Operating manual

Operation with computer or terminal

Measuring amplifiers for panel mounting

MVD2555 and MVD2555–RS485

A0109-5.4 en

HBM

Contents **Page**

Safety instructions

The device complies with the safety requirements of DIN EN 61010-part1 (VDE 0411-part1); protection class I.

Before connecting the device, please note the mains voltage adjusted at the factory; it is specified on the device rear (230 V / 115 V, 48 ... 60 Hz).

Please also note the safety information in the separate documentation Operating manual "Measuring amplifiers for desktop housing" for the MVD2555.

1 Introduction to operation with computer or terminal

The MVD2555 panel amplifier for panel-frame mounting (in accordance with DIN 43700) is suitable for recording and processing measured data from passive transducers in the field of industrial test-facility engineering and manufacturing-process monitoring.

Its main features are:

- attachable transducers: SG full and half bridges, inductive full and half bridges, piezoresistive transducers, LVDTs, potentiometers
- 10-character alphanumeric display
- operation through touch-sensitive keypad; keys individually lockable
- 2 peak value stores for maximum and minimum values, also envelope and instantaneous value
- 4 limit monitors
- parameter store for storing up to 8 data records
- control I/Os (optocoupler-isolated)

This manual describes how to operate your MVD2555 with a terminal or computer. It describes connection of a computer via the RS−232 for complete parameter input and scanning of measured data.

All steps required for setting up the instrument via the keypad, all information required for commissioning and all menus are listed and described in a separate document, **"MVD2555 Panel Amplifier User Manual Part 1"**.

2 Serial interface: RS–232C or RS–485

2.1 Introduction to the interface

Through this serial interface data is transferred serially, one bit at a time. General properties are:

- transmission speed relatively ”low”
- requires in the simplest case a 3-core cable for bi-directional (duplex) transmission
- only one device can be connected (point-to-point link)

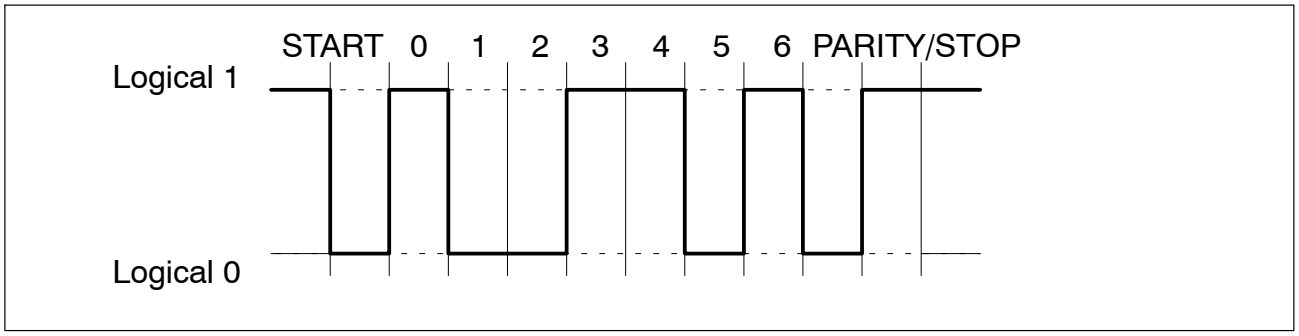


Fig. 1: Line level of the character Y with negative logic

A start bit is placed in front of each character (data byte). Then follow the data bits and a stop bit. Since data is transferred sequentially, the speed of the transmitter must match that of the receiver.

The number of bits per second is termed the baud rate. A receiver’s exact baud rate is synchronized by the start bit for each byte transmitted. Then follow the data bits, all of equal length. Once the stop bit has been reached, the receiver enters its waiting state until reactivated by the next start bit.

Data transmission is controlled by means of the software handshake X-ON (DC1) and X-OFF (DC3).

When the instrument is ready to transmit data it sends the control character X–ON (DC1) down the data line. If it cannot accept data, e.g. if its memory is full, the control character X–OFF (DC3) is sent.

2.2 Key data for the serial interface

Sampling rate	10 meas./s
Word length	8 bits
Stop bits	1*; 2
Parity	odd, even* and none
Baud rate	300; 600; 1200; 2400; 4800; 9600*

* Factory setting

The interface configuration of the MVD2555 (baud rate, parity and stop bit) must match that of the computer (see also page 8)**.**

3 Communication with the MVD2555

3.1 Connect MVD2555 and computer

On the back of the instrument there is an RS−232 serial interface for connecting a computer or terminal. For RS−232 connection a connectorless cable (length 1.5 m) and 9-pin subminiature socket* are supplied (Stock No.: 3−3301.0104). Wiring and pin assignment should be as illustrated below.

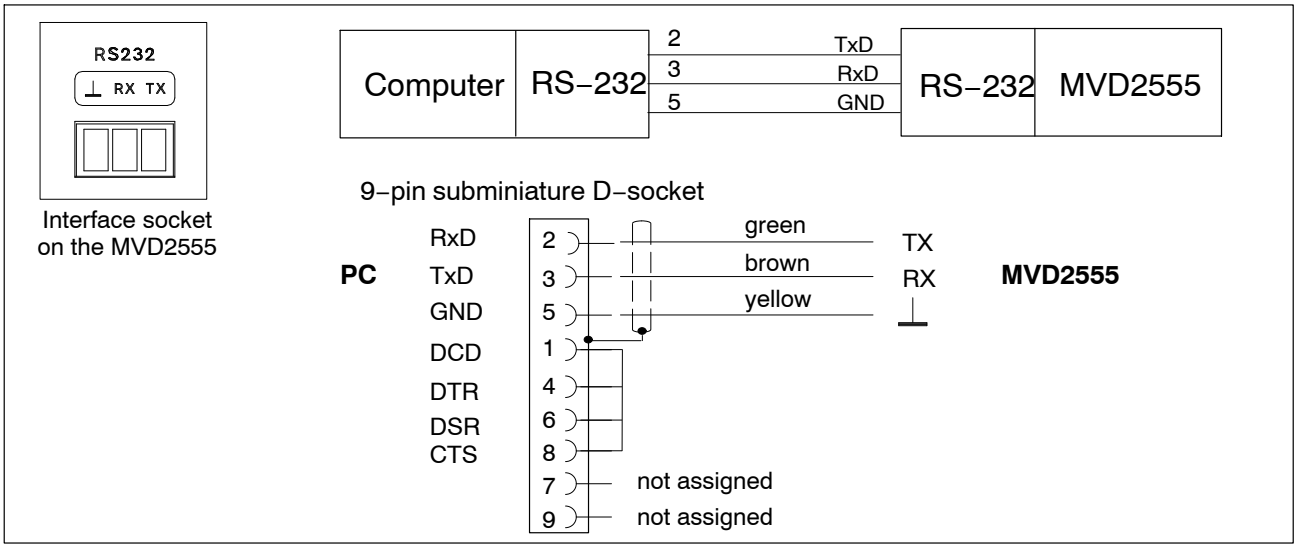


Fig. 2: Computer/MVD2555 connection

* accessories

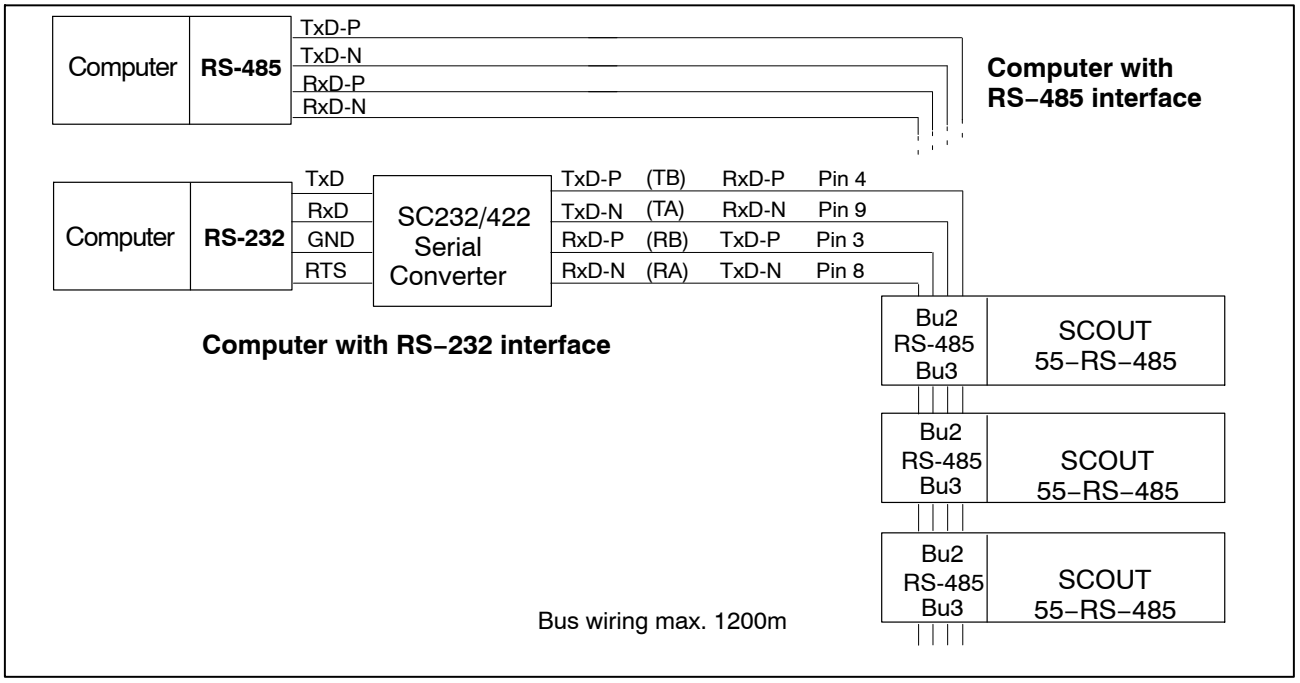


Fig. 3: The RS−485/422 bus with and without serial converter

To connect the MVD2555 to a computer proceed as follows:

- Connect both systems to the mains, leaving them switched off
- Connect the interface as shown in the diagram(s)
- The computer's interface configuration (baud rate, data format) must match the MVD2555's basic setting. If it does not, the interface configuration must be altered via the keypad (see MVD2555/RS−485 Part 1).
- Finally, switch both systems on.

When a printer is connected, a simple line printer operating at no more than 4 seconds per line is adequate. The printout is in 12 columns. This corresponds to a line length of 132 characters.

3.2 Activation of the RS−232C or RS−485 interface

The HBM Interpreter is activated by the following signal:

* CTRL R (DC2) computer operation without echo

Input of the control character puts the instrument into remote-operation mode; only the display's output functions can now be controlled.

Computer operation without echo means that no command characters but only the data generated are sent back to the MVD2555. With the RS−232C interface each information-item generated is output as soon as it is complete in the output buffer.

With the following command you can deactivate remote operation:

CTRL A (SOH); see also command DCL on page 13.

4 Command set of the HBM Interpreter

4.1 Important conventions

These conventions and general notes make working with the HBM Interpreter's commands easier for you.

Notation

- All commands can be input in lower or upper case.

Short commands

- Short commands consist of 3 to 5 characters and, depending on the command, a list of parameters separated by commas.

  e.g. **BDR 6,2,1 (x)**

Blanks

- Prefixed and following blanks in parameters are suppressed.

Command types

- Query commands – used for retrieving information – are identified by an added question mark (?)

  e.g. **BDR?**

Responses

- The instrument's responses given in the examples are shown in the User Manual in *italics*.

Command terminator

for input commands:

- (x) marks the command terminator. Permitted command terminators are:

  ";", LF, LFCR, CRLF

for output commands:

- (y) marks the command terminator. The command terminator is always CRLF.

I/O with numbers

- The numbers entered are changed to the relevant parameter's numeric format
- Numbers are always output in fixed point format

Serial interface

- With the RS−232C interface, communication with a computer begins with the permitted control characters:

  CTRL R or **CTRL B** and ends with **CTRL A** or the command **DCL**

- In the case of serial interfaces every command generates an output (response)

Acknowledgement

- Output commands – identified by a ? – always give rise to output data.
- Changing parameters
- If parameters affecting the measurement process itself are changed, calibration is performed after input; this can take 1 ... 3 s.

Norms and standards

All commands used have a defined structure. There are essentially two types of command:

Set-up commands:

The MVD2555 is set up through the computer.

Example: **BDR6,2,1** (x)

0 (y)

The interface is set to 9600 baud, even parity and 1 stop bit.

Query commands:

Measured values or instrument settings are read from the MVD2555 and appear on the screen.

Example: **BDR?** (x)

6,2,1 (y)

The interface is set to 9600 baud, even parity and 1 stop bit.

4.1.1 Command structure

Short command	Parameters	End marker
TTT?	p1,p2, ... pn	(x)

Example:

BDR? (x)

BDR	Short commands as alphabetical characters (a...z)
?	Only in query commands
p1,p2...pn	Parameter values, consisting of sign (+/-) and numbers (0 ... 9) or character strings (always in quotation marks ” ”). A positive sign can be omitted.
,	Separator
(x)	Command terminator:
	Line Feed (LF), Semi-colon (;) Carriage Return/Line Feed (CRLF) or Line Feed/Carriage Return (LFCR)
CR	ASCII characters: Carriage Return = decimal 13
LF	ASCII characters: Line Feed = decimal 10
;	ASCII characters: Semicolon = decimal 59

If an additional parameter - e.g. Parameter 2 - is omitted, at least the separator must be entered, e.g. **ASA 1,,0**(x)

If from a particular point all additional parameters are omitted, input can be concluded with the command terminator.

4.1.2 Data-output structure

q1,q2 ... qn (y)

Example 1:

IDN? (x)

HBM,MVD2555,0,P10 (y)

The responses sent by the MVD2555 are printed in *italics* in this documentation (second line in the examples).

q1,q2 ... qn	Signed numerical values,
	Character strings (always in quotation marks) or ’?’ as an error message
;	Separator
(y)	End of sequence (CRLF)

4.2 Description of individual commands

On the following pages each command is listed, its structure analyzed and explained with an example.

Command

The character string which must be input to operate the instrument, e.g.:

BDR

Syntax

Mandatory notation for a command, e.g.:

BDR p1,p2,p3 (x)

BDR p1,,p3 (x)

Parameters

The meaning of any parameters is explained:

e.g. if for command ASA parameter p1=1, this means:

1 V bridge excitation voltage

Effect

e.g. explanation of how the instrument is set up.

Response

The instrument responds to your input. In operation via terminal this response appears on the screen (always in the case of output commands).

Example

The example shows you the command entered and the instrument's response. The response is always shown in *italics*.

In the Appendix you will find the commands listed in alphabetical order.

Command

DCL **Device Clear**

Terminate communication

Syntax: DCL (x) or with RS−232C/RS−485 control character CTRL A (ASCII code 01 decimal).

Parameters: none

Effect: Remote control operation is terminated.

Response: none

Example: DCL(x)

Interpreter is no longer active.

Note:

After this command you can input a new command only after approx. 3 s.

ESR? **Standard Event Status Register**

Output of the event-status register

Syntax: ESR? (x)

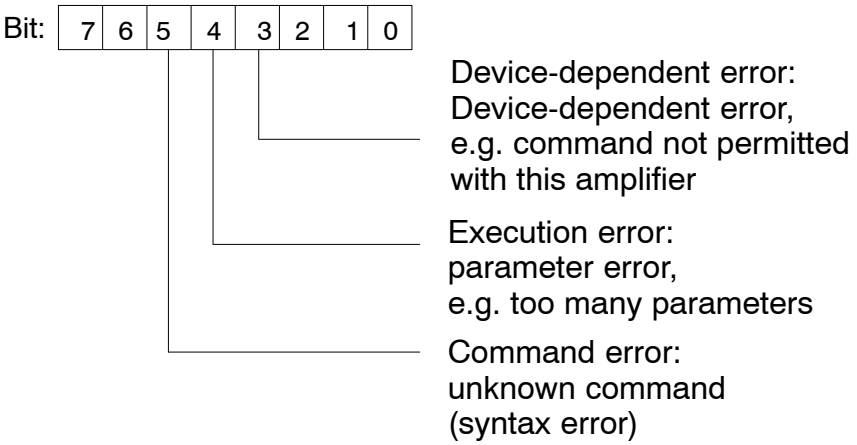
Parameters: none

Effect: Output of the contents of the standard event-status register (ESR) in decimal equivalent.

The standard event-status register (ESR) is set if errors occur in communication. Different causes of error set different bits, so that errors can be specified precisely.

Response: q1(*y)*

q1 8, 16 or 32



All other bits are undefined.

4.2.1 Setting-up of functions in the additional functions group

4.2.1.1 Setting of the parameters for the RS−232C interface

Command

BDR **Baud rate**

Setting of the RS−232C parameters

Syntax: BDR p1,p2,p3 (x)

Parameters:

p1	Baud rate
1	300
2	600
3	1200
4	2400
5	4800
6	9600

p2	Parity
0	None
1	Odd
2	Even

p3	Stop bits
1	1 stop bit
2	2 stop bits

Transmission is always carried out with a character length of 8 bits.

Effect: The serial interfaces' baud rate, parity bit and number of stop-bits are reset.

Response:

Acknowledgment	Meaning
0	Command has been executed
?	Error

Example: The MVD2555 is being operated via the RS−232C interface:

BDR6,2,1 (x)

0 (y)

The RS−232C interface has been set to 9600 baud, even parity and 1 stop bit.

Command

BDR? **Baud Rate Query**

Output serial-interface parameters

Syntax: BDR?(x)

Parameters: none

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

Response: q1,q2,q3 (y)

q1	Baud rate
q2	Parity
q3	Stop bits

Example: BDR? (x)

6,2,1 (y)

The interface has been set to 9600 baud, even parity and 1 stop bit.

4.2.1.2 Setting of the RS−485 interface parameters

ADR **Address**

Assign RS−485 address to the instrument*)

Syntax: ADR p1(x)

Parameters:

p1	Device address
	0 ... 31

Effect: The command specifies the instrument's RS−485 address (see also command Sxx on page 17).

Response:

Acknowledgment	Meaning
0	Command has been executed
?	Error

ADR? **Address Query**

Output the device address

Syntax: ADR?(x)

Parameters: none

Effect: Output the device address.

The RS−485 address can be set using the command ADR or via the keypad in the additional functions under COMM.ADR.

Response: q1(y)

q1	Device address
	0 ... 31

*) for MVD2555/RS−485

Command

Sxx **Select**

Selects the MVD with the address xx

Syntax: S00(x) to S99(x)

Parameters: none

Effect: With the Select command*) you can actuate individually up to 32 MGC devices connected to one RS−422/485 bus. There are 32 usable addresses 0 ... 31. With the Select command these addresses are mapped again on to addresses 32 ... 63 and 64 ... 95, i.e. the commands S00, S32, S64 actuate the devices with the address 00, but their effect on them is not the same. Addresses 96 ... 99 are provided for special functions.

Address Sxx	**Device with the specified address Sxx**		**All other devices**	
	Execute command	Responses	Execute command	Responses
00 ... 31	Yes	Yes[2)]	No	No
32 ... 63	Yes	Yes[2)]	Yes	No[1)]
64 ... 95	Yes	No[1)]	as for last address selected	
96	No	No	No	No
97, 98	Yes	No[1)]	Yes	No[1)]
99[3)]	Yes	Yes[2)]	Yes	Yes[2)]

1) The response to the previous command is stored internally.

2) The stored response to the previous command is output subsequently.

3) Factory setting

*) for MVD2555/RS−485

Explanation:

S00 ... S31(x)

Only the instrument with the specified address receives commands, executes them and responds.

S32 ... S63(x)

All instruments receive all commands and execute them. Only the instrument with the specified address (S32 = device 0) responds on behalf of all instruments.

S64 ... S95(x)

The instrument with the specified address is accepted as a supplementary station which receives and executes all commands but sends no responses.

S96(x)

All instruments wait for Select and send no responses.

S97 (x) or S98(x)

All instruments receive all commands and execute them, but send no responses.

S99(x)

All instruments on the bus are active, receive all commands and send responses (where there are multiple stations this leads to collisions on the bus). Presetting of the devices after switching on (default).

Response: none

Example: S03(x)

Instrument with the address 03 executes all commands and responds.

S35(x)

All instruments on the bus receive and also execute all commands. Instrument with the address 03 (35-32) responds on behalf of all instruments.

4.2.1.3 Querying for device identification/firmware status.

Command

AID? **Amplifier Identification Query**

Output of device identification

Syntax: AID?(x)

Parameters: none

Effect: Output of amplifier identification (firmware status)

Response: Character string (20 characters)

Example: AID? (x)

HBM,MVD2555,0,P15 (y)

Company, device designation, 0, software version number

Instruction

SNR? **Serial Number**

Output serial number of device

Syntax: SNR?

Parameter: None

Effect: Output of the serial number of the device

Response: Character string (10 characters)

Example: SNR? (x)

4021837410

4.2.1.4 Print functions

Command

PFS **Print Format Select**

Define print-format

Syntax: PFS p1 (x)

Parameters:

p1	Signal to be printed
0	Value shown on the display
1	Gross value
2	Net value
4	Peak value1 (maximum)
8	Peak value2 (minimum)
16	Peak value3 (peak-to-peak)
63	All signals and status of limit values

You can set all signal-combinations by totalling the code numbers.

Effect: Signal to be printed is specified.

The setting affects print-output through the initiation of printing (key, remote)

Response:

Acknowledgment	Meaning
0	Command has been executed
?	Error

Example: Gross value, Net value are to be printed

p1 = 1+2

PFS 3 (x)

0 (y)

Command

PFS? **Print Format Select Query**

Query print-format

Syntax: PFS?(x)

Parameters: none

Effect: Signal being printed is output.

Response: q1 (y)

Signal, or signal-combination which was set with the PFS command (Coding: see PFS command).

Example: PFS? (x)

1 (y)

The gross signal is printed (initiation via key or remote).

4.2.2 Setting-up of the Parameter-sets group

Command

MDD **Memory Device Data**

Input of amplifier set-up data

Syntax: MDD p1 (x)

Parameters: p1

Amplifier set-up data obtained from the amplifier with the MDD? command (as a hexadecimal string ” ___ ”, approx. 100 bytes = 200 characters).

Effect: The command is used to save and recall complete set-ups.

To change individual parameters, please use the relevant command (e.g. IMR).

Response:

Acknowledgment	Meaning
0	Command has been executed
?	Error

Example: MDD ”____(hexadecimal string)____” (x)

0 (y)

The amplifier is now set up.

Command

MDD? **Memory Device Data Query**

Output of amplifier set-up data

Syntax: MDD? (x)

Parameters: none

Effect: The amplifier’s set-up parameters are output.

Response: ”___(*hexadecimal string)*___” (y) ”approx. 100 bytes = 200 characters

Example: MDD? (x)

”0a00ff.....” (y)

All set-up parameters are output.

Command

TDD **Transmit Device Data**

Save amplifier settings

Syntax: TDD p1,p2 (x)

Parameters:

p1	Amplifier settings
0	Factory settings (set-up)
1	RECALL from parameter set 1 ... 8
2	SAVE from parameter set 1 ... 8
3	Automatic saving of zero/tare values

if p1=0 (factory setting); p2 no effect

if p1=1 or p1=2 ; p2=parameter-set no.

p2	Number of the parameter set (if p1=1 or p1=2)
1..8	Parameter set 1 to 8

if p1=3: p2=1, status of automat. saving of zero/tare values

p2	Status of automatic zero/tare value saving (if p1=3)
0	Off
1	On

Effect: The amplifier settings are saved or stored. Automatic saving of zero/tare values to the EEPROM can be switched on or off.

Response:

Acknowledgment	Meaning
0	Command has been executed
?	Error

Example 1: TDD2,8 (x)

0 (y)

The current amplifier settings are stored in parameter set 8.

Note: This command triggers a calibration process which permits communication to continue only after 1 ... 3 s.

Example 2: TDD3,1 (x)

0 (y)

Automatic saving of zero/tare values is switched on. At each zeroing the zeroing value is stored in the current parameter set. At each taring the tare value is stored in the current parameter set.

Command

TDD? **Transmit Device Data Query**

Query source of the amplifier settings.

Syntax: TDD?p1 (x)

Parameters:

p1	
0	Source of the amplifier setting
3	Status of automat. saving of zero/tare values

Effect: The source of the currently active amplifier setting is output or the status of zero/tare value saving is indicated.

Response: if p1 = 0; q1 shows the source of the amplifier settings

q1	Source of the amplifier settings
1 ... 8	Parameter set 1 ... 8
?	Error

if p1 = 3; q1 corresponds to the status of tare/zero value saving

q1	Status of automat. saving of zero/tare values
0	Off
1	On

Example 1: TDD?0 (x)

2 (y)

The source of the currently active amplifier setting is parameter set 2.

Example 2: TDD?3 (x)

1 (y)

Automatic saving of zero/tare values is switched on.

4.2.3 Define output format, measurement output

4.2.3.1 Define output format

Command

COF **Change Output Format**

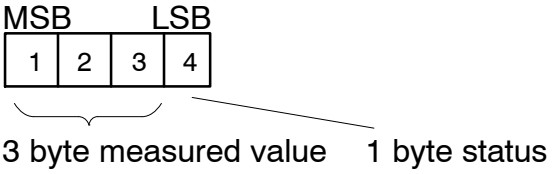
Change format of measurement output

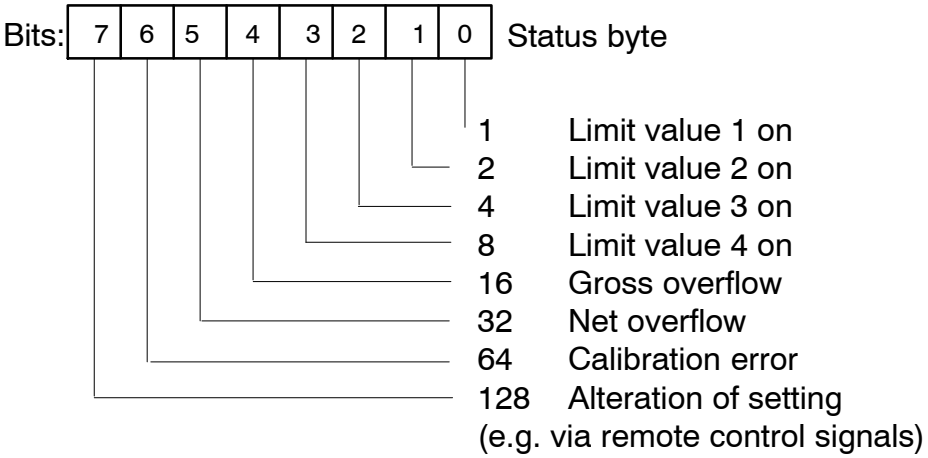
Syntax: COF p1 (x)

Parameters:

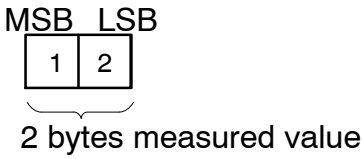
p1	Measurement output format
0	Measured value, status (ASCII format)
1	Measured value (ASCII format)
2	Binary measurement output 4 bytes (MSB XXXX LSB)
3	Binary measurement output 4 bytes (LSB XXXX MSB)
4	Binary measurement output 2 bytes (MSB LSB)
5	Binary measurement output 2 bytes (LSB MSB)
6	BCD measurement output

Binary 4-byte output:

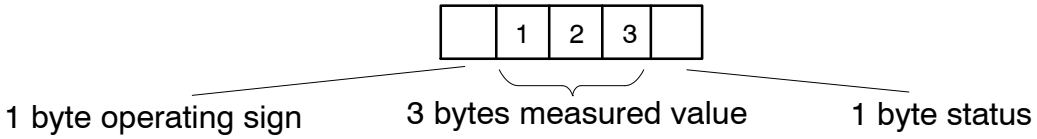




Binary 2 byte output: 1=MSB, 2=LSB



BCD output:



Measured values are scaled to the indication upper limit. Where output is in ASCII format, account is taken of the decimal point. In binary/BCD format the decimal point must be included by the user in processing of measured values.

Effect: With the following MSV commands measured values are output in the preferred form.

Response:

Acknowledgment	Meaning
0	Command has been executed
?	Error

Example: COF0 (x)

0 (y)

Measured values and status are output in ASCII format.

Command

COF? **Change Output Format Query**

Query format of measurement output

Syntax: COF?(x)

Parameters: none

Effect: Code number for the output format is output.

Response: q1 (y)

Example: COF?(x)

0 (y)

ASCII format is set as the output format for measured value and status.

4.2.3.2 Specify measurement output

Command

MSV? **Measuring Signal Value Query**

Output of the measured value

Syntax: MSV p1,p2 (x)

Parameters:

p1	Signal	
1	GR	Gross (with display filtering)
2	NET	Net (with display filtering)
3	STORE1	Peak value 1 (maximum)
4	STORE2	Peak value 2 (minimum)
5	STORE3	Peak value 3 (peak–to–peak)
6	LVS1	Level
7	LVS1	Hysteresis
8	LVS2	Level
9	LVS2	Hysteresis
10	LVS3	Level
11	LVS3	Hysteresis
12	LVS4	Level
13	LVS4	Hysteresis
14	GR	Gross (dyn., without filtering)
15	NET	Net (dyn., without filtering)

p2	Number of measured values
0	Send continuously
1 ... 65535	Default = 1

Effect: The measured value from the required signal p1 is output. Format dependent on the last COF command.

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

Example 1: **Output in full ASCII format**

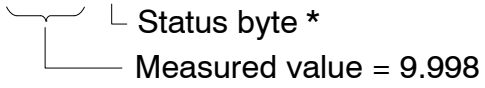
COF0 (x)

0 (y)

Fetch a gross measured value.

MSV?1 (x)

9.998,0 (y)



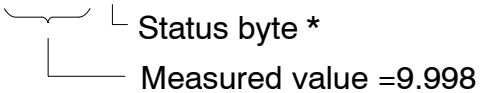
Fetch three net measured values.

MSV?2,3 (x)

9.998,0 CRLF

9.998,0 CRLF

9.998,0 CRLF (y)



Example 2: **Output in 4 byte binary format**

Binary 4 byte format

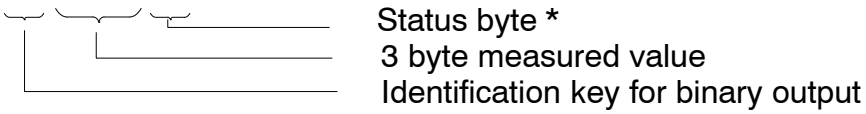
COF2 (x)

0 (y)

Fetch a gross measured value.

MSV?1 (x)

#0ffeedd00CRLF(y)



***** see page 25

Example 3: **Continuous output**

Gross measured values are output continuously.

MSV?1,0 (x)

#0ffeedd00CRLF

#0ffeedd00CRLF

#0ffeedd00CRLF

STP(x) Terminate output

Command

STP **Stop**

End of measurement output

Syntax: STP (x)

Parameters: none

Effect: The measurement output initiated with MSV?1,0 is stopped.

Response: none

Example: STP (x)

4.2.4 Setting up the Adaptation group functions

4.2.4.1 Setting up amplifier input

Command

ASA **Amplifier Sensor Adaptation**

Input bridge excitation voltage, transducer type and input range

Syntax: ASA p1,p2,p3 (x)

Parameters:

P1	Bridge excitation voltage
1	1 V
2	2.5 V

P2	Transducer type
1	Full bridge
2	Half bridge
3	LVDT

P3	Input signal range (at Eop)
1	4 mV/V (Eop=2,5 V) / 10 mV/V (Eop=1 V)
2	40 mV/V / 100 mV/V
3	400 mV/V / 1000 mV/V

Effect: Bridge excitation voltage, transducer type and input-signal range are set.

Response:

Acknowledgment	Meaning
0	Command has been executed
?	Error

Example: The MVD2555 is being set up:

ASA1,2,2 (x)

0 (y)

The MVD2555 is set to bridge excitation voltage 1 V, half bridge and input-signal range 100 mV/V.

Command

ASA? **Amplifier Sensor Adaptation Query**

Output bridge excitation voltage, transducer type and input range

Syntax: ASA?p1(x)

Parameters:

p1	
0	Output bridge excitation voltage, transducer type and input-signal range settings
1	Output table of possible settings for bridge excitation voltage, transducer type and input-signal range

Effect: The amplifier outputs the bridge excitation voltage, transducer type and input-signal ranges.

Response: ASA?0 (x)

q1,q2,q3 (y)

q1	Bridge excitation voltage
q2	Transducer type
q3	Input signal ranges

Example: ASA?0 (x)

1,2,2 (y)

The MVD2555 is currently set to bridge excitation voltage 1V, half bridge and input-signal range 100 mV/V.

Response: ASA?1 (x)

q1,q2,q3 (y)

Table of available settings

q1	Bridge excitation voltage
q2	Transducer type
q3	Input signal ranges

See table, page 30

Example: ASA?1 (x)

Amplifier's response:

"01.002.50", "123", "123"(y)

4.2.4.2 Choose filter settings

Command

ASF **Amplifier Signal Filtering**

Input of cutoff frequency and filter characteristics

Syntax: ASF p1,p2(x)

Parameters:

p1	**Filter frequency**
1 ... n	Code number for frequency value (corresponds to the index from the frequency table, which can be output with the command ASF?0) see page 34

p2	**Filter characteristics**
1	Bessel
2	Butterworth

Effect: The low-pass filter is set to a frequency value and set of filter characteristics.

Response:

Acknowledgment	Meaning
0	Command has been executed
?	Error

Example: Input of cutoff frequency and filter characteristics:

ASF 10,1(x)

0 (y)

The Filter is set to a cutoff frequency of 40 Hz and Bessel characteristics (see page 34).

Command

ASF? **Amplifier Signal Filtering Query**

Output of cutoff frequency and filter characteristics.

Syntax: ASF?p1(x)

Parameters:

p1	Filter code number
0	Current filter settings
1	Frequency table (Bessel and Butterworth)

Effect: Output of the low-pass filter parameters, i.e. set cutoff frequency and filter characteristics

Response: If p1 =0

q1,q2 (y)

q1	Code number for the filter frequency
q2	Filter characteristics (1=Bessel, 2= Butterworth)

Table of available filter frequencies (Bessel/Butterworth)

Example: Table of available filter frequencies

ASF?1 (x)

”0.050 0.100 0.200 0.500 1.250 2.500 5.000 10.00 20.00 40.00 100.0 200.0 400.0”,
”5.000 10.00 20.00 40.00 80.00 200.0 500.0” (y)

The following table shows a summary of the available cutoff frequencies and the index of the frequency to be set (each element is 5 characters long).

p1	Bessel frequencies (Hz)	Butterworth frequencies (Hz)
1	0.050	5.000
2	0.100	10.00
3	0.200	20.00
4	0.500	40.00
5	1.250	80.00
6	2.500	200.0
7	5.000	500.0
8	10.00	
9	20.00	
10	40.00	
11	100.0	
12	200.0	
13	400.0	

Command

MTC **Motion Control**

Specify motion-count indication (measured values/tolerance band/output)

Syntax: MTC p1,p2,p3 (x)

Parameters:

p1	Number of measured values
0	Motion count indication off
1 ... 255	Number of measurements; in conjunction with the chosen filter frequency this yields the corresponding time-span
p2	**Tolerance band**
	In digits
p3	**Motion-count indication output status**
0	No output of status via ”WARNING”
1	Output of status via ”WARNING”

Effect: The motion-count indication function is set up.

Example: MTC 200,10,1 (x)

0 (y)

Assumption:

Filter setting: f<2.5 Hz = sampling rate of 1200 values/sec

Indication upper limit: 100.00 N, resulting in a time span of 166 ms

Motion count indication is set:

If 200 measured values lie within a tolerance band of 0.1 N (10 digits), motion-count indication is activated. The status is also output via ”WARNING”.

Command

MTC? **Motion Control Query**

Output of motion-count indication

Syntax: MTC?p1(x)

Parameters:

p1	
0	Motion-count indication settings
1	Motion-count indication status

Effect: Output of motion−count indication settings

Response: If p1=0; output of motion−count indication settings

q1,q2,q3 (y)

q1	**Number of measured values**
q2	Tolerance zone in displayed units
q3	”WARNING” output status

If p1=1; q1 shows the status of motion-count indication

q1	**Motion-count indication status**
q2	No standstill; conditions not satisfied
q3	Standstill; conditions satisfied

Example: MTC?0 (x)

0,0,0 (y)

Motion-count indication has not been activated. The status of motion-count indication is not output via ”WARNING”.

4.2.4.3 Setting autocalibration

Command

ACL **Autocal**

Switching on/off of autocalibration

Syntax: ACL p1 (x)

Parameters:

p1	Automatic calibration
0	Switch off
1	Switch on

Effect: Switchover of autocalibration setting.

Response:

Acknowledgment	Meaning
0	Command has been executed
?	Error

Example: ACL1 (x)

0 (y)

Hint: A calibration is triggered and cyclic autocalibration is switched on. This interrupts the measurement process approximately every 5 minutes and calibrates the amplifier. If such interruption during a measurement process would be a problem, automatic calibration must remain switched off.

Command

ACL? **Autocal Query**

Switching on/off of autocalibration

Syntax: ACL ? (x)

Parameters: none

Effect: Status of autocalibration is output.

Response:

q1	Status
0	Autocalibration is off
1	Autocalibration is on

Example: ACL? (x)

1 (y)
Autocalibration has been switched on.

Command

CAL **Calibrate**

Calibration

Syntax: CAL (x)

Parameters: none

Effect: A single calibration is triggered.

Response:

Acknowledgment	Meaning
0	Command has been executed
?	Error

Example: CAL (x)

0 (y)
Calibration is performed.

Note: This command initiates a single calibration, permitting further communication only after 1 to 3 s.

4.2.5 Setting up the Calibration group functions

4.2.5.1 Selecting the unit of measure

Command

ENU **Engineering Unit**

Input of the unit of measure

Syntax: ENU p1(x)

Parameters:

p1	Input of the unit of measure
1 ... n	Code number for the desired unit of measure (see table)

Effect: The unit of measure is set.

Response:

Acknowledgment	Meaning
0	Command has been executed
?	Error

Example: ENU11(x)

0 (y)

kN is set as the unit of measure.

Command

ENU? **Engineering Unit Query**

Output of the unit of measure.

Syntax: ENU?p1(x)

Parameters:

p1	Output of the unit of measure
0	Output of currently set unit of measure
1	Output of all available settings

Effect: The currently selected unit of measure is output

Response: q1 (y)

Example 1: ENU?0 (x)

11 (y)

kN has been selected as the unit of measure.

Example 2: ENU?1 (x)

” mV/V, V, g, kg, T, kT, TON, LB, oz, N, kN, bar, mbar, Pa, PAS, HPas, KPas

PSI, µm, mm, cm, m, Inch, Nm, kNm, FTLB, INLB, µm/m, m/s, m/ss, %, ‰, PPM s, MP, MN, A, mA ” (y)

Summary of all available units and code numbers

Index		**Index**		**Index**		**Index**	
1	mV/V	13	mbar	25	kNm	37	MN
2	V	14	Pa	26	FTLB	38	A
3	g	15	PAS	27	INLB	39	mA
4	kg	16	HPas	28	µm/m		
5	T	17	kPas	29	m/s		
6	kT	18	PSI	30	m/ss		
7	TON	19	µm	31	%		
8	LB	20	mm	32	‰		
9	oz	21	cm	33	PPM		
10	N	22	m	34	s		
11	kN	23	inch	35	”blank”		
12	bar	24	Nm	36	MP		

4.2.5.2 Selecting the indication upper limit

Command

IAD **Indication Adaptation**

Input, indication upper limit, decimal point, step width

Syntax: IAD p1,p2,p3 (x)

p1	Indication upper limit without decimal point (max. 200000)
p2	Decimal point (number of decimal places 0 ... 5)
p3	Step width (see table)

Parameters:

p3	Step width
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 the indication adaptation values.

Note: For ”V” and ”mV/V” scaling is fixed.

Response:

Acknowledgment	Meaning
0	Command has been executed
?	Error

Example: IAD 10000,3,4 (x)

0 (y)

Indication adaptation is set to:

indication upper limit 10,000 with step width 10

Command

IAD? **Indication Adaptation Query**

Output input, indication upper limit, decimal point, step width

Syntax: IAD?(x)

Parameters: none

Effect: Output of the current settings for indication upper limit, decimal point, step width.

Response: q1,q2,q3 (y)

Parameters: see IAD command

Example: IAD? (x)

10000,3,4 (y)

Indication adaptation is set to:

indication upper limit 10,000 with step width 10

4.2.5.3 Setting zero value

Command

CDW **Calibration Dead Weight**

Start zeroing /Input zero value (balance)

Syntax: CDW (x) or CDW p1(x)

Parameters: p1 (optional)

p1	Zero value in mV/V
	Value is input in mV/V; within the input-signal range

Effect: The value entered is stored in the amplifier's zero store.

Response:

Acknowledgment	Meaning
0	Command has been executed
?	Error

Example 1: Start zeroing

CDW (x)

0 (y)

The current measured value is adopted as zero value.

Example 2: Input zero value 2.0000 mV/V (selected input range 4 mV/V)

CDW 2.0000(x)

0 (y)

If for p1 the value read with CDW?1 is sent, the adjacent measurement signal is set to zero.

Command

CDW? **Calibration Dead Weight Query**

Output of zero value

Syntax: CDW?p1(x)

Parameters:

p1	Zero value
0	Currently set zero value (mV/V)
1	Current measured value (mV/V)

Effect: This command causes the currently set zero value or currently adjacent measured value to be output.

Response: q1 (y)

Example 1: CDW?0 (x)

3.256 (y)

Currently set zero value is 3.256 mV/V.

Example 2: CDW?1 (x)

2.001 (y)

Measured value currently applied is output. CDW2.001 sets this signal to zero.

4.2.5.4 Set measuring range

Command

IMR **Input Measuring Range**

Input of the upper limit of the measuring range

Syntax: IMR p1(x)

Parameters:

p1	Upper limit of the measuring range in mV/V
	Value is input in mV/V; within the input signal range

Effect: The measuring range is set.

Response:

Acknowledgment	Meaning
0	Command has been executed
?	Error

Example: IMR 2.0 (x)

0 (y)

The measuring range is set to 2.0 mV/V.

Command

IMR? **Input Measuring Range Query**

Output of the upper limit of the measuring range

Syntax: IMR?p1(x)

Parameters:

p1	Upper limit of the measuring range
0	Current measuring range in mV/V
1	Current measuring signal in mV/V
2	Maximum and minimum adjustable upper limits of the measuring range in mV/V

Effect: Output of the set measuring range.

Response: q1,q2 (y)

Example 1: IMR?0 (x)

1.987 (y)

Currently set upper limit of the measuring range is 1.987 mV/V.

Example 2: IMR?2 (x)

4.0,0.2 (y)

With a selected input-signal range of 4 mV/V, 4.0 mV/V is output as the maximum and 0.2 mV/V as the minimum value.

4.2.5.5 Tare

Command

TAR **Tare Instruction**

Start taring/Input tare value

Syntax: TAR (x) or TAR p1(x)

Parameter: p1 (optional) or tare value in displayed units

Effect: This command tares the signal/sets a tare value.

Response:

Acknowledgment	Meaning
0	Command has been executed
?	Error

Example 1: Start taring

TAR (x)

0 (y)

The current measured value is adopted as tare value.

Note: Taring is done computationally, not by balancing of the input signal.

Example 2: TAR200.0 (x)

0 (y)

Input value is written to the tare store.

Command

TAR? **Tare Value Query**

Output tare value

Syntax: TAR?(x)

Parameters: none

Effect: The tare value is output in displayed units.

Response: q1 (y)

Tare value in displayed units

Example: TAR? (x)

200.0 (y)

Suppose, for example, that an indication upper limit of 2000.0 kN has been set. The tare value is 200.0 kN.

4.2.6 Setting up the Limit Value 1 ... 4 group functions

Command

LIV **Limit Value**

Input of limit monitor settings

Syntax: LIV p1,p2,p3,p4,p5,p6,p7,p8 (x)

Parameters:

p1	Limit monitors
1	1
2	2
3	3
4	4

p2	Limit value monitoring
0	OFF
1	ON

p3	Source of the limit values
1	Gross value
2	Net value
3	Peak value store 1 (maximum)
4	Peak value store 2 (minimum)
5	Peak value store 3 (peak–to–peak)

p4	Operating direction
1	Operates when overrange occurs
2	Operates when underrange occurs

p5	Limit value level in displayed units
	Value is specified in displayed units (e.g. kN)

p6	Hysteresis value in displayed units
	Value is specified in displayed units (e.g. 100 kN); always positive

p7	Output logic of the limit monitors
1	Active corresponds to On
2	Active corresponds to Off

p8	Level-setting by limit value key in measuring mode
0	Locked
1	Enabled

Effect: With this command limit monitor p1 is activated, set to input signal p3, switching direction p4, switching-level p5, and also to hysteresis p6 and output logic p7. Level-setting by the limit value key is set to p8.

Response:

Acknowledgment	Meaning
0	Command has been executed
?	Error

Example: LIV1,1,3,1,100,10,1,1 (x)

0 (y)

Limit monitor 1 has been activated and the input signal assigned to Store/Max (maximum). The limit monitor on exceeding of the On-level of 100 kN and hysteresis of 10 kN (Off-level 90 kN). The control output is active. Level-setting by limit value key for LV1 is possible.

Important:

All limit monitors required for the measurement process must be set in sequence according to the above scheme.

Command

LIV? **Limit Value Query**

Output of the limit-monitor settings

Syntax: LIV? p1,p2 (x)

Parameters:

p1	Limit monitors
0	Query the signal value of p2 (output in displayed units)
1	Current LV1 settings
2	Current LV2 setting
3	Current LV3 setting
4	Current LV4 setting

P2	Signal code-number, if p1=0
1	Current gross signal in displayed units
2	Current net signal in displayed units
3	Current maximum value in displayed units
4	Current minimum value in displayed units
5	Current peak-to-peak value in displayed units

Effect: This command causes the setting of limit monitor p1 to be output.

Response: q1,q2,q3,q4,q5,q6,q7,q8 (y)

q1	Number of the limit monitor
q2	Limit value monitoring On/Off
q3	Input signal of the limit monitor
q4	Operating direction positive/negative
q5	Switching level of the limit monitor
q6	Hysteresis value
q7	Logic of the control output
q8	Level-setting in measuring mode

Example 1: LIV?2 (x)

2,1,3,1,100,10,1,1 (y)

Limit monitor 2 has been activated and the input signal assigned to Store/Max (maximum). The limit monitor operates if the level of 100 kN is exceeded (corresponds to On-level). Hysteresis is 10 kN (Off-level 90 kN). The control output is active. Level-setting by limit value key for LV2 is enabled.

Example 2: LIV?0,3 (x)

200 (y)

The value stored in Store1/Max is 200kN.

4.2.7 Setting up the functions of the Peak value store group

Command

PVS **Peak Value Select**

Input of the peak value store settings

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

Parameters:

p1	Peak value store
1	Maximum
2	Minimum
3	Peak-to-peak

p2	Peak value determination (applies to all stores)
0	Off
1	On

p3	Source of stores
1	Gross value
2	Net value

p4	Envelopes (applies to all stores)
0	Envelope function is off
00100 ... 60000	Timing constant in ms

Effect: This command is used to set the function of the peak value store p1.

Response:

Acknowledgment	Meaning
0	Command has been executed
?	Error

Example: PVS1,1,1,0 (x)

0 (y)

The gross signal is assigned to peak value store 1 (maximum). All peak value stores are enabled; the envelope function is switched off.

Command

PVS? **Peak Value Select Query**

Output of peak value store settings

Syntax: PVS?p1(x)

Parameters: p1

Code number for the peak value store (see command PVS)

Effect: This command causes the setting of peak value store p1 to be output.

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

q1	Code number for the peak value store
q2	Peak value determination On/Off
q3	Source of store
q4	Timing constant for envelope function in ms

Example: PVS?1 (x)

1,1,1,0 (y)

The gross signal has been assigned to peak value store 1 (maximum). All peak value stores are enabled; the envelope function is switched off.

Command

CPV **Clear Peak Value**

Clear peak value store

Syntax: CPV (x)

Parameters: none

Effect: This command clears the peak-–value stores

Response:

Acknowledgment	Meaning
0	Command has been executed
?	Error

Example: CPV (x)

0 (y)

Peak value store 1 (max), peak value store 2 (min) and peak value store 3 (min-max) are cleared.

Note: After clearing of the peak value store the output signal of stores 1 and 2 is the adjacent measured value. Store 3 (min-max) has the value zero.

4.2.8 Setting up the functions of the Inputs/Outputs group

4.2.8.1 Select amplifier input signal

Command

ASS **Amplifier Signal Select**

Select amplifier input signal

Syntax: ASS p1(x)

Parameters:

p1	Input source
0	Internal zero signal
1	Internal calibration signal
2	Measuring signal

Effect: Selection of the amplifier input signal.

Response:

Acknowledgment	Meaning
0	Command has been executed
?	Error

Example: The MVD2555 is being set up:

ASS 0(x)

0 (y)

The amplifier input is switched to internal zero signal.

Note: This command triggers a calibration process which permits communication to continue only after 1 ... 3 s.

To resume measurement, enter p1=2

Command

ASS? **Amplifier Signal Select**

Output amplifier input signal.

Syntax: ASS?(x)

Parameters: none

Effect: The amplifier input signal's type is output.

Response: q1 (y)

q1	Amplifier's input signal source
0	Internal zero signal
1	Internal calibration signal
2	Measuring signal

Example: ASS? (x)

2 (y)

Amplifier input is switched to the measuring signal.

4.2.8.2 Setting up the analogue output

Command

OPS **Output Path Select**

Assign signal to the analogue output and select operating mode

Syntax: OPS p1,p2 (x)

Parameters:

P1	Signal
1	Gross signal at analogue output
2	Net signal at analogue output
3	Store 1 (maximum) at analogue output
4	Store 2 (minimum) at analogue output
5	Store 3 (peak-to-peak) at analogue output

P2	Mode of analogue output (U/I)*
0	Analogue output OFF
1	+/- 10V (U) / +/- 20 mA (I)
2	No funct. (U) / 4 ... 20 mA (I)

Effect: A signal is assigned to the analogue output and the operating mode is set.

Note)* : The analogue output (voltage or current) is selected by rearranging jumpers on the PCB. The setting-up procedure is described on page 9 of the User Manual Part 1.

Response:

Acknowledgment	Meaning
0	Command has been executed
?	Error

Example: OPS1,1 (x)

0 (y)

The gross signal is assigned to the analogue output. +/– 10 V is set as the operating mode.
(Assumption: voltage has been specified as the analogue output signal)

Command

OPS? **Output Path Select Query**

Output input-signal of the analogue output and operating mode

Syntax: OPS?p1(x)

Parameters:

p1	Analogue output: signal and operating mode
0	Currently assigned input signal
1	”Voltage” or ”current” operating-mode set

Effect: The analogue output’s currently assigned input signal is output or the selected operating-mode is output.

Response: q1,q2 (y)

q2 corresponds to parameter p2 (see command OPS)

q1	Operating mode (set)
1	Voltage
2	Current

Example: OPS?0 (x)

2 (y)

The net signal is now assigned to the analogue output.

Example: OPS?1 (x)

2,2 (y)

Current output set; mode 4 ... 20 mA selected

4.2.8.3 Setting up remote control

Command

LOR **Local/Remote**

Switching between Local/Remote

Syntax: LOR p1 (x)

Parameters:

p1	Status
0	Remote, remote control through remote outputs
1	Local, no remote control

Effect: Switching to remote control of certain amplifier functions via remote control inputs.

Response:

Acknowledgment	Meaning
0	Command has been executed
?	Error

Example: LOR1 (x)

0 (y)

Local control is enabled, i.e. all set-up functions for amplifier parameters via the remote control inputs are blocked.

Command

LOR? **Local / Remote Query**

Query Local / Remote status

Syntax: LOR? (x)

Parameters: none

Effect: Local/Remote control status is output

Response: q1 (y) corresponds to p1 (see command LOR)

Example: LOR? (x)

0 (y)

Remote control is enabled, i.e. all set-up functions for amplifier parameters via the remote control inputs are enabled.

4.2.8.4 Setting up assignment of the remotes

Command

RFP **Remote Function Programming**

Assignment of remote functions

Syntax: RFPp1,p2 (x)

Parameters: p1 corresponds to the number of the remote (1 ... 6)

p2 corresponds to the code number of the function (see table)

p2		Function
0	NOP	No function
1	ACAL	Autocalibration
2	TARE	Taring
3	CPV1	Store 1 /Curr
4	HLD1	Store 1 /Hold
5	CPV2	Store 2 /Curr
6	HLD2	Store 2 /Hold
7	ZERO	Zeroing
8	PRNT	Print
9	PAR1	Bit for querying param. set 1 ... 8
10	PAR2	Bit for querying param. set 1 ... 8
11	PAR3	Bit for querying param. set 1 ... 8

The default assignment after a ”Set-up” of the instrument is ”No function” for all remotes. The functions PAR1, PAR2 and PAR3 can be used to retrieve the eight parameter sets in binary form (000 to 111) (see User Manual Part 1, page 43).

Effect: The remote’s effect on the selected amplifier functions is specified.

Response:

Acknowledgment	Meaning
0	Command has been executed
?	Error

Example: RFP 2,1 (x)

0 (y)

The Autocal function (Acal) is now assigned to remote 2.

Note: Switching between Remote and Local remains possible even when the instrument is in local status.

Command

RFP? **Remote Function Programming Query**

Query re: assignment of the remote functions

Syntax: RFP?p1(x)

Parameters:

p1	
0	Output table of available functions
1 ... 6	Output assignment of remote functions

Effect: Output assignment of remote functions at the cable-connector.

Example 1: RFP?0 (x)

"NOPACALTARACPV1HLD1CPV2HLD2NULLPRNTPAR1PAR2PAR3" (y)

Response: q1 (y)

Example 2: RFP?2 (x)

1 (y)

The Autocal function (Acal) is now assigned to remote 2.

4.2.9 Setting up the Adaptation group functions

4.2.9.1 Lock-control of the keys

Command

KLC **Key Lock Control**

Key lock control

Syntax: KLC p1,p2 (x)

Parameters:

p1	Key lock control
1	Set LVS key
2	ZERO key
3	TARE key
4	Clear STORE key
5	Initiate PRINTING key
6	Select SIGN key

p2	Key authorization
0	Lock
1	Free

Effect: Direct keys can be individually locked.

Response:

Acknowledgment	Meaning
0	Command has been executed
?	Error

Example: KLC 2,0 (x)

0 (y)

The ZERO key has been locked.

Command

KLC? **Key Lock Control Query**

Querying key-lock control

Syntax: KLC?p1 (x)

Parameters: p1 corresponds to the key selected
(see command KLC)

Effect: Enablement status of the selected key is output.

Response:

q1	Key status
0	Locked
1	Enabled

Example: KLC?2 (x)

0 (y)

The ZERO key has been locked.

5 Keyword index

R

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