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

**DMA-22-**

**03/04/06/08/10**

**VERSIONS FOR CLOSED LOOP APPLICATIONS**

- For one valve with feedback or process value feedback
- Optional with 0 … +/- 10 V output to control subsequent electronics (process value feedback)
- Optional with bus interface (PROFIBUS DP, PROFINET, ETHERNET/IP, CAN-OPEN) multi module configurations available
- Adaptation possible to all kind of proportional valves
- Full digital PI current controller
- Full digital multifunctional controller for valve or process control systems
- Analogue inputs with high resolution and accuracy
- Easy usage and operation by means of WINDOWS program **HCSTool**
  **NEW:** Now including oscilloscope function!
- Extreme short cycle time for best dynamic behaviour (best in class)
1 Applications and usage

The amplifier modules DMA-2 are used for:
- proportional valves with feedback as
directional / direct and pilot operated
- flow control valves
- pressure reducing valves
- pressure regulating valves
- cartridge valves
- servo valves (on request)
- valves without feedback used in applications with process value feedback (e.g. Position, pressure, velocity, rpm, etc.)

2 Features

- Fully digitized amplifier module
- All adjustments and parameter settings possible by means of PC --> no on board potentiometers
- Flexible and reliable system, use of a modern 16 bit CPU with high power reserve
- Optional available with several bus interfaces

3 Technical data

<table>
<thead>
<tr>
<th>Feature</th>
<th>Range, characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage</td>
<td>Unom = 24 V (12 … 33V) DC, residual ripple &lt; 10 % (max. 50 VA power draw) The module can also be used on supply voltage of Unominel = 12 V (&gt; 9,5 V)</td>
</tr>
<tr>
<td>Solenoid system selection</td>
<td>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)</td>
</tr>
<tr>
<td>Control voltage for digital inputs</td>
<td>(12) 24 V +/- 10 %, residual ripple &lt; 10 %, current draw per input &lt; 20 mA</td>
</tr>
<tr>
<td>Temperature ranges</td>
<td>Ambient: 0° C … 50° C (other on request) storage-20° C … 60° C</td>
</tr>
<tr>
<td>Connection</td>
<td>16 pole (4 x 4); screw terminals for 0.2 - 2.5 mm² (AWG 24 -12) or cage clamps; for detailed technical data refer to Phoenix Contact Combicon Product Catalog</td>
</tr>
<tr>
<td>Type of connector</td>
<td>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</td>
</tr>
<tr>
<td>EMC</td>
<td>In accordance with applicable standards (CE); Germanischer Lloyd VI-7-2 on request</td>
</tr>
<tr>
<td>Analogue set value and feedback value (input)</td>
<td>2 differential signal inputs with 12 bit resolution, 0 … +/- 10 V, 0 … 20 mA, 4 … 20 mA (one command, one feedback)</td>
</tr>
<tr>
<td>Digital inputs</td>
<td>Depending on version: Up to 3 digital inputs, opto-coupled</td>
</tr>
<tr>
<td>Solenoid current (output) (not for DMA-22-10!)</td>
<td>2 output stages, each for up to max. 3.5 A (with over-energ. and quick de-energization); max. combined current = 4.5 A</td>
</tr>
<tr>
<td>Digital output</td>
<td>1 output opto-coupled, voltage level 0 V / 24 V, 10 mA (ERROR)</td>
</tr>
<tr>
<td>Reference output (optional)</td>
<td>1 Reference output 10 V (max. 20 mA), short circuit protected</td>
</tr>
<tr>
<td>Analogue output (optional)</td>
<td>1 Analogue output 0 … +/- 10 V (max. 5 mA)</td>
</tr>
<tr>
<td>Interface 1</td>
<td>RS232, 6-pole female RJ45/6 connector</td>
</tr>
<tr>
<td>Interface 2 +1 (only one available per module)</td>
<td>PROFIBUS-DP: RS485, Sub-D 9-pole female PROFINET (in/out): 2 x RJ45 (integrated switch) ETHERNET/IP: RJ45 CAN-OPEN: Sub-D 9-pole male PROFIBUS and PROFINET: PNO certified!</td>
</tr>
<tr>
<td>Versions with Bus-Interface only!</td>
<td></td>
</tr>
<tr>
<td>Status signals</td>
<td>3 status LED’s at front (Run/OK; Enable, Error)</td>
</tr>
<tr>
<td>PWM frequency, cycle times</td>
<td>Approx. 22 kHz PWM frequency, cycle time 0,255 msec</td>
</tr>
<tr>
<td>Mounting/housing</td>
<td>Mounting: top-hat rail (mounting rail) in accord. with EN50022 with inegrated 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)</td>
</tr>
</tbody>
</table>

*1: For more detailed information regarding DMA with bus-interfaces please refer to the according data sheet!
4 Hardware block diagram

Example diagram for version: DMA-22-03-xxx-S0; Operation Mode: 03

Example diagram for version: DMA-22-10-xxx-S0; Operation Mode: 10
5 Block diagram of software functions

Example version: DMA-22-03-xxx-S0 / Operation Mode: 03; 1 valve with 2 solenoids and feedback
6 Block diagram of software functions

Example version: DMA-22-04-xxx-S0 / Operation Mode: 04; 1 valve with 2 solen. and process feedback
Block diagram of software functions

Example version: DMA-22-10-xxx-S0 / Operation Mode: 10; 1 valve (one solen.) with process feedback
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

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

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

For more detailed information regarding DMA with bus-interfaces please refer to the according data sheet!
### Accessories and Options

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HCSTool</strong></td>
<td>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: <a href="http://www.h-c-s-gmbh.de/download/">http://www.h-c-s-gmbh.de/download/</a></td>
</tr>
<tr>
<td>DMA-RS232-DS9F-RJ45</td>
<td>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</td>
</tr>
<tr>
<td>USB-RS232-RJ45</td>
<td>As above but w. USB-adaptor. 1 x connector Western-Digital 6-pole, w. 2.5 or 10 m cable</td>
</tr>
<tr>
<td>EKB-04</td>
<td>EKB-04 Handheld keypad and display unit for parameter setting and copying</td>
</tr>
<tr>
<td>CU/DMA</td>
<td>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</td>
</tr>
<tr>
<td>4MSTBU</td>
<td>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</td>
</tr>
<tr>
<td>4FKCT</td>
<td>Set of 4 connectors for DMA; Phoenix Combicon connectors with cage clamp terminals, type: FKCT 2,5/4-ST</td>
</tr>
<tr>
<td>Coding for connectors (order separately)</td>
<td>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</td>
</tr>
</tbody>
</table>

**Not to scale!**

<table>
<thead>
<tr>
<th>Commissioning Unit</th>
<th>Cable for comm. unit</th>
<th>Interface Cable</th>
<th>Interface Cable</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HCSTool</strong></td>
<td>EKB-4</td>
<td>Connectors 4MSTBU</td>
<td>Connectors 4FKCT</td>
</tr>
</tbody>
</table>

DMA-22-03/04/06/08/10 Data Sheet
Revision: R18 05.10.2015
Ordering code example:
Version with PROFIBUS and for closed loop operation for process control and 2.7 A solenoid including the set of mating connectors

**DMA-22-04-270-PBDP-4MSTBU-S0**
11 Ordering code, only multi module bus versions (not all combinations available!)

Ordering code example:

```
D M A - 2 2 - M 3 - 0 1 0 4 0 2 - P B D P - M S T B U - S x x x x x
```

- **Digital Module Amplifier**
- **Module Version**
  - 22 = DMA-22
- **Number of slave modules**
  - M2 = 2 slave modules
  - M3 = 3 slave modules
  - M4 = 4 slave modules
  - M5 = 5 slave modules
  - other configurations on request
- **Operation Mode / Version**
  - 03 = 1 valve w. 2 solen. w. 1 feedback
  - 04 = 1 valve w. 2 solen. w. 1 process feedb.
  - 05 = 1 Hawe valve with feedback (HPR)
  - 06 = 1 valve w. 2 solen. w. 2 feedbacks
  - 08 = 1 valve w. 2 solen. w. 2 process feedb.
  - 10 = analogue output for process feedb.
- **Bus Interface (for multi module versions only!)**
  - PBDP = PROFIBUS; PN = PROFINET
  - EIP = ETHERNET/IP; CO = CAN-OPEN
- **Connection type Phoenix Contact**
  - 0 = without mating connectors
  - MSTBU = including all necessary sets of mating connectors, 4 pieces per slave module. Version: MSTBT 2,5/4-ST BU (blue)
  - FKCT = including all necessary sets of mating connectors, 4 pieces per slave module. Version: FKCT 2,5/4-ST (green)
- **Special part designation number**
  - 5 digits
  - **Important note:**
    - If special part designation number is unknown please specify each slave module separately by using ordering code from page 7!
  - See also example below.

Important note: for ordering single mult-module bus versions refer to ordering code on page 9

**Ordering code example:**

PROFIBUS Version with 3 slaves (DMA modules). Each of the 3 slaves (modules) is the same version and is a closed open loop configuration for a 2.7 A coil including the set of mating connectors. Please specify each of the modules.

```
DMA-22-M3-030304-PBDP-MSTBU-Sxxxxx
```

- DMA-22-03-270-x-S0 (module in operation mode 3)
- DMA-22-03-270-x-S0 (module in operation mode 3)
- DMA-22-04-270-x-S0 (module in operation mode 4)
EC Declaration of Conformity in accordance with EMC Directive 2004/108/EG

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: DMA-2
Rated voltage: 24 V DC; SELV
Rated power: max. 100 W
Protection class: III
Protection degree: IP00 (IP20 on request)
Applicable EU Standards:
             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
01.01.2015
Details of signatory: Dipl.-Ing. (FH) Peter Deuschle (General Manager)
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DMA-22-03/04/06/08/10 Data Sheet
Revision: R18
05.10.2015
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