Interface description and command set

English

DMP41

Digital precicion measuring device

HBM

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Table of Contents

1 Documentation overview

The complete production documentation of the precision measuring devices DMP41 (DMP41-T2; DMP41-T6) comprises the following publications:

- The *operating manual 'Digital precision measuring device DMP41-T2, DMP41-T6' (*A3463)
  explains the manual operation of the device
- The operating manual *'Digital precision measuring device DMP41 Interface description and command set* (A3462) explains programming and measurement via terminal or computer, including all HBM interpreter commands

Important

You are currently reading the 'Interface description and command set' operating manual.
For operation as a 'stand-alone device', please use the general operating manual 'Digital precision measuring device DMP41−T2, DMP41−T6' (A3470)

1.1 How to work with this manual

Before putting the device into operation please note the following information:

Important

Please comply with the safety instructions in the ***operating manual*** *Digital precision measuring device DMP41 (document number A3470).*

This manual - Operation with computer or terminal - is intended to help you operate the DMP device via a computer as rapidly as possible. It is both suitable for beginners without PC experience and for experts with computer experience.

Various **guides** are available to help you:

- The table of contents at the beginning of the manual provide an initial overview.
- The header shows you which chapter or sub-chapter you are currently reading.
- Example:
- The footer displays the name of the manual (Operating with computer or terminal, Operating manual, etc.)
- The page numbers are coupled with capital letters according to the chapter designations. Each chapter starts with Page 1.
- If you are looking for individual commands, it is best to refer to the command overview in Appendix IV or Appendix V.
- The keyword index contains an index register to help you orientate yourself rapidly in the manual.

1.1.1 Operation with PC

This manual explains the operation of your HBM device with a computer.

- You can implement all device settings by sending an appropriate command sequence from the computer. Automation of repetitive measurement sequences is possible with a computer and the corresponding programs.

In order to match up the signals output from or required by the various devices (computer, plotter, printer, measuring device, etc.), the devices must be connected together via interfaces.

Interfaces are standardized so that devices from various manufacturers can be used.

The DMP device can be operated via the following standardized interfaces:

- Ethernet interface
- USB port for RS232

Administrator rights are required for all **measurement-relevant settings** (see also Page 28)

Administrator rights belong to:

- The person who entered the password
- The person working directly (stand-alone) on the DMP41 (default)

1.1.2 Chapter and appendix overview

Chapter A
Introduction
General information for using this manual. A documentation overview shows you which documents are part of the DMP device.

Chapter B
Comparison of the Ethernet, RS-232-C
This shows which interfaces are included in the DMP device and what their primary differences are.

Chapter C
Communication with the DMP device
This shows you how to activate the various interfaces and how to connect the DMP device to your computer.

Chapter D
Program creation
This contains routines for programming interfaces to create your own programs.

Chapter E
Command set of the HBM interpreter
Important agreements about command syntax, command structure and the command notation are listed at the start of this chapter. The complete command set of the HBM interpreter completes the chapter.

Appendix I
Glossary
The glossary describes the main technical terms used in this manual in dictionary format.

Appendix II
Alphabetic command overview
Command overview sorted alphabetically for rapid orientation.

Appendix hang III
Functional command overview
You can also search for commands sorted by function.

Appendix IV
Keyword index

2 Interface comparison

The DMP41 has four different interfaces:

- Ethernet
- USB Host
- RS232 (external adapter on USB Host)

The device can be operated simultaneously via all interfaces, but can only be parameterized over one connection at the same time.

The HBM Interpreter “translates" the command and corresponding character string received from an interface into a code understood by the DMP41.

You can call up the Interpreter via the above-mentioned interfaces.

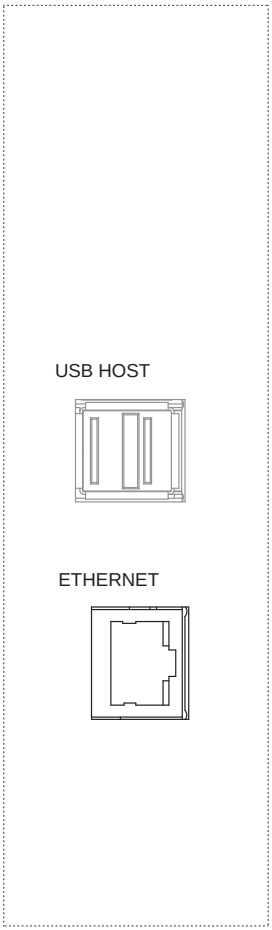
All HBM Interpreter commands are shown in Chapter “5Command set of the HBM interpreter".

This chapter is to help you determine which interface to use. How the interfaces function can be found in the corresponding Chapter.

Interface	**Connection options**	**Cable**	**Distance** max.	**Transmission speed**	**Comments**
Ethernet	Direct to PC, network	Ethernet (Cat-5 or higher)	100 m	10/100 Mbit/s	Dependent on PC
USB HOST	Keyboard, stick, RS232 adapter	USB 2.0	5 m	60 Mbyte/s	
RS232	External adapter on USB Host	3-wire cable for transmission in both directions	20 m	115200 baud	Just one adapter per device

3 Communication with the DMP

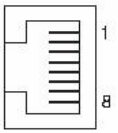
3.1 Ethernet interface



The DMP41 can be included in an Ethernet network, and thus directly to the TCP/IP world, via the Ethernet connection RJ45 socket. This means that visualization and control are not only possible on site, but also, with relevant safety devices, anywhere in the world.

The Internet Protocol (IP) applies correct addressing and routing of the data packets, while the Transport Control Protocol (TCP) set up on it is responsible for data transport and security.

The Ethernet network supports speeds of 10 Mbit/s and 100 Mbit/s, as well as half and full duplex mode. The transmission mode and speed are automatically adapted to the existing network.



Type RJ45

Function	Pin
Transmitter +	1
Transmitter –	2
Receiver +	3
line termination	4
	5
Receiver –	6
line termination	7
	8

Cable

Category 5 (Cat-5) or higher cables must be used for this purpose. This enables line lengths of 100 m to be implemented. When operating several devices in an Ethernet network, we recommend the use of industrial Ethernet switches.

Parameterisation

Each DMP41 has an individual MAC address. A logical IP address is assigned to this.

IP addresses are 32-bit long binary strings (4 bytes), which for greater clarity are specified as four decimal numbers separated by periods (octets) (e.g. 192.156.168.10).

The IP address can be assigned automatically (default setting) in the DMP41 (DHCP) or entered via the device keyboard.

Standard addresses

Choose Start -> Run from the Windows start menu and enter “CMD", you can then use “Ping IP" in the DOS window to test whether the connected device is communicating.

If the DMP41is to be operated in a cross-network segment and the device accessed via Ethernet, a **Gateway address** must be set.

The Gateway address is necessary so that access from outside, e.g. Internet, is possible via a router in the network.

However, an existing firewall or managed switch in the network must be set for this remote access so that access is permitted (see Chapter 3.1.1).

If necessary, contact the responsible network administrator.

Notes on operation in an Ethernet network

In order to avoid network problems, you should check the following points before connection to an Ethernet network:

- Are the connected device addresses unique, i.e. no identical IP addresses?
- Does the network have sufficient reserves for the transmission of the planned data or could the network load become too great?
- Are there nodes that could load the network through broadcasts, i.e. data sent to all nodes?

In order to avoid disturbance of measurement operation by other network nodes, you can also operate the devices in a separate network disconnected from your company network.

When operating several devices in an Ethernet network, we recommend the use of industrial Ethernet switches.

In order to achieve the best possible separation between the network with the measuring instruments and the remaining company network, you can

also use a router that separates both networks and only transmits messages between the two networks when necessary.

3.1.1 Ports and addresses used

TCP server on DMP41:

IP : as set, or DHCP = Default

Port: 1234

Multicast server for device scan:

IP : 239.255.77.76

Port : 31416

Important

The ports must be enabled for access to the server (firewall).

Important

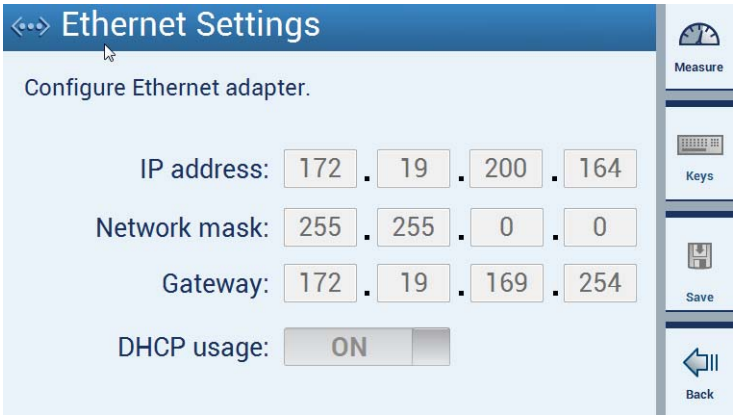
Cable connection for Ethernet interface !
If the interface cable for the interface is not connected, an IP address cannot be set.
► *Ensure that the interface cables for the Ethernet interface are always connected before setting up the DMP41.*

3.1.2 Setting the Ethernet interface

When the Ethernet interface is set to DHCP (Dynamic Host Configuration Protocol), the addresses assigned by the DHCP server to DMP41 are displayed in the address fields.

It is also possible to set fixed addresses directly in the DMP41

(IP address, network mask, Gateway, DHCP).


Ethernet Settings
Configure Ethernet adapter.
IP address: 172 . 19 . 200 . 164
Network mask: 255 . 255 . 0 . 0
Gateway: 172 . 19 . 169 . 254
DHCP usage: ON
Measure
Keys
Save
Back

3.2 USB HOST interface

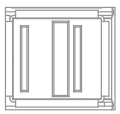
The DMP41 enables connection to a USB HOST interface.

A USB Device (e.g. keyboard) is always connected to a USB HOST (controller).

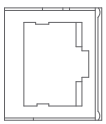
The DMP41 can be connected via the **USB HOST** socket to

- a USB stick
- a keyboard
- an RS232 adapter

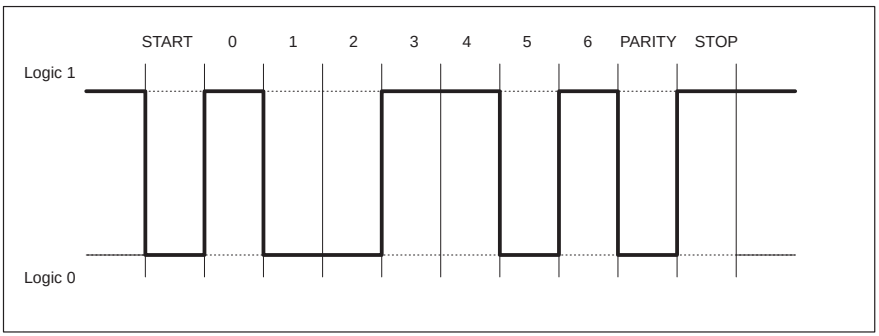
USB HOST



ETHERNET



3.3 RS-232 interface



Line level of the Y character with negative logic

A START bit is set before each character (data byte). It is followed by the data bits and a STOP bit. As the data are transferred serially, the speed of transmission must match the speed of reception.

The number of bits per second is called the baud rate. The exact baud rate of the receiver is synchronized with the START bit for each byte transferred. Next come the data bits, each with the same length. When the STOP bit is reached, the receiver goes to the wait state, until it is reactivated by the next START bit.

Serial interface characteristics (default settings)

Word length	8 bit
Stop bit	1
Parity	Even
Baud rate	300, 600, 1200, 2400[2)], 4800[2)], 9600[1)], 19 200, 38400, 576000, 115200

[1)] Factory setting
[2)] Can only be set with command BDR

Baud rate, parity and stop bits can be set in the settings menu or by command.

3.3.1 Activation of the RS-232 interface

The HBM interpreter is activated by the control character:

- CTRL B (STX) - Computer operation
- CTRL R (DC2) - Computer operation

Entering one of these control characters puts the device into the remote control state “Computer Control" so that, apart from the display functions of the display, it can still be operated but no longer set.

With the RS-232-C interface, all information generated is immediately output once fully present in the output buffer.

You can deactivate the remote control state with the following commands:

DCL **or**
CTRL A (SOH) or
with the RES and RST commands

Important

An RS232 interface can only be operated with the DMP41 via an adapter (USB -> RS232).
A USB-RS232 adapter is included in the scope of delivery of the DMP41 (1-KAB297).

3.3.2 Setting the interface

The menu (Hardware -> RS232) or the commands (BDR) can be used to set

- the baud rate
- the parity and
- the number of stop bits

Baud rates

300, 600, 1200, 2400, 4800, 9600 *), 19200, 38400, 57600, 115200

Parity

Even *), odd, none

Stop bit

1 1), 2

1) Factory setting

4 Program creation

4.1 Communication via the Ethernet interface / Test program

To facilitate your entry into program creation, routines are provided here for programming the DMP41 via Ethernet interfaces.

The applicable demo program is on the supplied system CD under *“DMP41Demo"*.

In order to use the demo program, you need the free program *“Microsoft Visual Studio Express"*[1)].

► Connect the DMP41 and PC, then switch both on

► Install *“Microsoft Visual Studio Express"*

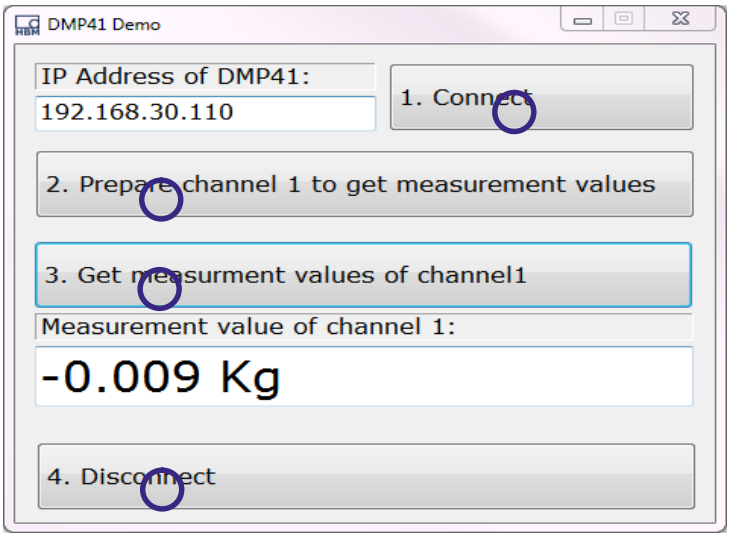
► Open the program DMP41Demo.sln on the system CD

► Press “RUN"

The screen display of the demo program will appear.

1) *Visual Studio*® is a registered brand and patented technology, licensed by Microsoft.

User interface DMP41Demo:



- Enter the IP address of your DMP41
- Click in sequence from ① to ④

Jump to the appropriate point (1-4) in the program with a double click (see following page).

Extract from the example program

Connection DMP41 via TCP

```
namespace DMPDemo
public partial class Form1: Form
       TCPClient myTCPClient;
public Form1()
       InitializeComponent();
```

Single measured value acquisition with DMP41

```
private void ConnectBt_Click(object sender, EventArgs e)  (1)
myTCPClient = new TCPClient(this.IPAddressTB.Text, 1234); //
                                                  Set up connection with DMP41 (via entered
                                                  IP address and default Port 1234)

private void PrepareBt_Click(object sender, EventArgs e)  (2)
myTCPClient.WriteLine("RAR1234");       //     Request administrator rights (to
                                               be able to change settings; Default
                                               password="1234")
myTCPClient.WriteLine("SRB1");//               Command acknowledgement on
myTCPClient.WriteLine("CHS1");//               Select amplifier 1
myTCPClient.WriteLine("ASA2,1");//             Set excitation voltage and measuring range
myTCPClient.WriteLine("ASS2");//               Transducer signal = Measure
myTCPClient.WriteLine("AFS1");//               Select Filter 1
myTCPClient.WriteLine("ASF1,6,1");//           Set filter limit frequency
myTCPClient.WriteLine("CMR2");//               Select scaled signal
myTCPClient.WriteLine("ENU2,"KG"");//          Set unit of measurement
myTCPClient.WriteLine("LTB2,0,0,2,500");//     Set measured value scaling
myTCPClient.WriteLine("IAD2,,3,1");//          Set decimal place and step for scaling
myTCPClient.WriteLine("COF1");//               Set measured value output format

private void GetMeasvalsBt_Click(object sender, EventArgs e)  (3)
MeasvalTb.Text = myTCPClient.WriteLine("MSV?2")+" Kg";//
                                               Read measured value net and output in
                                               Textbox

private void DisconnectBt_Click(object sender, EventArgs e  (4)
myTCPClient.Close()
```

You can also program other tasks accordingly following this example.

References:

Tom Archer, Andrew Whitechapel

Inside C#
Objektorientiertes Programmieren mit C# und dem .NET Framework

Microsoft Press

ISBN: 3-86063-669-3

5 Command set of the HBM interpreter

5.1 Important agreements

These agreements and general information will facilitate your work with the HBM Interpreter commands.

Notation

- All commands can be input using lower or capital case letters.

Command shortform

- The command shortform consists of 3 characters and, depending on the command, a list of parameters separated from each other by commas. E.g.CHS 3(x)

Space

- Prefixed and suffixed empty spaces (blanks) are ignored for parameters.

Command types: - Setting commands - Query commands

- The setting and query commands act on all selected (active) channels (see CHS command).
- Query commands - these are used to read out information - are marked by an added question mark (?).E.g. IDN?

Responses

- The device responses shown in the examples are displayed in italics. The responses are only displayed for one channel.

Character strings

- Character strings must be enclosed in quotes when input. Quotes are also used during output.
  E.g.UCC“TEST"(x)

Command end

For input commands:

- The command end character is indicated by (x).
  Permitted command end characters are:
  ';', LF, LFCR, CRLF

For output commands:

- The command end character is indicated by (y).
  The command end character is always CRLF.

Interfaces - serial

- Computer communication in the RS-232-C interface starts with the permitted control character.

'CTRL R' or 'CTRL B' and ends with 'CTRL A'

Acknowledgment behavior

- You can select whether the response of the DMP41 should be output or not following setting commands.
  Output commands - indicated by a ? - always generate output data (see SRB command).

Outputs for setting commands are:

- '0' for error-free process or
- '?' if an error occurs.

This also applies to unknown commands.

E.g ASS2(x)
0(y)

Standards

- The standard IEEE 488.2, which defines the codes, formats and various general commands, is taken into account as far as possible.

5.1.1 Command structure

All commands used are created according to a specific structure.
There are basically two command types:

- **Setting commands:**

The DMP41 is set via the computer.

Example: BDR4800,2,1(x)
0(y)
The interface was set to 4800 baud.

- **Query commands:**

Measured values or device settings are read out from the DMP41 and displayed on the screen.

Example: BDR?(x)
4800,2,1,1(y)
The RS-232 interface is set to 4800 baud,
Even Parity and 1 Stop Bit.

5.1.2 Command structure

Command shortform	Parameter	End character
*TTT?		p1, p2, ...pn (x)
Example:	*PRE?(x)	

*	only in IEEE standard commands
TTT	Command shortform as alpha character (a ... z)
?	only in query commands
p1, p2...pn	Parameter values, consisting of a preceding sign (+/-) and numbers (0...9) or character strings (always inquotes “ "). A positive sign can also be omitted. Separator
(x)	Command end: Line Feed (LF), semicolon (;), Carriage Return/Line Feed (CRLF) or Line Feed/Carriage Return (LFCR).
CR	ASCII sign Carriage Return = decimal 13
LF	ASCII sign Line Feed = decimal 10
;	ASCII sign Semicolon = decimal 59

If an additional parameter - e.g. Parameter 2 - is excluded, the separator must be included.
E.g. ASA1,,0(x)

The commands act on all selected (active) channels (see CHS command).

5.1.3 Data output structure

q1, q2...qn(y)

Example 1:

*IDN?(x)
HBM,DMP41,4D:5B:B9:02:00:00,1.0.3.2(y)

Example 2:

CHS?0(x)
3(y)

The responses sent by the DMP41 are indicated in *italics* in this documentation (second line in examples).

Output values:

q1,q2...qn	Numerical values with preceding sign, character strings (always in “ ") or '?' as error message
,	Separator
(y)	End sequence (CRLF).

5.1.4 Individual command descriptions

Each command is listed, the structure decoded and explained with an example in the following pages.

Command

The character sequence you must input in order to operate the DMP41.

E.g. **?CPV**

Syntax

Notation required for the command:
E.g. ASA p1,p2(x)

Parameter

The significance of any parameters is explained:
E.g. If, in command ASA, the parameter p1=1, this means:
2.5V bridge excitation voltage

Effect

E.g. Explanation how the DMP41 is set.

Response

The DMP41 responds to your input. This response is shown on the screen with terminal operation (always with output errors, optional with input errors).

Example

The example shows the inputted command and the response of the DMP41. The response is always displayed in italics.

The individual commands are sorted alphabetically and according to function in the appendix.

5.1.5 Administrator rights

Administrator rights are required for all measurement-relevant settings:

Function	Command
Set bridge excitation voltage and transducer type	ASA
Select amplifier input signal	ASS
Switchover filter	AFS
Input of cut-off frequency and filter characteristic	ASF
Set baud rate of serial interface	BDR
Start zero setting/input zero value	CDW
Clear peak value memory	CPV
Input of unit	ENU
Input display full scale, decimal point, step	IAD
Output of device identification	*IDN?
Linearization of transducer characteristic curve	LTB
Warm start	RES
Reversal of preceding sign	SGN
Start taring/Input tare value	TAR
Save amplifier settings and comments	TDD
Enter channel names	UCC

Information

*Query commands (with added question mark) do **not** require administrator rights.*

Administrator rights are **not** required for the following functions:

Function	Command
Change password	CHP
Select amplifier channels	CHS
Measuring range switchover	CMR
Measured value output format	COF
Output of device identification	*IDN?
Set measured value transfer rate	ISR
Output measured value	MSV
Request administrator rights	RAR
Select interface acknowledgement behavior	SRB
Stop measured value output	STP
Start with administrator rights	SWA
Define measured value separator	TEX
Change channel names	

5.2 Communication

5.2.1 Addressing

Control character (only with RS-232-C):

CTRL R: Start of computer communication (ASCII code 18 decimal)

CTRL B: Start of computer communication (ASCII code 2 decimal)

CHS

Channel Select

Select amplifier channel

Syntax: CHS p1(x)

Parameter: p1

p1	Channel encoding value
	1 - 63

Channel combinations are set by the sum of the corresponding channel encoding values.

DMP41-T6

Channel encoding value p1	Channel number
1	1
2	2
4	3
8	4
16	5
32	6
63	All

DMP41-T2

Channel encoding value p1	Channel number
1	1
2	2
3	All

Effect: The amplifier channels are selected according to the binary value of the parameter p1. This specifies which amplifier channels are addressed by the following command.

Response:

Acknowledgement	Significance
0	Command executed
?	Error

Example 1: CHS3(x)
0(y)

Channels 1 and 2 are selected
(encoding value 1+2=3)

Example 2: Only channel 2 should be selected:
CHS2(x)
0(y)
Channel 2 is selected

Important

The commands for the amplifier settings and the amplifier functions only affect the selected channels. All channels are always selected (active) after switch on.

CHS?

Channel Select Query

Output of amplifier channels

Syntax: CHS? p1(x)

Parameter:

p1	Existing / selected channel numbers
0	The existing channels
1	The selected channels

Effect: The existing and selected channels result from the sum of the channel encoding values.

Response: q1(y)

Channel encoding value q1	Channel number
1	1

2	2
4	3
8	4
16	5
32	6
63	All

Bit mask:

Bit mask	32	16	8	4	2	1
Channel	6	5	4	3	2	1

Example 1: Query: Which channels are present in the device?
CHS?0(x)
3(y)
DMP41S2 is equipped with Channel 1 and 2.

Example 2: Query: Which channels are selected?
CHS?1(x)
1(y)
Channel 1 is selected.
or
CHS? can also be sent instead of CHS?(0).

RES

Reset

Execute warm start

Syntax: RES (x)

Parameter: none

Effect: The device executes a warm start. Communication is terminated.

Response: none

Example: RES(x)

Information

The RES command is a HBM command.

5.2.2 Computer-DMP41 communication

BDR

Baud Rate

Set baud rate of serial interfaces

Syntax: BDR p1,p2,p3,p4(x)

Parameter:

p1 baud rate		p2	Parity
300		0	No
600		1	Odd
1200		2	Even[1)]
2400			
4800			
9600[1)]			
19 200			
38400			
57600			
115200			

p3	Stop Bits		p4	The settings apply for the following interfaces:
1	1 Stop Bit[1)]		0	The interface from which the DMP41 is operated
2	2 Stop Bits		1	RS-232-C

[3)] [1)] Factory setting

The transmission is always carried out with 8 bit character length.

Effect: Baud rate, parity bit and number of stop bits for the serial interfaces are reset.

Response:

Acknowledgement	Significance
0	Command executed
?	Error

Example 1: The DMP41 is operated via the RS-232-C interface:

BDR19200,2,1,1(x)

0(y)

The RS-232-C interface was set to 19200 baud, even parity, 1 stop bit.

Example 2: The DMP41 is operated via the RS-485 interface:

BDR4800,0,2(x)
0(y)

The RS-485 interface was set to 4800 baud, no parity, 2 stop bits.

Important

The response after a BDR command is always output with the changed setting.

BDR?

Baud Rate Query

Output baud rate of serial interfaces

Syntax: BDR? p1(x)

Parameter:

p1	Interface whose baud rate is being queried
0	The interface from which the DMP41 is operated
1	RS−232−C interface
2	RS−485 interface

Effect: The set baud rate, parity bit, number of stop bits and the ID of the serial interface are output.

Response: q1,q2,q3,q4(y)

q1	Baud rate
q2	Parity
q3	Stop Bits
q4	Interface identification

Example 1: The DMP41 is operated via the RS-232-C interface:

BDR?(x)
4800,0,2,1(y)

The RS-232-C interface is set to 4800 baud, no parity, 2 stop bits.

Example 2: BDR?2(x)
4800,0,2,2(x)

The interface is set to 4800 baud, no parity,
2 stop bits.

SRB

Select Response Behavior

Select interface acknowledgement behavior

Syntax: SRB p1(x)

Parameter:

p1	Switch acknowledgment output on/off
0	Switch acknowledgment output off
1	Switch acknowledgment output on
2	Command; Response is returned

Effect: There are two command modes:

a.

Output commands (e.g. MSV?) that are identified by a question mark generate output data independently of the interface acknowledgement behavior selection. The output of this data cannot be suppressed with this command.

b.

Setting commands (e.g. SRB) generate acknowledgement data (0 or ?). The output of this data can be switched on/off with this command.

Example 1: SRB?(x)
Device ->

Example 2: SRB?;2(x)
Device <-
or
SRB2(x) Device ->
SRB2;0(x) Device <-

The responses are activated after the DMP41 is switched on.

Response:

Acknowledgement	Significance
0	Command is executed when SRB 1(x) was input
?	Error when SRB 1(x) was input
None	Command is executed or error when SRB 0(x) was input

Example:

SRB1(x)
0(y)

The command was acknowledged.
The setting commands now output an acknowledgement response 0 or ?.

SRB?

Select Response Behavior Query

Output of the interface acknowledgement behavior

Syntax: SRB?(x)

Parameter: none

Effect: The output behavior (acknowledgement switched on or off) of the interface is output (see SRB command).

Response: q1(y*)*

q1	Switch acknowledgment output on/off
0	Acknowledgment output switched off
1	Acknowledgment output switched on
2	Command; Response is returned

Example: SRB?(x)
1(y)

The setting commands do not output a response.

SRB2(x)
SRB2;0

Command returned again from here

IDN?
IDN?; HBM,DMP41,D1:09:BA:02.00.00,1.0.4.0

5.2.3 Error control, status register

XST?

Extended Status Query

Extended status query

Syntax: XST?(x)

Parameter: none

Effect: The DMP41 responds with a bit-coded decimal number.

Bit	Hex	Decimal
0	0001	1
1	0002	2
2	0004	4
3	0008	8
4	0010	16
5	0020	32
6	0040	64
7	0080	128
8	0100	256
9	0200	512
10	0400	1024

Bit0: Transducer error
Bit1: Calibration error
Bit2: No calibration carried out
Bit3: Timeout output stage
Bit4: Amplifier overloaded
Bit5: Sense lead (2-2') interrupted
Bit6: Sense lead (3-3') interrupted
Bit7: Calibration running
Bit8: Background calibration running
Bit9: Filter settling time
Bit10: Background calibration error
Bit11: No 0-wire detected
Bit12: No 1-wire detected
Bit13: Converters (internal) not synchronous
Bit14: Initialization (new transducer)
Bit15: Modulator overloaded

XST? outputs the sum of all relevant bits.
Response 258 means: 256 (calibration) and 2 (calibration error). This is a typical response after a channel change and ongoing initial calibration.

TED?

Transducer electronic datasheet Query

Output TID/TEDS

Syntax: TED?p1(x), p2(x)

Parameter:

q1	TID/TEDS function
3	Read out TID

p1	Kanal
1	Channel 1
…	
6	Channel 2

Response: q1(y)

q1	TID/TEDS Data
1	TID

Example: TED?3,1(x)
„*57000000932E9C23*„

5.2.4 Identification

AID?

Amplifier Identification Query

Output of amplifier identification

Syntax: AID?(x)

Parameter: none

Effect: Output of amplifier identification.

Response: String (20 characters per active amplifier)(y)

Example: AID?(x)
HBM,DMP41, 4D:5B:B9:02:00:00:1.0.3.2(y)
Company, device designation, serial number, version number.

IDN?

Identification Query

Output of device identification

Syntax: *IDN?(x)

Parameter: none

Effect: Output of device identification.

Example: IDN?(x)
HBM,DMP41, 4D:5B:B9:02:00:00:1.0.3.2(y)
Company, device designation, serial number, version number of software.

5.3 Amplifier settings

5.3.1 Amplifier input

ASA

Amplifier Sensor Adaptation

Input bridge excitation voltage and transducer type

Syntax: ASA p1,p2(x)

Parameter: p1

Code number of required bridge excitation voltage

p1	Bridge excitation voltage
1	2.5 V
2	5 V
3	10 V

Parameter: p2
Code number of the required input sensitivity

p2	Input sensitivity
1	2.5 mV/V
2	5 mV/V (excitation 2.5 V or 5 V)
3	10 mV/V (excitation 2.5 V)

Response:

Acknowledgement	Significance
0	Command executed
?	Error

Example: ASA3,1(x)
0(y)
The amplifier is set to 10 V bridge excitation voltage, 2.5 mV/V sensitivity and Shunt 'OFF'.

Important

This command triggers a calibration procedure in the measuring amplifier.

ASA?

Amplifier Sensor Adaptation Query

Output bridge excitation voltage and transducer type

Syntax: ASA? p1(x)

Parameter:

p1	
0	Output bridge excitation voltage and input sensitivity settings
1	Output table of possible bridge excitation voltage and input sensitivity settings

Effect: The amplifier outputs the set bridge excitation voltage and input sensitivity (p1=0) or their possible values (p1=1).

Response: ASA?0(x)
q1,q2(y)

q1	Bridge excitation voltage
q2	Input sensitivity

Example: ASA?1(x)
“02.505.010.0”,“123“

Response: ASA?1(x)
q1,q2(y)

Table of possible settings

q1	Possible bridge excitation voltage
q2	Possible sensitivities

Bridge excitation voltages

p1	Bridge excitation voltage (V)
02.5	2.5
05.0	5.0
10.0	10.0

The index corresponds to the bridge excitation voltage to be set (each element in the table is 4 characters long).

Sensitivity

p2	Sensitivity
1	Only 2.5 mV/V possible (10 V excitation)
12	2.5 mV/V or 5 mV/V possible (5 V excitation)
123	2.5 mV/V, 5 mV/V, 10 mV/V possible (2.5 V excitation)

Each element corresponds to the transducer type to be set (see assignment of code number to transducer type. Each element in the table is 1 character long).

ASS

Amplifier Signal Select

Select amplifier input signal

Syntax: ASS p1(x)

Parameter:

p1	Input source
0	ZERO Internal zero signal
1	CAL Internal calibration signal
2	MEAS Measurement signal

Effect: Specification of amplifier input signal.

Response:

Acknowledgement	Significance
0	Command executed
?	Error

Example: ASS0(x)
0(y)
Amplifier input switched to ZERO (internal zero signal).

ASS?

Amplifier Signal Select Query

Output of input signal type

Syntax: ASS?(x)

Parameter: none

Effect: Type of amplifier input signal is output.

Response: q1(y)

q1	Input signal source of the amplifier
0	Amplifier input is switched to ZERO.
1	Amplifier input is switched to CAL.
2	Amplifier input is switched to MEAS.

Example: ASS?(x)
2(y)

Amplifier input is switched to MEAS (measurement signal).

5.3.2 Filter setting

AFS

Amplifier Filtering Select

Filter switchover (fc 1/2)

Syntax: AFS p1(x)

Parameter:

p1	Filter code number
1	fc1
2	fc2

Effect: Switchover between two filters (see also ASF).

Response:

Acknowledge-ment	Significance
0	Command executed
?	Error

Example: AFS 2 (x)
0(y)
Filter fc2 is switched on.

AFS?

Amplifier Filtering Select Query

Output filter settings

Syntax: AFS?(x)

Parameter: none

Effect: Output of set filter

Response: q1(y)

q1	Filter code number
1	fc1
2	fc2

Example: AFS?(x)
1(y)
Filter fc1 is switched on

ASF

Amplifier Signal Filtering

Input of cut-off frequency and filter characteristic

Syntax: ASF p1,p2,p3(x)

Parameter:

p1	Filter code number
1	fc1
2	fc2

p2	Filter frequency
1...n	Code number for frequency value (equivalent to the index in the frequency table that can be output with the command ASF?0).

p3	Filter characteristic
0	Bessel
1	Butterworth

Effect: The low-pass filter fc1 or fc2 is assigned a frequency value and a filter characteristic.
(See frequency table for command ASF?).

Response:

Acknowledge-ment	Significance
0	Command executed
?	Error

Example: Input of cut-off frequency and filter characteristic for filter fc2.
ASF 2,4,0 (x)
0(y)
Filter fc2 is set to 0.22Hz cut-off frequency and Bessel characteristic.(see tables for command ASF?)

ASF?

Amplifier Signal Filtering Query

Output of cut-off frequency and filter characteristic

Syntax: ASF? p1(x)

Parameter:

p1	Filter code number
0	Frequency table (Bessel and Butterworth)
1	Filter fc1
2	Filter fc2

Effect: Output of cut-off frequency and filter characteristics set in the low-pass filter.

Response: If p1=0
q1, q2(y)

q1	Table, Bessel frequencies
q2	Table, Butterworth frequencies

If p1≠0
q1, q2, q3(y)

q1	Filter number fc1 / fc2
q2	Cut-off frequency of filter fc1/fc2
q3	Filter characteristic (0=Bessel, 1= Butterworth)

Example 1: Table of possible filter frequencies
ASF?0(x)
"*0.040 0.080 0.100 0.200 0.0400 0.800 1.000*",
"*2.000 4.000 8.000 10.000 20.000 40.000*"*(y)*

The following tables list the possible cut-off frequencies with Bessel or Butterworth characteristics with the maximum possible sampling rate (see also command ISR).

The index corresponds to the frequency voltage to be set (each element in the table is 5 characters long).

Index	Bessel frequency (Hz)	Butterworth (Hz)
1	40.00	40.000
2	20.00	20.000
3	10.00	10.000
4	8.00	8.000
5	4.00	4.000
6	2.00	2.000
7	1.00	1.000
8	0.80	0.800
9	0.40	0.400
10	0.20	0.200
11	0.10	0.100
12	0.08	0.080
13	0.04	0.040

5.3.3 Measuring range

CDW

Calibration Dead Weight

Start zero setting/input zero value (balance)

Syntax: CDWp1,p2(x)

Parameter:

q1	Zero value in ADU units
	7680000 ADU units correspond to the momentarily set measuring range full scale (range) 2.5 mV/V, 5 mV/V or 10 mV/V or in scaled units

Parameters: p1 and p2 optional

p2=10 or not given
p1 in ADU
p2=11
p1 in mV/V
p2=12
p1 in scaled units

Effect: The input value is saved in the amplifier zero memory.

Response:

Acknowledge-ment	Significance
0	Command executed
?	Error

Example 1: Start zero setting
CDW(x)
0*(y)*

Example 2: CDW10000(x)
0(y)

Information

If the value read out with CDW?1 (absolute value) is sent for p1, the momentarily present gross measurement signal is set to zero.

CDW7680000(x)
0(y)
Zero value set to 7680000 ADU

CDW2.5,11(x)
0(y)
Zero value set to 2.5 mV/V

CDW780.75,12(x)
0(y)
Zero value set to 780.75 in scaled unit

Important

It is still possible to set a basic misalignment to zero by calculating the zero value to be input using the following calculation:

$$\text{Zero value (ADU units)} = \frac{7680000 \times \text{basic misalignment (mV/V)}}{\text{Measuring range full scale (mV/V)}}$$

CDW: If correspondingly programmed, the input value is inverted

CDW?: If correspondingly programmed, the output value is inverted

See also SGN

A zero value that is more ±10.1 mV/V will not be accepted.

CDW?

Calibration Dead Weight Query

Output of zero value

Syntax: CDW? p1(x)

Parameter:

p1	Return value
0	Zero value in ADU
1	Actual absolute value in ADU
10	Zero value in ADU
11	Zero value in mV/V
12	Zero value in scaled units

Effect: This command outputs the zero value from the memory or the actual absolute value.

Response: q1(y)

q1	Zero value in (equal to p1) required unit
	7680000 ADU units correspond to the currently set measuring range full scale (Range 1) 2.5 mV/V, 5 mV/V or 10 mV/V.

Example 1: CDW?1(x)
10000(y)
The current ABS measured value is output.
This signal is now set to zero with CDW 10 000(x).
CDW?11(x)
2.5(y)
Zero value output in mV/V
CDW?0(x)
7680000(y)
Zero value output in ADU

CMR

Change Measuring Range

Measuring range switchover (Range 1/2)

Syntax: CMR p1(x)

Parameter:

p1	Measuring range code number
1	Measuring range (Range) 1
2	Measuring range (Range) 2

Effect: The required measuring range is switched on.

Response:

Acknowledge-ment	Significance
0	Command executed
?	Error

Example: CMR2(x)
0(y)
Measuring range 2 set.

CMR?

Change Measuring Range Query

Output of measuring range

Syntax: CMR?(x)

Parameter: none

Effect: The selected measuring range is output.

Response: q1(y)

q1	Measuring range code number
1	Measuring range (Range) 1
2	Measuring range (Range) 2

Example: CMR?(x)
2(y)
Measuring range 2 set.

5.3.4 Taring

TAR

Tare Instruction

Start taring/Input tare value

Syntax: TAR p1,p2(x)

Parameters: p1 and p2 (optional)
Tare value in ADU units
p2=10 or not set
p1 in ADU
p2=11
p1 in mV/V
p2=12
p1 in scaled units

Effect: The net measured value is tared.

Response:

Acknowledge-ment	Significance
0	Command executed
?	Error

Example 1: Start taring
TAR(x)
0(y)

Important

Taring is implemented mathematically, not by comparing the input signal

A tare value that is more ±10.1 mV/V will not be accepted.

Example 2: TAR3840000(x)
0(y)
Input value in ADU is written to the Tare memory.

Example 3: TAR0(x)
0(y)
The Tare memory is cleared (gross measured value = net measured value).
TAR1.25,11(x)
0(y)
Input value in mV/V is written to the Tare memory.

TAR?

Tare Value Query

Output Tare value or current value

Syntax: TAR?p1

Parameter: p1 (optional)
Tare value in ADU units

p1	Return value
-	Tare value in ADU
0	Tare value in ADU
1	Actual gross measured value in ADU
10	Tare value in ADU
11	Tare value in mV/V
12	Tare value in scaled units

Effect: The tare value is output (equal to p1) in the required unit.

Response: q1(y)
Tare value

Example: TAR?(x)
3840000(y)

TAR: If correspondingly programmed, the input value is inverted

TAR?: If correspondingly programmed, the output value is inverted

See also SGN

ESM?

Extended Status Mask Query

Output channel mask

Syntax: ESM?(x)

Parameter: none

Effect: Returns the channel masks of the channels that could not be tared or set to zero.

Response: q1(y)
0
All channels tared/set to zero

Example: CHS63(x)
0
CDW(x)
?
ESM?
3
Channel 1 and Channel 2 could not be set to zero.

CPV

Clear Peak Value

Clear peak value memory

Syntax: CPV(x)

Parameter: none

Effect: The peak value memory is cleared with this command.

Response:

Acknowledge-ment	Significance
0	Command executed
?	Error

Example: CPV(x)
0(y)
Peak value memories are cleared.

Important

After the peak value memory is cleared, the output signal of the memory corresponds to the present measured value.

5.3.5 Transfer of amplifier settings and comments

TDD

Transmit Device Data

Saves amplifier settings and comments

Syntax: TDD p1(x)

Parameter:

p1	Amplifier settings
0	Restore Factory Settings
1	Restore User Settings
2	Save User Settings

p1	Comments
5	Restore User Channel Names
6	Save User Channel Names

Effect: Saves or loads settings according to parameters with immediate effect.

Response:

Acknowledgement	Significance
0	Command executed
?	Error

Parameter p2 optional:

Syntax: TDD p1,ps(x)

Parameter:

p1	Amplifier settings
0	Restore Factory Settings
1	Restore User Settings
2	Restore Save Settings
5	Restore User Channel Names
6	Save User Channel Names

P1: 1, 2, 5, 6

P2 = Number of parameter set

P2	Comments
1. . . 100	1 … 100 (load from settings, save in user parameters)

Example: TDD1,100(x)
0(y)
Loads the channel sets back from parameter set 100.

Example: TDD2(x)
0(y)
Saves actual channel settings.
Saving to an external EEPROM takes ca. 3 sec.

Example: TDD2,67(x)
0(y)
Save amplifier settings to user parameter slot 67.

Example: TDD5,3(x)
0(y)
Read channel name out of user parameter slot 3.
If slot 3 is not occupied, the default name is set.

TDD?

Transmit Device Data Query

Query origin of amplifier settings

Syntax: TDD? p1(x)

Parameter:

p1	
0	Origin of amplifier settings

Effect: Queries the source of the currently applicable amplifier settings.

Response: q2(y)

q2	at p1=0
0	Setup
1	Internal EEPROM
2	User input
3	External EEPROM (transducer EEPROM)
?	Error

Example:
TDD?0 returns “0"

UCC

User Channel Comment

Enter channel names

Syntax: UCC p1(x)

Parameter: p1
Any string “_ _ _ _ _", (45 characters)

Effect: Any channel name can be assigned with this command.

Response:

Acknowledgement	Significance
0	Command executed
?	Error

Example: UCC“Displacement transducer on tunnel wall right" (x)
0(y)

UCC?

User Channel Comment Query

Output channel names

Syntax: UCC?(x)

Parameter: none

Effect: A channel name saved in the amplifier can be read out with this command.

Response: “_ _ (String)_ _"(y)

Example: UCC?(x)
“Pressure transducer on load machine"(y)

SLN

Slot Name

Assign slot name

Syntax: SLNp1,p2(x)

Parameter: p1

p1	Status
1	Slot number (1 … 100)

P2	Status
1	Slot name (string)

Effect: The channel settings are saved with the TDD command. The command makes it possible to assign a freely definable name to each of these slots (1…100).

Beispiel: Das MGC wird von der IEEE-Schnittstelle gesteuert

Example: SLN1,“TestSlot"(x)
0*(y)*
Assigns Slot 1 the name “TestSlot".

SLN?

Slot Name Query

Query slot name

Syntax: SLN?p1(x)

Parameter:

q1	Status
1	Number of slot

Effect: Returns the name of the slot. SLN?1 … SLN?100 are possible

Example: SLN?1(x)
Master channel
Returns the name of Slot1, e.g. “Master channel"
SLN?0
Outputs a list of all names.
“TestSlot,“2",“NameSlot3", … “Slot name for Slot100"

Response: String (14 characters)(y)

Example: IDN?(x)
HBM,DMP41, 4D:5B:B9:02:00:00:1.0.3.2(y)

5.4 Amplifier functions

5.4.1 Output format, measured value output

COF

Change Output Format

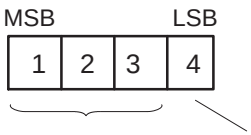
Change measured value output format

Syntax: COF p1(x)

Parameter:

p1	Measured value output format
0	Measured value, channel, status (ASCII format)
1	Measured value (ASCII format)
2	Binary measured value output 4 byte (MSB XX XX LSB)
3	Binary measured value output 4 byte (LSB XX XX MSB)
4	Binary measured value output 2 byte (MSB LSB)
5	Binary measured value output 2 byte (LSB MSB)

4 byte output:



7680000 = Measuring range full scale (unit)
The output value multiplied by 1/2560 is equivalent to the measured value in degrees for thermocouples and the units 5C,5F, K.

Status		Significance	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	GUI message
0	OK	Measurement without warnings or error	0	0	0	0	LV 4	LV 3	LV 2	LV 1	
1	Warning	Filter setting	0	x	x	1	LV 4	LV 3	LV 2	LV 1	Change color of filter text
2		Overflow	0	x	1	x	LV 4	LV 3	LV 2	LV 1	Display warning symbol

Status		Significance	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	GUI message
3		Calibration expired	0	1	x	x	LV 4	LV 3	LV 2	LV 1	Display warning symbol
4	Error	Transducer not connected	1	0	0	0	LV 4	LV 3	LV 2	LV 1	Switchover value to: No transducer
5		Transducer or amplifier	1	0	0	1	LV 4	LV 3	LV 2	LV 1	Switchover value to: Transducer error
6		Overflow	1	0	1	0	LV 4	LV 3	LV 2	LV 1	Switchover value to: Overflow error
7		Initialization	1	1	0	0	LV 4	LV 3	LV 2	LV 1	Switchover value to: Initialization

Information

Bit 7: If this bit is set, the corresponding error is shown in the measurement window.
Error: Only one error message is displayed.
Warning: All warnings are shown at the same time on screen.

Effect: The measured values are output in the required format with the following MSV commands.

Response:

Acknowledgement	Significance
0	Command executed
?	Error

Example: COF0(x)
0(y)
Output measured values with Channel No. and Status in ASCII format.

Information

This command applies to all channels of a device.

Information

The measured values are scaled in ASCII format or output in ADU units in binary format.

COF?

Change Output Format Query

Query measured value output format

Syntax: COF?(x)

Parameter: none

Effect: Code number of measured value output format is output.

Response: q1(y)

Code number of the output format (see COF command).

Example: COF?(x)
0(y)
Measured values, Channel No. and Status are output in ASCII format.

ISR

Input Sampling Rate

Set measured value transfer rate

Syntax: ISR p1(x)

Parameter: p1
Divider value for the data rate with measured value output via an interface.

Effect: This command ensures output in a fixed timeslot for measured value output using the command MSV?x,y.

The relationship between parameter p1 and the output rate results from the calculation below.

The following calculation applies for the determination of the input value for p1:

$$p1 = \frac{\text{Internal cycle frequency (=75 Hz)}}{\text{Measured value transfer rate}} = 1...75$$

Syntax: ISR p1,p2(x)
p1 is ignored, the following calculation applies for p2:

$$P2 = \frac{\text{Internal cycle frequency (=450 Hz)}}{\text{Measured value transfer rate}} = 1 .. 450$$

The following commands initiate an output with a timeslot of 15 measured values/second:

Command	Function
ISR5(x)	Measured value transfer rate 15 per second
COF2(x)	Output format 4 byte binary
MSV?13,0(x)	Duration of measured value output Gross signal
STP(x)	Stop measurement output

MSV?

Measuring Signal Value Query

Output measured value

Syntax: MSV? p1,p2,p3(x)

Parameter: p1

Selection of amplifier signal

p1	Signal	
1	Meas. val. Gross	According to actual measuring range
2	Meas. val. Net	According to actual measuring range
3 … 12	unassigned	
13	Meas. val. Gross	According to actual measuring range
14	Meas. val. Net	According to actual measuring range
15	Measured value Absolute	According to actual measuring range
16	Minimum value Gross	According to actual measuring range
17	Minimum value Net	According to current measuring range
18	Minimum value Absolute	According to actual measuring range
19	Maximum value Gross	According to actual measuring range
20	Maximum value Net	According to actual measuring range
21	Maximum value Absolute	According to actual measuring range
22	Peak-to-peak	According to current measuring range (Gross, Net, Absolute are always identical here)
23	Meas. val. Gross	mV/V
24	Meas. val. Net	mV/V
25	Measured value Absolute	mV/V
26	Minimum value Gross	mV/V
27	Minimum value Net	mV/V
28	Minimum value Absolute	mV/V

29	Maximum value Gross	mV/V
30	Maximum value Net	mV/V
31	Maximum value Absolute	mV/V
32	Peak-to-peak	mV/V
33	Meas. val. Gross	Unit 2
34	Meas. val. Net	Unit 2
35	Measured value Absolute	Unit 2
36	Minimum value Gross	Unit 2
37	Minimum value Net	Unit 2
38	Minimum value Absolute	Unit 2
39	Maximum value Gross	Unit 2
40	Maximum value Net	Unit 2
41	Maximum value Absolute	Unit 2
42	Peak-to-peak	Unit 2
43	Measured value in ADU	

p2	Number of measured values
0	Send continuously
1 ... 65 535	Default = 1

Parameter: p3

Follow-up time in seconds 0.1 s to 60.0 s.

Output time in seconds between measured values (only for binary measured value output).

Effect: The measured value of the required signal p1 is output. The output format depends on the last COF and TEX commands. The command CHS is used to determine from which channel the measured values are output.

Response: Measured value (output format see COF command).

MSV?: If appropriately programmed, all values are inverted (see also SGN command).

Exceptions for the following parameters:

16 to 18
19 to 21
22
26 to 32
36 to 43

Example 1: Output in ASCII full format

TEX44,59(x) Separator `,' and `;'
*0(y)*COF0(x) ASCII full format (measured value, channel, status)
0(y)

Get measured value from S1.
MSV?1,2(x)
-0.000406,6,0;-0.000410,6,0;(y)

Example 2: Output in ASCII short format

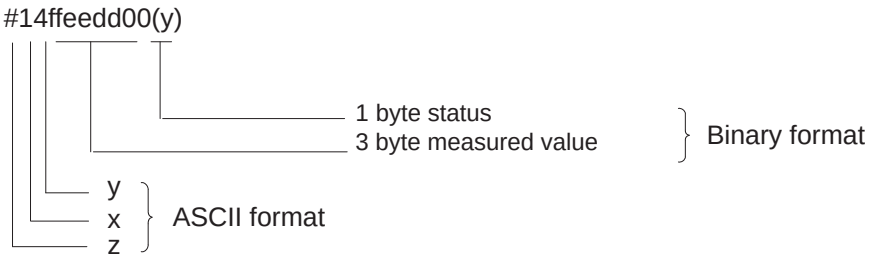
ASCII short format (measured value only).
One measured value from S1.

COF1(x)
0(y)
MSV?1(x)
9.998(y)

Example 3: Output in 4 byte binary format

Binary 4 byte format
One measured value from S1

COF2(x)
0(y)
MSV?1(x)



z: Identifier for binary output

x: Indicates the number of decimal places of y (x=0 with continuous output)

y: Indicates the number of binary bytes that follow (omitted in continuous output)

E.g.:
x = 1 y = 8 (8 binary bytes are output)
x = 2 y =16 (16 binary bytes are output)

MEV

Measuring Extended Values Query

Output of extended measured values

Syntax: MEV? p1 (x)

Parameter: p1

Selection of amplifier signal

p1	Channel mask for temperature values (up to 4, also for DMP41–T2)
1	Temperature 1
2	Temperature 2
4	Temperature 3
8	Temperature 4
…	
15	All temperature sensors

The maximum sampling rate is 1 Hz; it is reduced as the number of temperature sensors connected increases (1Hz/n). The temperature is returned in °C x 100.
The status of the temperature channel is transmitted by another parameter.

Example: Measurement of transducer temperature with 1-wire temperature sensor

MEV?1(x)
2650.0
26,50ºC, Status OK
MEV?15 (15 = Channel mask)
2650,0,2850,0,2670,0,0,5
Channel 1: 26.5 ºC, Status OK
Channel 2: 28.5 ºC, Status OK
Channel 3: 26.7 ºC, Status OK
Channel 4: no temperature sensor

Delivers temperature and temperature status of all 4 temperature sensors (4 temperature sensors, also for DMP41-T2).

Status table:

Status	Meaning
0	TEMP_NOERROR
1	TEMP_NEVER_MEASURED
2	TEMP_SHORT_CIRCUIT
3	TEMP_NO_PRESENCE_PULSE
4	TEMP_MANY_DEVICES
5	TEMP_NO_TEMP_SENSOR
6	TEMP_SEARCH_ROM_FAILED
7	TEMP_CONVERT_FAILED
8	TEMP_READING_FAILED

STP

Stop

Stop measured value output

Syntax: STP(x)

Parameter: none

Effect: The measured value output started with MSV? is stopped.

Response: none

Example: STP(x)

TEX

Define Terminator

Define measured value separator

Syntax: TEX p1,p2(x)

Parameter:

p1	Parameter separator
	1 - 126 Default: 44, ASCII “,”

p2	Block separator
	1 - 126 Default: 13, ASCII “CR”

Effect: ASCII characters entered with p1 and p2 act as separators in ASCII measured value output (command MSV?). ASCII characters entered with p1 are output as parameter separators, ASCII characters entered with p2 are output as block separators between repeated measured values.

Response:

Acknowledgement	Significance
0	Command executed
?	Error

Example: TEX59,13(x)
0(y)
59 → ASCII “;"
13 → ASCII “CR"

TEX?

Define Terminator Query

Output measured value separator

Syntax: TEX?(x)

Parameter: none

Effect: Output measured value separator (see TEX).

Response: q1,q2(y)

Parameter and block separator

Example: TEX?(x)
44,13(y)
44 → ASCII “,"
13 → ASCII “CR"

5.4.2 Display functions

Important

The commands in this “Display functions" chapter have an effect on the measured values shown in the display.

ENU

Engineering Unit
Input of unit

Syntax: ENU p1,p2(x)

Parameter:

p1	Measuring range to which the unit applies
	1 = Measuring range 1; 2 = Measuring range 2

p2	The required unit as a string
	4 characters

Effect: Unit is set with p2.

Response:

Acknowledge-ment	Significance
0	Command executed
?	Error

Example: ENU 2,“KG_ _"(x)
0(y)

ENU?

Engineering Unit Query

Output of unit

Syntax: ENU? p1(x)

Parameter:

p1	
0	Unit of the momentarily set measuring range
1	Measuring range 1 unit
2	Measuring range 2 unit
3	Table of possible units

Effect: The selected unit is output.

Response: q1,q2(y)

q1 No. of measuring range (Range1/2)

q2 A string consisting of maximum 4 characters.

The string characters can be found in the table on the next page.

Possible unit for measuring range 1:

“MV/V"

Possible units for measuring range 2:

“V__G___KG__T___KT--TONSLBS-N---KN--BAR-mBARPA__PAS_HPASKPASPSI_uM__MM__CM__M___INCHNM__FTLBINLBUM/MM/S_M/SSp/o_p/ooPPM"

Significance:

MV/V	=	mV/V	PSI	=	PSI
V	=	V	uM	=	µm
G	=	g	MM	=	mm
KG	=	kg	CM	=	cm
T	=	t	M	=	m
KT	=	kt	INCH	=	inch
TONS	=	tons	NM	=	Nm
LBS	=	lbs	FTLB	=	ftlb
N	=	N	INLB	=	inlb
KN	=	kN	uM/M	=	µm/m
BAR	=	bar	M/S	=	m/s
mBAR	=	mbar	M/SS	=	m/s^2
PA	=	PA	p/o	=	%
PAS	=	PAS	p/oo	=	‰
HPAS	=	HPAS	PPM	=	ppm
KPAS	=	KPAS			

Example 1: ENU?(x)

1,“MV/V"(y)

Unit of momentarily set measuring range

Example 2: ENU?3(x)

"V_ _ _G_ _ _KG_ _T_ _ _KT_ _TONSLBS_N_ _ _KN_ _BAR_mBARPA_ PAS_HPASKPASPSI_UM_ _MM_ _CM_ _M_ _ _INCHNM_ _FTL-BINLB

U*M/MM/S_M/SSp/o_p/00PPM_"(y)*

Output table of possible units.

This string contains the table of possible units for this amplifier. Each element in the table is 4 characters long.

IAD

Indication Adaptation

Input, display full scale, decimal point, step

Syntax: IAD p1,p2,p3,p4(x)

Parameter:

p1	Range 1 or 2
p2	Display full scale without decimal point
p3	Decimal point (number of decimal places)
p4	Step (= minimum digit jump) (digit)

The step p4 can have the following values:

p4	Step
1	1
2	2
3	5
4	10
5	20
6	50
7	100
8	200
9	500
10	1000

Effect: This command is used to input display adaptation values.

Response:

Acknowledgement	Significance
0	Command executed
?	Error

Example: IAD2,10000,3,4(x)
0(y)

Set display adaptation for measuring range 2

Display full scale 10.000 with step 0.010

Important

Only the range momentarily selected with ASA can be input in measuring range 1; the decimal places can vary between 3 and 6.

Permissible, e.g.: IAD1,250000,6,2
IAD1,50000,4,1

IAD?

Indication Adaptation Query

Output display full scale, decimal point, step

Syntax: IAD? p1(x)

Parameter:

p1	Status
1	from measuring range 1
2	from measuring range 2

Effect: Output of display full scale, decimal point, step.

Response: q1,q2,q3,q4(y)
Parameters see IAD command

Example: IAD?2(x)
2,10000,3,1(y)
Display full scale in measuring range 2 is 10.000 with step 0.001.

LTB

Linearization Table
Linearization of transducer characteristic curve

Syntax: LTB $n,x_1,y_1 \ldots x_n,y_n(x)$

Parameters: n=2 ...11
x=Numbers in mV/V (Measuring range 1)
y=Numbers with actual unit from measuring range 2

Effect: This command can be used to correct known linearity deviations of the transducer by specifying up to 11 points of the characteristic curve.

Important

Value pairs are sorted according to X and checked that they increase or decrease monotonically.

“0" = OK
“?" = NOK

LTB?

Linearization Table Query
Output actual linearization curve

Syntax: LTB?(x)

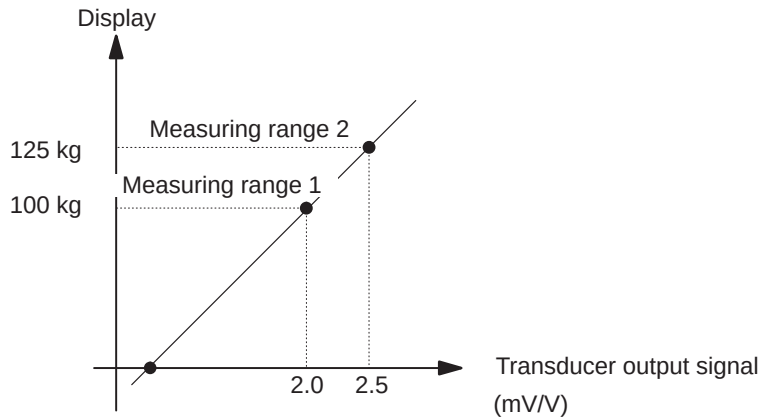
Parameter: none

Effect: The actual characteristic curve points are output.

Important

After the characteristic curve points are entered, the display adaptation (command “IAD") of the measuring range 2 is automatically adapted. As the linearization table is input in mV/V, a correction after a measuring range change is not necessary.
Values that lie outside the momentarily selected measuring range can also be input.

Example:



SGN

Sign Reversal
Reversal of preceding sign

Syntax: SGN p1(x)

Parameter: p1

p1	Display
0	Normal display of measured values
1	Inverted display of measured values
2	Change normal / inverted

SGN?

Sign Reversal Query

Output of preceding sign

Syntax: SGN?(x)

Parameter: none

Response: q1(y)

q1	
0	Normal display of measured values
1	Inverted display of measured values

Company, device designation, serial number, version number of software.

5.5 Multi-Client

RAR

Request Admin Rights

Request administrator rights

Syntax: RAR p1(x)

Parameter: p1

p1	Display
Any string	Current password

Special case: P1 = 0

Effect: Requests the administrator rights

Response:

Acknowledgement	Significance
0	Command executed Password correct Administrator rights received
?	Incorrect password or other parameter error

Example: RAR1234(x)
0(y)
Password was correct. The requesting Client now has administrator rights.
RAR1234(x)
?(y)
Incorrect password input. Existing administrator status remains unchanged.
Special case p1 = 0
“0" may not be used as a password. Client returns the administrator rights (if StartWithAdminrights = 1, the device client receives the administrator rights again, otherwise the administrator rights are not automatically assigned to any client).

RAR?

Request Admin Rights Query

Query assigned administrator rights

Syntax: RAR?(x)

Parameter: none

Effect: Queries the assigned administrator rights

Response: q1(y)

q1	Status
1	The requesting Client already has administrator rights (setting amplifier settings is permitted).
0	The requesting Client has no administrator rights.

CHP

Change Admin Password

Change password

Syntax: CHP p1,p2(x)

Parameter: p1, p2 (any string)

p	Status
P1	Current password
P2	New password

Effect: The password can be changed.

Response:

Acknowledge-ment	Significance
0	Command executed Current password changed
?	Incorrect password or other parameter error

Example: CHP1234,12345(x)
0(y)
If the old password was 1234, the new password is now set to 12345.

Example: CHP1234,12345(x)
?(y)
Incorrect password or other parameter error.

SWA

Start with Adminrights

Start with administrator rights

Syntax: SWAp1,p2(x)

Parameter: p1, p2,

P1= Actual password

P2= 0 start without administrator rights

P2=1 start with administrator rights

Effect: Specifies whether the device starts with or without administrator rights.

Response: (y)

Acknowledgement	Significance
0	Password correct
?	Incorrect password or other parameter error

Example: SWA1234,1(x)
0(y)

Password OK. DMP41 display Client starts with administrator rights.

SWA1234,1(x)
?(y)

Password incorrect. DMP41 display Client starts with current settings.

SWA1234,0(x)
0(y)

Password OK. DMP41 display Client starts **without** administrator rights.

SWA?

Start with Adminrights Query

Start with/without querying administrator rights

Syntax: SWA?(x)

Parameter: none

Effect: Status of start behavior is queried.

Response: q1(y)

q1	Status
1	Display Client starts with administrator rights
0	Display Client starts without administrator rights

5.6 Other

BGL

Background light

Background lighting

Syntax: BGLp1,p2,p3(x)

Parameter: p1

p1	Status
1−100	Standard intensity of screen brightness in % (1 − 100)

P2	Status
0−100	Dimmed intensity of screen brightness in % (0 − 100)

P3	Status
1−3600	Time until screen is dimmed in seconds

Effect: Determines the intensity of the background lighting.

BGL?

Background light Query

Query intensity of background lighting

Syntax: BGL?(x)

Parameter: none

Effect: Intensity of background lighting is queried

Response: q1(y)

q1	Status
1	Value in %, normal intensity in percent

2	Value in %, dimmed intensity in percent
3	Value in seconds

q1(y)

0.100

Example: BGL?(x)
100,25,600*(y)*

Standard intensity set to 100%, dimmed intensity set to 25%.

Switch to dimmed intensity after 600 seconds idle time (no screen contact and no keys pressed).

CIN?

Get Channel Information

Special command that returns all information for display of measured values

Syntax: CIN?(x)

Parameter:

The response is then displayed dependent on the number of channels.

The returned parameters separated by commas (e.g. 6,37768,0.00,3 …) have the following significance

p		
P1	2	Number of existing measurement channels (important for the correct evaluation of this response)
P2	37768	Status of actual measured value line
P3	0.00	Temperature channel 1, temperature in °C (always 2 decimal places)
P4	3	Status of temperature channel 1
P5	0.00	Temperature channel 6
P6	3	Status of temperature channel 6

Example: Number of channels 2

P7	CHn	Name of measurement channel 1
P8		Name of measurement channel 2
P9	0	Filter characteristic for measurement channel 1
P10		Filter characteristic for measurement channel 2
P11	16	Filter frequency for measurement channel 1
P12		Filter frequency for measurement channel 2
P13	0	Filter characteristic for measurement channel 1

P14		Filter characteristic for measurement channel 2
P15	16[1)]	Filter frequency for measurement channel 1
P16		Filter frequency for measurement channel 2
P17	2	Excitation voltage channel 1
P18		Excitation voltage channel 2

1) Note: Meaning of second column: e.g. filter frequency index for measurement channel 1

P19	1	Sensitivity channel 1
P20		Sensitivity channel 2
P21	PPM	User Unit channel 1
P22		User Unit channel 2
P23	0	Status measured value of measurement channel 1
P24	0	Status measured value of measurement channel 2

Following the respective measured values of a specific signal (e.g. absolute, mV/V) for all channels, the states for these measured values are also output directly after one another (separated by commas).

Only then does the next signal follow (all measured values of the signal (e.g. gross, mV/V)) and then all states of the measured values of this signal.

Example: Also with 2 channels

P25	−1.500	Measured value channel 1 Signal **23** = Measured value gross in mV/V
P26	1.123455	Measured value channel 2 Signal 23 = Measured value gross in mV/V
P27	−1501	Status channel 1 Signal 23 = Measured value gross in mV/V
P28	−1501	Status channel 2 Signal 23 = Measured value gross in mV/V
P29	125346	Measured value channel 1 Signal **24** = Measured value net in mV/V
P30	212324	Measured value channel 2 Signal 24 = Measured value net in mV/V
P31		Status channel 1 Signal 24 = Measured value net in mV/V
P32		Status channel 2 Signal 24 = Measured value net in mV/V
….		
Pn		

Effect: Returns the channel information according to the specified formats.

DEN

Device Name

Syntax: DENp1(x)

Parameter: p1 = String, max. 16 characters
Example: DEN “DMP41 Schmidt"(x)
0(y)
Assign device name “DMP41 Schmidt".

DEN?

Device Name
Output device name

Syntax: DEN?(x)
Effect: Returns the name of the device, e.g. “DMP41 Schmidt".
This is the name that is shown during a device scan.

VIN

Version Information
Version information
Syntax: VIN?(x)
Effect: Returns the version information
Response: q1(y)

Example: VIN?(x)
“1.0.0.3",“11.4.26.1",“0.0.1.18",“0.0.1.29",“1.0.0.0",“1"(y)
Parameter 1 (“1.0.0.3") is the serial number of the device software
Parameter 2 (“11.4.26.1") is the hardware version
Parameter 3 (“0.0.1.18") is the FPGA version
Parameter 4 (“0.0.1.29") is the firmware version
Parameter 5 (“1.0.0.0") is the operating system (OS) version
Parameter 6 (“1") is the serial number of the device

DRS

Device Reset

Reset ranges to factory settings

Syntax: DRSp1(x)

Parameter: p1

p1	Significance	Content
1	Reset channel settings to factory settings	Range, Filter, Scaling, Name, Resolution, Zero, MinMax
2	Reset hardware settings to factory settings	Password, Brightness, DeviceName
3	Reset hardware settings to factory settings	Ethernet, RS232

RS2?

RS232 adapter detected

RS232 adapter detected

Syntax: RS2?(x)

Effect: RS232 adapter detection

Response: q1(y)

q1	Status
1	USB−RS232 adapter was detected
0	No adapter connected or adapter not supported

EST?

Extended Status

Syntax: EST?(x)

Effect: Returns the extended status once and then sets it to 0.
The extended status provides information about the last occurred error
(command acknowledged with “?") information

Response: q1(y)

q1	Status
10003	Unknown command was sent
10004	Too many or too few parameters included (e.g. CHS,1,2,3)
10005	Value of a parameter outside valid limits
10008	Command cannot be executed (e.g. a channel could not be set to zero because no valid measured value was present)

10009	Command requires administrator rights (e.g. DEN“MEINDMP”: You need to be an administrator in order to change a device name)
10010	Invalid parameter (e.g. a floating comma given instead of an integer; CHS3.5)
10011	Invalid password
10013	Unexpected command (during the processing of a command)
10014	Command cannot be executed in full (e.g. 4 channels selected but zero setting only functioned in 2 channels), see ESM?

RCL?

Remote Client Connection Query

Existing PC connection

Syntax: RCL?(x)

Effect: Returns the addresses and ports of all connected clients, e.g.

127.0.0:1096,172.19.1.3:54174

Example:

127.0.0.1:1096 = IP address and port of client that is running on

the DMP41 (display and operating software)

172.19.1.3:54174 = IP address and port of another client

(here via Ethernet)

Glossary

This glossary contains words that are used in the manual “Operation with computer or terminal" and general computing technology terms.

ASCII

ASCII is a standardized code (**A**merican **S**tandard **C**ode for **I**nformation **I**nterchange) which assigns a specific code to each printable character and control characters of your computer, e.g. 4F for the character O.

Baud

Baud is the unit of measurement for the speed with which data is transferred between device units via a serial interface. 1 baud is equivalent to a transfer rate of one bit per second.

Bit

Bit is the abbreviation for binary digit. A bit is the smallest information unit that a computer can recognize. A bit has the value 0 or 1. 8 bits are 1 byte.

Command

Command is the technical term for an instruction to a computer. Commands are input to the computer via the keyboard, mouse or other input device. Commands instruct the computer to start/stop operations or call up and execute a program.

Byte

A byte is the unit size for the memory space required to store one character. One byte consists of 8 bits, e.g. 01010001.

Firmware

Software that is saved in EEPROM or PROM and which defines the device function. The firmware is permanently installed and does not run on an external computer.

Channel encoding value

Each channel is assigned a binary value. The corresponding decimal value is transmitted.

Interface

Any connection point through which data can be transmitted or which can be connected to the devices.

Serial

A standardized transmission mode where data is transfered bit by bit between a transmission and a reception device.

Syntax

A specified sequence of characters in which commands, parameters and switches must be entered.

Functional command overview

Communication responses

Addressing

CHS,	Select amplifier channel
CHS?,	Output of amplifier channels,
RES,	Reset

Communication computer/DMP

BDR,	Set baud rate of serial interfaces
BDR?,	Output baud rate of serial interfaces
SRB, ,	Select interface acknowledgement behavior
SRB?,	Output of the interface acknowledgement behavior

Error control, status register

XST?,	Extended status query

Identification

AID?,	Output of amplifier identification

Amplifier settings

Amplifier input

ASA,	Input bridge excitation voltage and transducer type,
ASA?,	Output bridge excitation voltage and transducer type
ASS,	Select amplifier input signal
ASS?,	Output of input signal type

Filter settings

AFS,	Filter switchover (fc 1/2)
AFS?,	Output filter settings,
ASF,	Input of cut-off frequency and filter characteristic
ASF?,	Output of cut-off frequency and filter characteristic

Measurement range

CDW,	Start zero setting/input zero value (balance)
CDW?,	Output of zero value
CMR,	Measuring range switchover (Range 1/2)
CMR?,	Output of measuring range

Taring

TAR,	Start taring/Input tara value
TAR?,	Output tara value

Peak value memory

CPV,	Clear peak value memory

Transfer of amplifier settings and comments

TDD,	Saves amplifier settings and comments
TDD?,	Query origin of amplifier settings
UCC,	Enter channel names
UCC?,	Output channel names

Amplifier functions

Measurement value output format

COF,	Change measured value output format
COF?,	Query measured value output format
ISR,	Set measured value transfer rate
MEV,	Output of extended measured values
MSV?,	Output measured value
STP,	Stop measured value output
TEX,	Define measured value separator
TEX?,	Output measured value separator

Display functions

ENU,	Input of unit
ENU?,	Output of unit

IAD,	Input, display full scale, decimal point, step
IAD?,	Output display full scale, decimal point, step
SGN,	Reversal of preceding sign
LTB?,	Output actual linearization curve
Multi Client	
RAR,	Request administrator rights
RAR?,	Query assigned administrator rights
CHP,	Change password
SWA,	Start with administrator rights
SWA?,	Start with/without requesting administrator rights
Other	
BGL,	Background lighting
BGL?,	Query intensity of background lighting
DEN,	Device name
DRS,	Reset to factory settings
VIN?,	Version information
RS2?,	RS232 adapter detected

Index

A

B

C

D

E

G

I

L

M

P

R

S

T

U

V

X

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