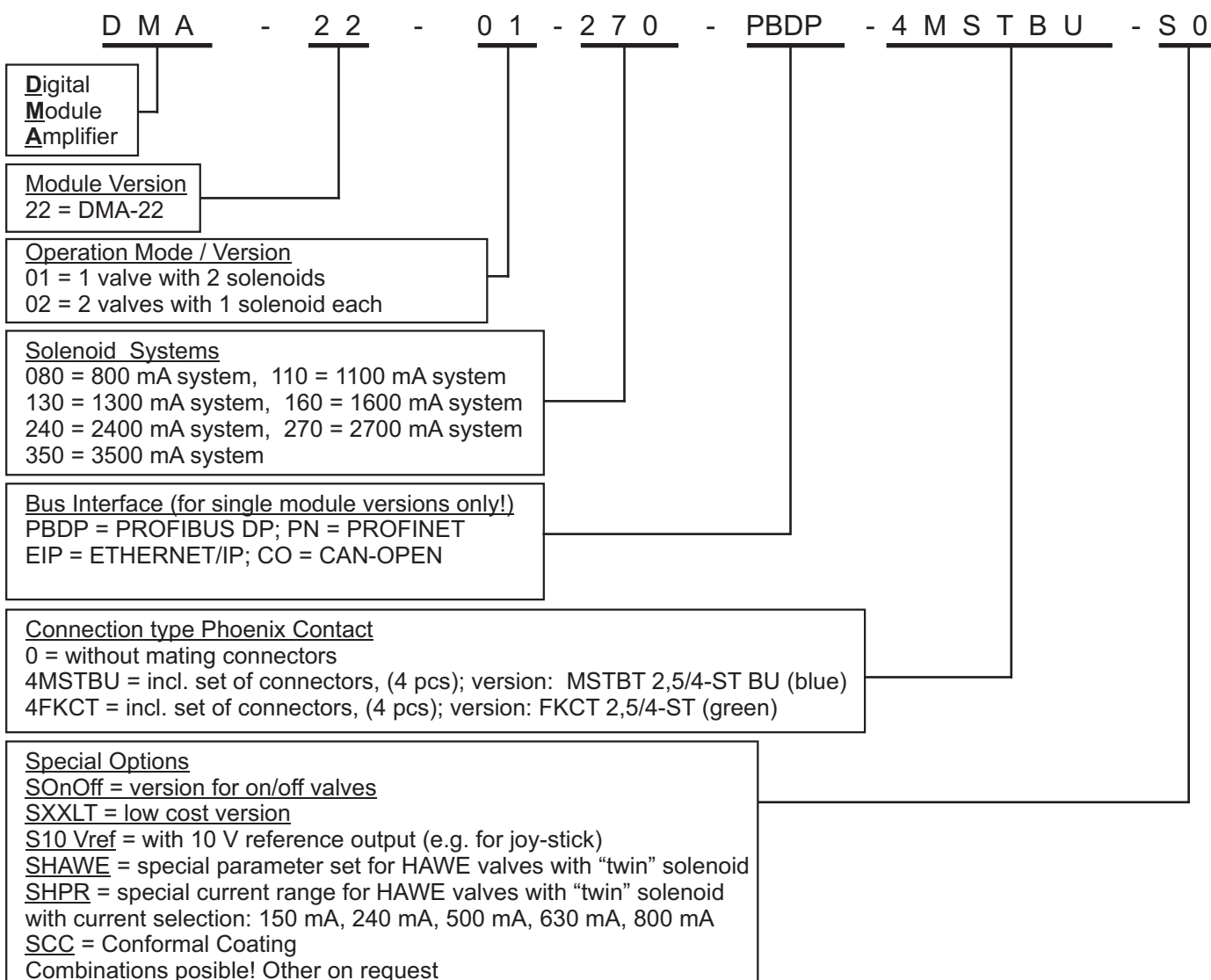
8 Accessories and Options

Name	Description
HCSTool	Software for parameterization, operation, monitoring, storage and documentation of adjustments. In English, French and German on CD (free download available). Please follow this link in order to download the most recent version of HCSTool: http://www.h-c-s-gmbh.de/download/
DMA-RS232-DS9F-RJ45	Interface cable for communication between PC and DMA-2 for RS232 interface. 1 x Sub-D 9-pole connector female, 1 connector Western-Digital 6-pole, w. 2,5 m cable
USB-RS232-RJ45	As above but w. USB-adaptor. 1 x connector Western-Digital 6-pole, w. 2,5 or 10 m cable
EKB-04	EKB-04 Handheld keypad and display unit for parameter setting and copying
CU/DMA	Commissioning unit for DMA. For adaptation of one DMA. For Commissioning, serviceing, testing and trouble shooting etc. at machines, systems, for laboratories and for training
4MSTBU	Set of 4 connectors for DMA; Phoenix Combicon connectors with screw terminals, type: MSTBT 2,5/ 4-ST - special HCS version with printed on reference numbers
4FKCT	Set of 4 connectors for DMA; Phoenix Combicon connectors with cage clamp terminals, type: FKCT 2,5/4-ST
Coding for connectors (order separately)	Coding section (CR-MSTB), inserted into the recess in the header and keying profile (CP-MSTB), inserted into the slot on the plug (red); packages with 100 pcs each

Not to scale!

Commissioning Unit	Cable for comm. unit	Interface Cable	Interface Cable
			
HCSTool	EKB-04	Connectors 4MSTBU	Connectors 4FKCT
			

9 Ordering code, including single module bus versions (not all combinations available!)



Important note: for ordering of multi-module bus versions refer to according ordering code on page 9

Ordering code examples:

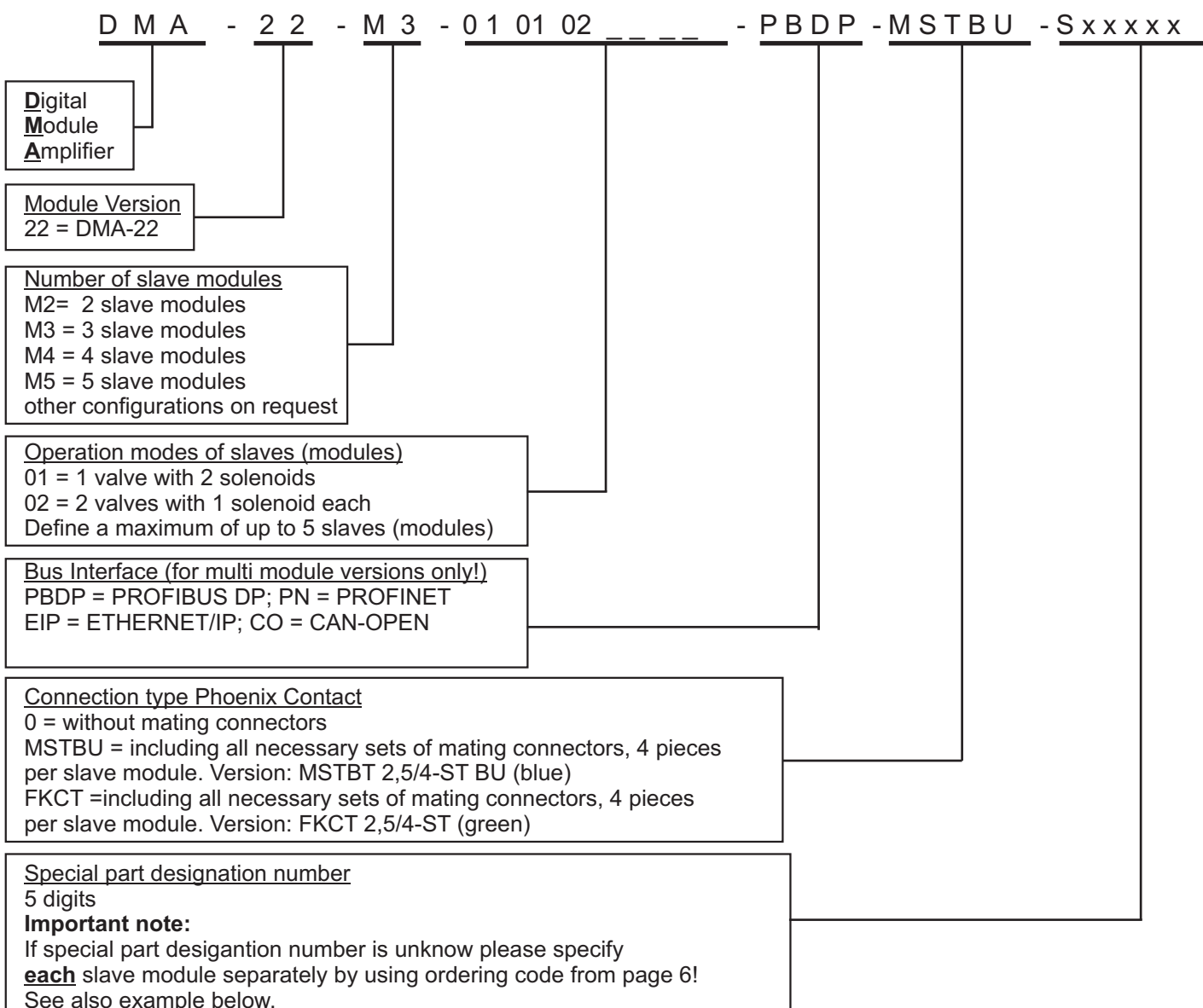
Version for one valve with 2.7 A solenoid;
operation in mode 1, including connectors

DMA-22-01-270-4MSTBU-S0

Version with PROFIBUS for two valves and 0.8 A
solenoids; operation in mode 2, including connectors

DMA-22-02-080-PBDP-4MSTBU-S0

10 Ordering code, only multi module bus versions (not all combinations available!)



Important note: for ordering single multi-module bus versions refer to ordering code on page 8

Ordering code example:

PROFIBUS version with 3 slaves (DMA modules). Each of the 3 slaves (modules) is the same version for valves with two coils each with 2.7 A including the connectors.
Please specify each of the modules.

DMA-22-M3-010102-PBDP-MSTBU-Sxxxxxx containing

DMA-22-01-270-x-S0 (module in operation mode 1)

DMA-22-01-270-x-S0 (module in operation mode 1)

DMA-22-02-270-x-S0 (module in operation mode 2)

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

**HCS Hydraulic Control Systems GmbH
 Neuffener Str. 29
 D-72636 Frickenhausen**

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 changes to the product without our written agreement.

Product:	Digital Amplifier and Controller Module
Intended use:	Automation systems (industrial applications)
Model:	<u>DMA-22-x</u>
Rated voltage:	24 V DC; SELV
Rated power:	max. 100 W
Protection class:	III
Protection degree:	IP00 (IP20 on request)
Relevant EC Directive:	EMC Directive 2014/30/EU
Applicable EU Standards:	
Emissions:	EN 61000-6-3:2007 + A1:2011 EN 61000-6-4:2007 + A1:2011 Germanischer Lloyd VI-7-2 (EN 60945) on request
Immunity:	EN 61000-6-2: 2005

Date/manufacturer's signature

01.01.2018

Details of signatory:



Dipl.-Ing. (FH) Peter Deuschle (General Manager)

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