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

**DMA-22 With Bus Interfaces**

**Versions for Open/Closed Loop Applications**

**For all kinds of Valves w/wo Feedback Systems**

- Available bus interfaces: PPROFIBUS, PROFINET, ETHERNET/IP, CAN-OPEN)
- Multi module configurations available
- For all kind of valves with/wo feedback or also process value feedback
- Optional 10 V outp. for feedback sensors
- Optional analogue output 0.... +10 V
- Special Hawe valve versions available
- 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)

Revision: R03
1 Applications and usage Bus Interfaces

Amplifier modules DMA-2 with Bus-Interfaces are generally used for:
- Automation systems with Bus-Interfaces
- machine-building / industrial applications
- offshore and marine applications
- chemical industry
- general plant construction
- mobile applications

2 Features Bus-Interfaces

- Different bus systems available: PROFIBUS, PROFINET, ETHERNET/IP, CAN-OPEN
- Bus functionality approved by PNO for PROFIBUS
- Bus functionality approved by PNO for PROFINET
- Extended functionality and diagnosis possibilities
- Outstanding reliability

3 Technical data Bus Interfaces

<table>
<thead>
<tr>
<th>Feature</th>
<th>Range, characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage</td>
<td>Via DMA</td>
</tr>
<tr>
<td>Temperature ranges, EMC, Mounting/housing</td>
<td>Refer to page 3: Technical Data DMA</td>
</tr>
<tr>
<td>PROFIBUS-DP</td>
<td>- Approved by PNO - Supports PROFIBUS-DP Slave in accordance with IEC 61158 - Supports PROFIBUS DPV1</td>
</tr>
<tr>
<td>Connection / Type of connector</td>
<td>RS485, Sub-D 9-pole female</td>
</tr>
<tr>
<td>Status signals</td>
<td>LED „Buserror“ (red)</td>
</tr>
<tr>
<td>Address selection</td>
<td>DIP switch 1-8, each on/off</td>
</tr>
<tr>
<td>PROFINET</td>
<td>- Approved by PNO - 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</td>
</tr>
<tr>
<td>Connection / Type of connector</td>
<td>In/Out: 2 x RJ45 (integrated switch)</td>
</tr>
<tr>
<td>Status signals</td>
<td>Power (green), Error (red), Maint (yellow), Sync (yellow), Status (yellow)</td>
</tr>
<tr>
<td>Future use</td>
<td>DIP switch 1-3, each on/off</td>
</tr>
<tr>
<td>ETHERNET I/P</td>
<td>- Maximum 32 Byte in-/output data - Supports 10 and 100MBit/s (autodetect) - IP address setting by means of parameter - Electrical isolated interface</td>
</tr>
<tr>
<td>Connection / Type of connector</td>
<td>RJ45</td>
</tr>
<tr>
<td>Status signals</td>
<td>Status (red), Maint (yellow), Link/Act (yellow)</td>
</tr>
<tr>
<td>Address selection</td>
<td>DIP switch 1-10, each on/off</td>
</tr>
<tr>
<td>CAN-OPEN</td>
<td>- Complete CAN-OPEN slave in accordance with standard CIA 301 / V4 - Supports all import Baud rates u.t. 2 Mbit - Node number and baud rate by means of vendor specific object - Node guarding</td>
</tr>
<tr>
<td>Connection / Type of connector</td>
<td>Sub-D 9-pole male</td>
</tr>
<tr>
<td>Status signals</td>
<td>Status (red), Maint (yellow), Link/Act (yellow)</td>
</tr>
<tr>
<td>Address selection</td>
<td>DIP switch 1-10, each on/off</td>
</tr>
</tbody>
</table>
4 Applications and usage DMA

Amplifier modules DMA-2 are generally used for:
- proportional valves with feedback as
- direction / 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.)

Available for all kinds of valves and applications with and without closed loop functionality

Optional available: special adapted versions for Hawe valves series PSL/PSV with/without feedback

Flash-EPROM technology for easy software update or modifications from PC via RS232 interface

Change of selected parameters “on-the-fly” without interference of function; monitoring of display values and 4-channel oscilloscope with HCSTool via PC (RS232 interface)

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

DMA-22-X-BUS INTERFACES

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5 Features DMA

- Fully digitized amplifier module with high resolution and accuracy for analogue signal (12-Bit A/D-converter)
- Flexible system with outstanding reliability
- Use of modern 16 bit CPU with high power reserve

6 Technical data DMA

<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)</td>
</tr>
<tr>
<td>The modul can also be used on supply voltage of Unominel = 12 V (&gt; 9.5 V)</td>
<td></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, 3.5 A and 0.15 A, 0.24 A, 0.5 A, 0.63 A, 0.8 A (optimised for Hawe solenoids)</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 ... + 60° C (other on request) storage: - 20° C ... + 80° C</td>
</tr>
<tr>
<td>Connection</td>
<td>16 pole (4 x 4); screw terminals for 0.2 - 2.5 mm² (AWG 24 - 12); for detailed technical data refer to Phoenix Contact Combicon Product Catalog</td>
</tr>
<tr>
<td>Type of connector</td>
<td>Phoenix Combicon connectors with screw terminals, type: MSTBT 2,5/ 4-ST - special HCS version with printed on reference numbers. Or: 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>max. 2 differential signal inputs (12 bit resolution): 0 ... +/- 10 V, 0 ... 20 mA, 4 ... 20 mA (one command, one feedback); optional feedback: 5 V +/- 3 V for Hawe hall sensor</td>
</tr>
<tr>
<td>Digital inputs</td>
<td>Depending on version: max. 5 digital inputs (Enable, S1.01 to S1.04), opto-coupled</td>
</tr>
<tr>
<td>Solenoid current (output)</td>
<td>2 output stages, each for up to max. 3.5 A (with over-energ. and quick de-energization);</td>
</tr>
<tr>
<td>Digital output</td>
<td>1 output opto-coupled, voltage level 0 V / 24 V, 10 mA (ERROR/Comparator)</td>
</tr>
<tr>
<td>Optional reference output</td>
<td>1 Reference output 10 V (max. 20 mA), short circuit protected; supply for hall sensor</td>
</tr>
<tr>
<td>Optional analogue output</td>
<td>1 Analogue output 0 ... +/- 10 V (max. 20 mA), short circuit protected; for monitoring etc.</td>
</tr>
<tr>
<td>Interface</td>
<td>RS232, 6-pole female RJ45/6 connector</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 max 0.220 msec</td>
</tr>
<tr>
<td>Mounting/housing</td>
<td>Mounting: top-hat rail (mounting rail) in accord. with EN50022 with inetrated 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>
7 Example block diagrams hardware

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

Diagram for version: DMA-22-02-xxx-S0; Operation Mode: 02
Example diagram for version: DMA-22-03-xxx-S0; Operation Mode: 03

Example diagram for version: DMA-22-05-xxx-SHPR-ANAOOut; Operation Mode: 05
Example block diagram software functions

Version: DMA-22-01-xxx-S0 / Operation Mode: 01; 1 valve (open loop) with 2 solenoids
Example version: DMA-22-03-xxx-S0 / Operation Mode: 03 ; 1 valve with 2 solenoids and feedback

DMA-22-X-BUS INTERFACES
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9 Example pictures of bus versions

e) PROFIBUS Examples single and multi-fold:
DMA-22-05-xxx-PBDP-x-SHPR:
example for PROFIBUS single module version
DMA-22-M3-050505-PBDP-MSTBU-Sxxxxx:
example for PROFIBUS 3-fold slave configuration

e) PROFINET Examples single and multi-fold:
DMA-22-05-xxx-PN-x-SHPR:
example for PROFINET single module version
DMA-22-M3-050505-PN-MSTBU-Sxxxxx:
example for PROFINET 3-fold slave configuration
<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><strong>DMA-RS232-DS9F-RJ45</strong></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><strong>USB-RS232-RJ45</strong></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><strong>EKB-04</strong></td>
<td>EKB-04 Handheld keypad and display unit for parameter setting and copying</td>
</tr>
<tr>
<td><strong>CU/DMA</strong></td>
<td>Commissioning unit for DMA. For adaptation of one DMA. For Commissioning, servicing, testing and trouble shooting etc. at machines, systems, for laboratories and for training</td>
</tr>
<tr>
<td><strong>4MSTBU</strong></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><strong>4FKCT</strong></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><strong>Coding for connectors (order separately)</strong></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>HCSTool</td>
<td>EKB-4</td>
<td>Connectors 4MSTBU</td>
<td>Connectors 4FKCT</td>
</tr>
</tbody>
</table>

**DMA-22-x-Bus Interfaces**

Data Sheet
Revision: R03
05.10.2015
11 Ordering code single module bus versions (not all combinations available!)

Digital Module Amplifier

Module Version
22 = DMA-22

Operation Mode / Version
01 = 1 valve with 2 solenoids
02 = 2 valves with 1 solenoid each
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.

Solenoid Systems
080 = 800 mA system, 110 = 1100 mA system
130 = 1300 mA system, 160 = 1600 mA system
240 = 2400 mA system, 270 = 2700 mA system
350 = 3500 mA system

Bus Interface (for single module versions only!)
PBDP = PROFIBUS; PN = PROFINET
EIP = ETHERNET/IP; CO = CAN-OPEN

S10 Vref = with 10 V reference output (e.g. for joy-stick)
SHAWE = special parameter set for HAWE valves with “twin” solenoid
SCC = Conformal Coating
SHPR = High Performance Range version (Hawe valves with feedback)
SANAOut = Analogue Output; SHPR-CC = Conformal Coating
Combinations possible! Other on request

For HPR only: valve version designation (specific parameter setting)
5 = Valve size (sizes: 3, 5, 7)
C = Valve with compensator

Important note: for ordering of multi-module bus versions refer to ordering code on page 12
Ordering code, only multi module bus versions (not all combinations available!)

**DMA-22**

- **M**odule 22 = DMA-22

**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

**Operation modes of slaves (modules)**
- 01 = 1 valve with 2 solenoids
- 02 = 2 valves with 1 solenoid each
- 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 feedbacks
- 10 = analogue output for process feedback

Define a maximum of up to 5 slaves (modules)

**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** module separately by using the according ordering code! See example below.

**Important note:** for ordering single bus versions refer to ordering code on page 11

**Ordering code examples:**

**Single module versions:**
Version with PROFIBUS is a closed loop version (for HPR valve size 5 with compensator) and has a 0.63 A coil including the set of mating connectors.

**DMA-22-05-063-PBDP-4MSTBU-SHPR-5C**

**Multi module versions:**
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** containing
- 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)
Certificate

PROFIBUS Nutzerorganisation e.V. grants to

HCS Hydraulic Control Systems GmbH
Neuffener Str. 29, 72636 Frickenhausen, Germany

the Certificate No: Z01871 for the PROFIBUS device:

Model Name: DMA-22-VPC3
Revision: V2.4; SW/FW: V0103a; HW: revision 02
GSD: HCS0EA7.GSD, File Version: V2.4 17.01.2014

This certificate confirms that the product has successfully passed the certification tests with the following scope:

- DP-V0 MS0, Sync, Freeze, Fail_Safe, Set_Slave_Add
- DP-V1 MS1, MS2, I&M
- Physical Layer RS485

Test Report Number: FZI0001
Authorized Test Laboratory: FZI Forschungszentrum Informatik, Karlsruhe, Germany

The tests were executed in accordance with the following documents:
“Test Specifications for PROFIBUS DP Slaves, Version 3.09, September 2008”.
This certificate is granted according to the document:
“Framework for testing and certification of PROFIBUS and PROFINET products”.
For all products that are placed in circulation by July 14, 2017 the certificate is valid for life.

(Official in Charge)

Board of PROFIBUS Nutzerorganisation e. V.

(Karsten Schneider)

(K.-P. Lindner)
Certificate

PROFIBUS Nutzerorganisation e.V. grants to

HCS Hydraulic Control Systems GmbH
Neuffener Str. 29, 72636 Frickenhäusen, Germany

the Certificate No: Z10981 for the PROFINET IO Device:

Model Name: DMA/DAC
Revision: SW/FW: V0.1.0; HW: 2
Identnumber: 0x01F0; 0x0002
GSD: GSDML-V2.3-HCS-DMA-20150204.xml
DAP: DAP 3: Standard, MRP, 0x00000003

This certificate confirms that the product has successfully passed the certification tests with the following scope:

- PNIO_Version V2.2
- Conformance Class C
  Optional features: MRP, IRT
- PNIO_Tester_Version V2.2.4
- Tester SIEMENS AG, Fürth, Germany, PN329-1, IRT078-1

This certificate is granted according to the document:
"Framework for testing and certification of PROFIBUS and PROFINET products".
For all products that are placed in circulation by February 26, 2018 the certificate is valid for life.

(Official in Charge)

Board of PROFIBUS Nutzerorganisation e. V.

(Karsten Schneider)

(K.-P. Lindner)
EC Declaration of Conformity in accordance with EMC Directive 2004/108/EG

HCS Hydraulic Control Systems GmbH
Neuffen 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 with PROFIBUS-Interface

Intended use: Automation systems (industrial applications)

Model: DMA-22-Mx-x-PBDP-x and DMA-22-x-PBDP-x

Rated voltage: 24 V DC; SELV

Rated power: max. 100 W

Protection class: III

Protection degree: IP00 (IP20 on request)


Applicable EU Standards:


Immunity: EN 61000-6-2:2005

Date/manufacturer’s signature

17.01.2015

Details of signatory: Dipl.-Ing. (FH) Peter Deuschle (General Manager)


date

HCS Hydraulic Control Systems GmbH · Geschäftsführer / General Manager: Dipl.-Ing. (FH) Peter Deuschle · Dipl.-Ing. (FH) Volkmar Bremer
Sitz / Head Quarter: D-72636 Frickenhausen Amtsgericht / Register Court: AG Stuttgart HRB 224899

EC Declaration of Conformity in accordance with EMC Directive 2004/108/EG

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Date/manufacturer’s signature

17.01.2015

Details of signatory: Dipl.-Ing. (FH) Peter Deuschle (General Manager)


date

HCS Hydraulic Control Systems GmbH · Geschäftsführer / General Manager: Dipl.-Ing. (FH) Peter Deuschle · Dipl.-Ing. (FH) Volkmar Bremer
Sitz / Head Quarter: D-72636 Frickenhausen Amtsgericht / Register Court: AG Stuttgart HRB 224899
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DMA-22-X-Bus Interfaces
Data Sheet
Revision: R03
05.10.2015
Our partners and distributors

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