DIS2116

Communication commands

HBM

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Safety instructions

See operating instructions Part 1

All the factory settings are stored at the factory so that they are safe from power failure and cannot be deleted or overwritten. They can be reset at any time by using the command TDD0.

For more information, see Chapter "Individual Command Descriptions".

The factory set production number must not be changed.

Remaining dangers are indicated in these instructions by the following symbols:

Symbol: **ATTENTION**

Meaning: **Possible dangerous situation**

Warns of a potentially dangerous situation in which failure to comply with safety requirements **could** result in damage to property or some form of physical injury.

Symbols for application instructions and useful information:

Symbol: **NOTE**

Means that important information about the product or its handling is being given.

1   Introduction and intended use

The DIS2116 digital scale electronics is a unit for a non−automatic weighing instrument (NAWI). It comprises all necessary scale functions for this application:

- Digital filtering

- Digital off−center load compensation

- Setting the scale characteristic curve

- Linearization

- One, two or three−range display

- Output scaling of measured values

- Range monitoring of display values (OIML, NTEP)

- Zero setting ($\pm$ 2 %)

- Tare

- Gross / net selection

- Standstill recognition

- Zero on start−up

- Automatic zero tracking

- Legal−for−trade switch with LFT counter

- Gravitational acceleration correction via adjustable factor

- Storage of parameters on an SD card

- Password protection of parameters

The abbreviation **DIS** will also be used in this text for the DIS2116 scale electronics.

2   DIS2116 command set

The commands can be divided into the following groups:

- Interface commands
  (**BD1, BD2, BD3, BD4, PA2, PA3, PA4, FC2, FC3, FC4, PT3, PT4, TWC**)

- Gravitational acceleration correction
  (**GCA**, **GDE**)

- Scale adjustment and output formatting
  (**CWT**, **LDW**, **LWT**, **NOV**, **RSN**, **MRA**, **MRB**, **MTD**, **ENU**, **DPT**)

- Linearization settings
  (**LIN**, **LIM**)

- Measuring mode settings
  (**ASF**, **FMD**, **HSM**, **ZSE**, **ZTR**)

- Measuring mode commands
  (**MSV?**, **TAR**, **TAS**, **TAV**, **CDL**, **PTM**, **PTV**)

- Special functions
  (**TDD**, **RES**, **DPW**, **SPW**, **IDN**, **NAM**, **ERR**)

- Commands for legal–for–trade applications
  (**LFT**, **TCR?**, **ENC**)

- Commands for the print settings
  (**ESC**, **PES**, **PFF**, **PID?**, **PLB**, **PLE**, **PRC**, **PRT**, **PST**)

- Commands for the external display
  (**SCC**, **SCH**, **ECC**, **ECH**, **EDC**, **EPT**, **EDL**, **PAU**)

- Commands for the limit value switch
  (**LIV**)

- Commands for setting the function keys, language, contrast
  (**BFC, DCO**, **LAG**, **MAL**, **WMD**)

2.1   Detailed menu structure and commands

This chapter describes the relationship between the "Parameters" menu and the implemented commands (also see the Operating Manual, Part 1).

Access level	Parameter menu	Second menu level	Third menu level	Command
0	**INFORMATION**			
		SCALE		
		TARE VALUE		**TAV?**
		WEIGHING RESULT		**–**
		BUSSCAN		**–**
		ERROR LIST		**–**
		SOFTWARE INFO		**IDN?**
		GRAPHIC		**–**
			OSCILLOSCOPE	
			CENTER OF GRAVITY	**–**
1	**PRINT**			
		MEASURED VALUE		**PRT**
		PARAMETER		
			SCALE PARAMETER	**PRT**
			DIS2116 PARAMETER	**PRT**
			BUSSCAN RESULT	**PRT**
2	**LIMIT VALUE**			
		LIMIT VALUE 1		**LIV**
			INPUT SIGNAL	**LIV**
			ACTIVATION LEVEL	**LIV**
			DEACTIVATION LEVEL	**LIV**
		LIMIT VALUE 2		**LIV**
			INPUT SIGNAL	**LIV**
			ACTIVATION LEVEL	**LIV**
			DEACTIVATION LEVEL	**LIV**
4	**FILTER**			
		FILTER MODE		**FMD**
		LIMIT FREQUENCY		**ASF**

Access level	Parameter menu	Second menu level	Third menu level	Command
4	**COMMUNICATION**			
		Load cells (COM 1)		
			BAUD RATE	**BD1**
			2–WIRE COMM.	**TWC**
		PC/PLC (COM 2)		
			FUNCTION	**FC2**
			BAUD RATE	**BD2**
			PARITY	**PA2**
		PRINTER (COM 3)		
			FUNCTION	**FC3**
			BAUD RATE	**BD3**
			PARITY	**PA3**
			PROTOCOL	**PT3**
		EXT.DISPLAY (COM 4)		
			FUNCTION	**FC4**
			STANDARD DISPLAY	–
			PROTOCOL	**PT4**
			BAUD RATE	**BD4**
			PARITY	**PA4**
			START STRING LENGTH	**SCC**
			CHARACTER	**SCH**
			END STRING LENGTH	**ECC**
			CHARACTER	**ECH**
			CRC	**EDC**
			DECIMAL POINT	**EPT**
			PAUSE [10ms]	**PAU**
			MEASURED VALUE LENGTH	**EDL**

Access level	Parameter menu	Second menu level	Third menu level	Command
3	**PRINT PROTOCOL**			
		PRINTOUT NUMBER		**PID?**
		USER–DEFINED LINE1		**PST**
		USER–DEFINED LINE2		**PST**
		USER–DEFINED LINE3		**PST**
		BLANK LINES ABOVE		**PLB**
		BLANK LINES BELOW		**PLE**
		SPACES		**PES**
		PAGE FEED		**PFF**
		PRINT COPIES		**PRC**
		ESCAPE1 (1.CHARACTER)		**ESC**
		ESCAPE1 (2.CHARACTERS)		**ESC**
		ESCAPE1 (3.CHARACTERS)		**ESC**
		ESCAPE1 (4.CHARACTERS)		**ESC**
		ESCAPE1 (5.CHARACTERS)		**ESC**
		ESCAPE2 (1.CHARACTER)		**ESC**
		ESCAPE2 (2.CHARACTERS)		**ESC**
		ESCAPE2 (3.CHARACTERS)		**ESC**
		ESCAPE2 (4.CHARACTERS)		**ESC**
		ESCAPE2 (5.CHARACTERS)		**ESC**
4	**CLOCK**			
		Date		
			DAY	**–**
			MONTH	**–**
			YEAR	**–**
		TIME		
			MODE	**–**
			MINUTES	**–**
			HOURS	**–**

Access level	Parameter menu	Second menu level	Third menu level	Command
4	**FUNCTION KEYS**			
		ZEROING		**BFC**
		TARING		**BFC**
		GROSS/NET		**BFC**
		10–FOLD RESOLUTION		**BFC**
		PRINT		**BFC**
4	**DISPLAY**			
		DISPLAY LINE 1		
			LEFT	
			RIGHT	
		DISPLAY LINE 2		
			LEFT	
			RIGHT	
		CONTRAST		**DCO**
0	**FUNCTION TEST**			
		BUSSCAN		
		LOAD CELL		
			LOAD CELL ADDRESS	
			MEASURED VALUE	
			LOAD CELL TEST	
		SEGMENT		
			SEGMENT NUMBER	
			MEASURED VALUE	
		COM1		
		COM2		
		COM3		
		COM4		
		SD CARD		
		DISPLAY		
		KEYS		

Access level	Parameter menu	Second menu level	Third menu level	Command
0	**MODE**			
		LANGUAGE		**LAG**
		ACCESS LEVEL		**MAL**
		LEGAL−FOR−TRADE CAPABILITY		**LFT**
		ENCRYPTION		**ENC**
		OPERATING MODE		**WMD**
5	**SCALE CONFIGURATION**			
		NUMBER OF SEGMENTS		
		SEGMENT 1		
			NUMBER OF LOAD CELLS	
			SERIAL NUMBER WZ11	
		CONFIGURATION		
		PARAMETER		
			MANUFACTURER	**NAM**
			IDENTIFICATION	**IDN**
			LOAD CELL SAMPLING RATE	**HSM**
			UNIT	**ENU**
			DECIMAL POINT	**DPT**
			NOMINAL VALUE	**NOV**
			MULTIRANGE 1	**MRA**
			MULTIRANGE 2	**MRB**
			RESOLUTION	**RES**
			ZERO TRACKING	**ZTR**
			ZERO ON START−UP	**ZSE**
			STANDSTILL MON.	**MTD**
			G FACTOR CALIBRATION	**GCA**
			G FACTOR APPLICATION	**GDE**
			MANUAL TARE MODE	**PTM**
			MANUAL TARE VALUE	**PTV**

Access level	Parameter menu	Second menu level	Third menu level	Command
		INPUT CHARACTERISTIC CURVE		
			CALIBRATION WEIGHT	**CWT**
			ZERO LOAD	**LDW**
			MAXIMUM CAPACITY	**LWT**
		MEASUREMENT CHARACTERISTIC CURVE		
			CALIBRATION WEIGHT	**CWT**
			ZERO LOAD	**LDW**
			MAXIMUM CAPACITY	**LWT**
		LINEARIZATION		
			WEIGHT 1	**LIN**
			MEASURED VALUE 1	**LIM**
			INPUT MEASURED VALUE 1	**LIM**
			WEIGHT 2	**LIN**
			MEASURED VALUE 2	**LIM**
			INPUT MEASURED VALUE 2	**LIM**
		LOAD CELL REPLACEMENT		
			LOAD CELL ADDRESS	
			NEW SERIAL NUMBER	
			UPLOAD PARAMETER	

Access level	Parameter menu	Second menu level	Third menu level	Command
5	**OFF–CENTER LOAD COMPENSATION**			
		MEASURE		
			MODE	
			CALIBRATION WEIGHT	
			SEGMENT 1	
		INPUT SEGMENT 1		
			Correction value	
5	**FACTORY SETTINGS**			
		DIS2116		**TDD0**
		LOAD CELLS		
		DATABASE		
			DELETE YARD LIST	
			DATABASE REPAIR	

2.2   Command format

Commands are not case–sensitive, so either format can be used for input.

Every command input must be completed with a delimiter. This can either be a line feed (LF) or a semi–colon (;).

If a delimiter is all that is sent to the DIS, the DIS input buffer is cleared.

The data provided in round brackets () for the commands are mandatory and must be part of the command input. Parameters in pointed brackets <> are optional and do not have to be provided. **The brackets themselves are not part of the input.**

Text must be enclosed in quotes.

With numeric input, preceding zeroes are suppressed.

Responses are output in ASCII characters and end with LF.

Each command consists of the command shortform, one or more parameters and the delimiter.

	Shortform	**Parameters**	**Delimiter**
Input	ABC	X	LF or ;
Output	ABC?	X	LF or ;

LF: Line Feed (lf = 0a hex)

Example: MSV?;

A measured value is output following this command.

All ASCII characters $<20_H$ (Blank) can be used between the command shortform, parameters and delimiter.

The following characters can be used for commands and parameters:

' ' '+' '–' '.' ',' '"' '0' ...'9' 'A'...'Z' 'a'...'z'

The input range for an input string (PST command) comprises: $0x1f_{hex} < char < 0x7f_{hex}$. In this case, the string is enclosed with "...String...".
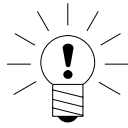
NOTE

When the master has sent a command sequence (query), the reply must be waited for before the next query is sent.

When the master has sent a command sequence (input), the next query or command can be sent at the earliest after 10 milliseconds.

2.3   Response to commands

NOTE

Note on the response times of the DIS:

The DIS response times indicated in the command description do not include the
transmission time of the command to the DIS or the transmission time of a response from the
DIS.

2.3.1   Response to inputs

The DIS COM2 computer interface is an RS−232 interface.

Following a valid input, the DIS responds with **0CRLF**.
Following an invalid input or syntax error, with **?CRLF.**

Example:

   ASF3;   *//Sets the filter to filter setting 3*

DIS response: 0CRLF

   ASF15;   *//Sets the filter to filter setting 15*

DIS response: ?CRLF //Setting 15 does not exist (asf 0...10)

When the master has sent a command sequence (query), the reply must be waited for
before the next query or command is sent.

NOTE

**If the parameter is a legal−for−trade parameter and the legal for trade mode is
switched on, this parameter is not changed and the response to the command is ?crlf.**

CRLF: carriage return, line feed (cr = 0d hex, lf = 0a hex)

2.3.2   Response to parameter queries

A parameter query is input with a command to which a question mark is added.

A parameter query is always responded to in ASCII format. The delimiter is a Line Feed (LF = 0A hex).

The output length of a query is always constant for every command.

Example:

   Query: *ASF?;*

   DIS response: *03 crlf*

When the master has sent a command sequence (query), the reply must be waited for before the next query or command is sent.

2.3.3   Responses to incorrect or unknown commands

The DIS responds with ?crlf when a command is incorrect or unknown.

2.4   Output types for measured values

The response to measured value queries (**MSV?**) is a ±8 digit measured value including decimal point followed by one blank and 4 characters unit.

Examples:

Command format	DIS response	No. of bytes
MSV?	± 000010.50␣kg␣␣CRLF	14 + 2

LF: Line Feed (= 0a hex) , CR: Carriage Return (= 0d hex)

The measurement output delimiter is always a Line Feed.

2.5   Password protection parameters

DIS password protection includes important settings for the characteristic curve of the scale and its identification. Commands with password protection are only activated once the password is entered. Unless the password is not entered with the command **SPW** this command will not be executed. A query is always possible.

2.6 Command overview (alphabetic)

Command	PW	LFT	Function	Page
ASF			Filter selection	56
BD1			Baud rate COM 1 (load cells)	21
BD2			Baud rate COM 2 (computer)	24
BD3			Baud rate COM 3 (printer)	27
BD4			Baud rate COM 4 (external display)	31
BFC			Function key settings	109
CDL			Set to zero	64
CWT	X	X	Calibration weight	42
DCO			LCD display contrast	112
DPT	X	X	Decimal marker	47
DPW			Password definition	72
ECC			Number of delimiters	87
ECH			Delimiter definition	89
EDC			Checksum	90
EDL			Measured value length	91
EPT			Decimal point	92
ESC	X		Printer escape sequence	96
ENC	X	X	Encryption	84
ENU	X	X	Unit of measurement	45
ERR?			Error query	79
FC2			Function COM 2 (computer)	23
FC3			Function COM 3 (printer)	26
FC4			Function COM 4 (external display)	30
FMD			Filter mode	57
GCA	X	X	Gravitational acceleration factor (adjustment)	35
GDE	X	X	Gravitational acceleration factor (application)	36
IDN?	X		Electronics identification with serial number	75
LAG			Language settings	111
LDW	X	X	Scale characteristic curve, zero point	38
LFT	X		Legal−for−trade	81
LIM	X	X	Linearization, measured value	52
LIN	X	X	Linearization, output values	53
LIV	X		Limit value switch	114
LWT	X	X	Scale characteristic curve, full scale	40

PW – Password protection via **DPW/SPW** commands

LFT – Legal parameter

Command	PW	LFT	Function	Page
MAL	X		Access authorization	108
MRA	X	X	Multirange changeover point 1	49
MRB	X	X	Multirange changeover point 2	50
MSV?			Data output	62
MTD	X	X	Motion detection	48
NOV	X	X	Nominal output value	44
PA2			Parity COM2 (computer)	25
PA3			Parity COM3 (printer)	28
PA4			Parity COM4 (external display)	32
PAU			Pause [10ms]	93
PES			Number of spaces in each line (printing)	98
PFF			Printer Form Feed	105
PID?			Print number (counter)	99
PLB			Blank lines before printout	97
PLE			Blank lines after printout	104
PRC			Print copies	106
PRT	X		Print protocol	95
PST			Printer strings	103
PT3			Protocol COM3 (printer)	29
PT4			Protocol COM4 (external display)	33
PTM	X		Manual tare mode	69
PTV	X		Manual tare input	69
RES			Electronics reset	74
RSN	X	X	Display resolution	46
WMD	X		Mode of operation	110
SCC			Number of start characters	86
SCH			Definition of start characters	88
SPW			Write enable for all password–protected parameters	73
TAR;			Taring	65
TAS			Gross / net selection	68
TAV			Tare value	66
TCR?			Legal–for–trade counter	83
TDD	X	X	Read/save settings in EEPROM	77
TWC			Communication COM 1 (load cells)	22
WMD	X		Scale operating mode	110
ZSE	X	X	Zero on start–up	60
ZTR	X	X	Automatic zero tracking	59

PW – Password protection via **DPW/SPW** commands
LFT – Legal parameter

3 Individual command descriptions

3.1 Interface commands

To set up communication between the DIS and the computer, the interface must be configured. The following commands are available in the DIS for setting up the interface and selecting the transmission format:

- COM1   Baud rate setting   **BD1**

          Communication (2, 4–wire operation)   **TWC**

- COM2   Baud rate setting   **BD2**

          Parity setting   **PA2**

          Function   **FC2**

- COM3   Baud rate setting   **BD3**

          Parity setting   **PA3**

          Function   **FC3**

          Protocol   **PT3**

- COM4   Baud rate setting   **BD4**

          Parity setting   **PA4**

          Function   **FC4**

          Protocol   **PT4**

Serial interface characteristics:

Start bit: 1
Word length: 8 Bit
Parity none / even / odd
Stop bit: 1
Baud rate: 1200 (9600) ... 115200 baud

The asynchronous interfaces of the DIS are serial interfaces, i.e., data are transferred bit by bit, one after the other and asynchronously. Asynchronous means that the transmission works without a clock signal.

A start bit is set before each data byte. Then come the word bits (D0...D7), one or no parity bit(s) for the transmission check and a stop bit.

Fig. 1: Composition of a character

As the data are transmitted one after another, the transmission speed must match the reception speed. 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 character transferred. Next come the data bits, which all have the same length. When the stop bit is reached, the receiver goes into the wait state until it is reactivated by the next start bit.

The number of characters per measured value is fixed at 13 characters (11 characters measured value and 2 characters CRLF).

3.1.1   COM1 interface commands

BD1

Baud Rate

(Setting the baud rate for the load cell interface, COM1)

Property	Contents	Note
Command string	**BD1**	
No. of parameters	1	
Parameter range	P1=9600,19200, 38400, 57600, 115200	P1 in Bd
Factory setting	38400 baud	
Response time	< 10 ms	
Password protection	No	
Relevant to verification	No	
Parameter protection	With command **TDD**1;	
Master input	BD1(P1);	
DIS response	0crlf	On input OK
Master query	**BD1**?;	
DIS response	P1	P1 = 6 characters

Note: ( ) Required parameters, < > optional parameters on parameter input.
DIS responds with ?CRLF, if the input or the query is incorrect.

Function:

The command sets up the baud rate for serial communication of the COM1 interface.
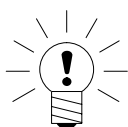
NOTE

When the baud rate of the COM1 interface is changed, the baud rate in the connected load cells is also automatically changed, the changes in the load cells are stored safe from power failure and a BUS scan is carried out in the new baud rate. The parity on the COM1 (load cells) interface cannot be changed.

Example:	*Response:*	
BD1?;	*38400crlf*	*corresponds to 38400 Baud,*
BD1 38400;	*0CRLF*	*DIS responds at 38400 baud*
		Parity is unchanged

TWC

Two wire communication

(2−wire communication for the load cell interface, COM1)

Property	Contents	Note
Command string	**TWC**	
No. of parameters	1	
Parameter range	P1=0.1	
Factory setting	0	
Response time	< 10 ms	
Password protection	No	
Relevant to verification	No	
Parameter protection	With command **TDD**1;	
Master input	TWC(P1);	
DIS response	0crlf	On input OK
Master query	**TWC**?;	
DIS response	P1	P1 = 1 character

Note: ( ) Required parameters, < > optional parameters on parameter input.
DIS responds with ?CRLF, if the input or the query is incorrect.

Function:

The command changes communication with the load cells (COM1 interface to 2−wire bus mode (half duplex). This operating mode is required when AD105C or measurement chains with AD105C are connected. In 2−wire operating mode, inputs are not responded to with 0crlf or ?crlf.

Example:	*Response:*	
TWC?;	*1crlf*	*corresponds to 2−wire communication activated*
TWC 0;	*0crlf*	*Configuration full duplex, DIS responds with set baud rate, parity is unchanged*

3.1.2 COM2 interface commands

FC2

Function COM2
(RS-232)

Property	Contents	Note
Command string	**FC2**	
No. of parameters	1	
Parameter range	P1: 0 =off 1=on	
Factory setting	0	
Response time	< 10 ms	
Password protection	No	
Relevant to verification	No	
Parameter protection	With command **TDD**1	
Master input	**FC2**(P1);	
DIS response	0crlf	On input OK
Master query	**FC2?;**	
DIS response	P1 crlf	1 character

Note: ( ) Required parameters, < > optional parameters on parameter input.

Function:

This command deactivates the COM2 interface. If the interface has been deactivated, it can only be reactivated via the front panel or keyboard. No commands are executed or responses given when the interface is deactivated.

Example:	*Response:*	
FC2?;	*1crlf*	*PC/PLC interface COM2 is activated*
FC2 0;	*none*	*COM2 interface is deactivated, reactivation via command is not possible.*

BD2

Baud Rate

(Setting the baud rate for the PC/PLC interface, COM2)

Property	Contents	Note
Command string	**BD2**	
No. of parameters	1	
Parameter range	P1 = 1200, 2400, 4800, 9600,19200, 38400, 57600, 115200	P1 in Bd
Factory setting	9600 baud	
Response time	< 10 ms	
Password protection	No	
Relevant to verification	No	
Parameter protection	With command **TDD**1;	
Master input	BD2(P1);	
DIS response	0crlf	On input OK
Master query	**BD2**?;	
DIS response	P1	P1 = 6 character

Note: ( ) Required parameters, < > optional parameters on parameter input.
DIS responds with ?CRLF, if the input or the query is incorrect.

Function:

The command sets up the baud rate for serial communication of the COM2 interface.

NOTE
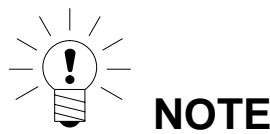
When the baud rate is changed, communication is initially no longer possible. The computer also has to be changed over to the chosen new setting (baud rate). For the change in baud rate to become permanent, it has to be saved with the **TDD1** command. This procedure ensures that you do not set baud rates in the DIS which are not supported by the remote station. If the new baud rate entry is not saved, the DIS will return to the previously valid baud rate after a reset or a power−up.

Example:	*Response:*	
BD2?;	*38400crlf*	*corresponds to 38400 Baud,*
BD2 38400;	*0CRLF*	*DIS responds at 38400 baud*
		Parity is unchanged

PA2

COM2 parity

(Setting the parity for the PC/PLC interface, COM2)

Property	Contents	Note
Command string	**PA2**	
No. of parameters	1	
Parameter range	P1: 0=none, 1=even, 2=odd	P1 = 1 character
Factory setting	1 (=even)	
Response time	< 10 ms	
Password protection	No	
Relevant to verification	No	
Parameter protection	With command **TDD**1;	
Master input	PA2(P1);	
DIS response	0crlf	On input OK
Master query	**PA2**?;	
DIS response	P1crlf	P1 = 1 character

Note: ( ) Required parameters, < > optional parameters on parameter input.
DIS responds with ?CRLF, if the input or the query is incorrect.

Function:

The command sets up the parity for serial communication of the COM2 PC/PLC interface.

Example:	*Response:*	
PA3?;	1CRLF	*corresponds to even parity*
PA3 2;	0CRLF	*Changes parity to odd*
		The baud rate remains unchanged

3.1.3   COM3 interface commands

FC3   **Function COM3**
(RS-232 /USB)

Property	Contents	Note
Command string	**FC3**	
No. of parameters	1	
Parameter range	P1: 0 ..2	
Factory setting	0	
Response time	< 10 ms	
Password protection	No	
Relevant to verification	No	
Parameter protection	With command **TDD**1	
Master input	**FC3**(P1);	
DIS response	0crlf	On input OK
Master query	**FC3?;**	
DIS response	P1 crlf	P1 = 1 character

Note: ( ) Required parameters, < > optional parameters on parameter input.

Function:

This command defines the COM3 interface.

Definition of parameters:

P1 = 0 :   Print function is deactivated (OFF)

P1 = 1;   Printing via RS232

P1 = 2;   Printing via USB

BD3

Baud rate COM3

(Setting the baud rate for the printer interface)

Property	Contents	Note
Command string	**BD3**	
No. of parameters	1	
Parameter range	P1 = 1200, 2400, 4800, 9600,19200, 38400, 57600, 115200	P1 in Bd
Factory setting	9600	
Response time	< 10 ms	
Password protection	No	
Relevant to verification	No	
Parameter protection	With command **TDD**1;	
Master input	BD3(P1);	
DIS response	0crlf	On input OK
Master query	**BD3**?;	
DIS response	P1crlf	P1 = 6 character

Note: ( ) Required parameters, < > optional parameters on parameter input.
DIS responds with ?CRLF, if the input or the query is incorrect.

Function:

The command sets up the baud rate for printer interface.

Example:	*Response:*	
BD3?;	*9600CRLF*	*corresponds to 9600 baud*
BD3 38400;	*0CRLF*	*Changes the baud rate to 38400*

PA3   **COM3 parity**

(Setting the parity for the printer interface)

Property	Contents	Note
Command string	**PA3**	
No. of parameters	1	
Parameter range	P1: 0=none, 1=even, 2=odd	P1 = 1 character
Factory setting	1 (=even)	
Response time	< 10 ms	
Password protection	No	
Relevant to verification	No	
Parameter protection	With command **TDD**1;	
Master input	PA3(P1);	
DIS response	0crlf	On input OK
Master query	**PA3**?;	
DIS response	P1crlf	P1 = 1 character

Note: ( ) Required parameters, < > optional parameters on parameter input.
DIS responds with ?CRLF, if the input or the query is incorrect.

Function:

The command sets up the parity for serial communication of the printer interface.

Example:	*Response:*	
PA3?;	*1CRLF*	*corresponds to even parity*
PA3 2;	*0CRLF*	*Changes parity to odd*

PT3

Protocol COM3
(RS232 / USB)

Property	Contents	Note
Command string	**PT3**	
No. of parameters	1	
Parameter range	P1: 0 = DTR, 1 = DC1	
Factory setting	0	
Response time	< 10 ms	
Password protection	No	
Relevant to verification	No	
Parameter protection	With command **TDD**1	
Master input	**PT3**(P1);	
DIS response	0crlf	On input OK
Master query	**PT3?;**	
DIS response	P1 crlf	1 character

Note: ( ) Required parameters, < > optional parameters on parameter input.

Function:

This command defines the protocol for the serial printer interface COM3.

Definition of parameters:

P1 = 0;   Printer: Hardware protocol (DTR)

P1 = 1;   Printer: Software protocol (DC1/DC3/DC4)

3.1.4   COM4 interface commands

FC4

External display function
(Selection of telegram for external display at COM4)

Property	Contents	Note
Command string	**FC4**	
No. of parameters	1	
Parameter range	P1: 0 ... 5	
Factory setting	0	
Response time	< 10 ms	
Password protection	No	
Relevant to verification	No	
Parameter protection	With command **TDD**1	
Master input	**FC4**(P1);	
DIS response	0crlf	On input OK
Master query	**FC4?;**	
DIS response	P1 crlf	1 character

Note: ( ) Required parameters, < > optional parameters on parameter input.

Function:

Definition of output string:

P1 = 0 :	no external display	
P1 = 1;	String 1 Gross or net value + unit	(<= 19 characters)
P1 = 2;	String 2 Gross or net value + unit and tare value	(<= 28 characters)
P1 = 3;	String 3 Weighing result + unit	(<= 19 characters)
P1 = 4;	String 4 Gross or net value	(<= 9 characters)
P1 = 5;	String 5 Gross or net value + unit + status	(<= 17 characters)

A detailed description of the telegrams can be found in the Operating Manual.

BD4

Baud rate COM4

(Setting the baud rate for external display)

Property	Contents	Note
Command string	**BD4**	
No. of parameters	1	
Parameter range	P1 = 1200, 2400, 4800, 9600,19200, 38400, 57600, 115200	P1 in Bd
Factory setting	9600	
Response time	< 10 ms	
Password protection	No	
Relevant to verification	No	
Parameter protection	With command **TDD**1;	
Master input	BD4(P1);	
DIS response	0crlf	On input OK
Master query	**BD4**?;	
DIS response	P1crlf	P1 = 6 character

Note: ( ) Required parameters, < > optional parameters on parameter input.
DIS responds with ?CRLF, if the input or the query is incorrect.

Function:

The command sets up the baud rate for serial communication with the external display COM 4.

Example:	*Response:*	
BD4?;	*9600CRLF*	*corresponds to 9600 baud*
BD4 38400;	*0CRLF*	*Changes the baud rate to 38400 Baud*
		Parity remains unchanged

PA4

COM4 parity

(Setting the COM4 interface parity for external display)

Property	Contents	Note
Command string	**PA4**	
No. of parameters	1	
Parameter range	P1: 0=none, 1=even, 2=odd	P1 = 1 character
Factory setting	1 (=even)	
Response time	< 10 ms	
Password protection	No	
Relevant to verification	No	
Parameter protection	With command **TDD**1;	
Master input	PA4(P1);	
DIS response	0crlf	On input OK
Master query	**PA4**?;	
DIS response	P1crlf	P1 = 1 character

Note: ( ) Required parameters, < > optional parameters on parameter input.
DIS responds with ?CRLF, if the input or the query is incorrect.

Function:

The command sets up the parity for serial communication of the COM4 interface (external display).

Example:	*Response:*	
PA4?;	*1CRLF*	*corresponds to even parity*
PA4 2;	*0CRLF*	*Changes parity to odd*

PT4 **External display: Protocol**
(Interface protocol for external display at COM4)

Property	Contents	Note
Command string	**PT4**	
No. of parameters	1	
Parameter range	P1: 0 ... 2	
Factory setting	0	
Response time	< 10 ms	
Password protection	No	
Relevant to verification	No	
Parameter protection	With command **TDD**1	
Master input	**PT4**(P1);	
DIS response	0crlf	On input OK
Master query	**PT4?;**	
DIS response	P1 crlf	1 character

Note: ( ) Required parameters, < > optional parameters on parameter input.

Function:

This command defines the protocol for the serial communication of the COM4 interface (external display).

Definition of parameters:

P1 = 0;   External display: no protocol (send only)

P1 = 1;   External display: Hardware protocol (DTR)

P1 = 2;   External display: Software protocol (DC1/DC3/DC4)

3.2   Scale characteristic curve and output scaling

Adjustment of scale characteristic curve LDW, LWT	**LDW**, **LWT**
Adjustment weight for LDW, LWT	**CWT**
Nominal value	**NOV**
Unit of measurement	**ENU**
Resolution	**RSN**
Decimal marker	**DPT**
Motion detection	**MTD**
2–range display	**MRA**
3–range display	**MRB**
Gravitational acceleration correction	**GCA**, **GDE**

The DIS2116 is solely suitable for operation with digital load cells (e.g. C16i). With these load cells, the factory settings are stored in the load cells themselves.

An unloaded digital load cell delivers a measured value of 0 and a digital load cell loaded with the maximum capacity delivers a measured value of 1000000 internal digits.

The relationship between internal digits and weight units, e.g. kg, t, etc. is implemented via the user characteristic curve (**LDW**, **LWT**)

The user characteristic curve is set with the commands described in this section:

Setting the characteristic curve

The DIS works with the factory characteristic curve set in the load cells. This factory characteristic curve must not be changed.

A second characteristic curve (**LDW**, **LWT**) is available for the adjustment of the scale.

The gravitational acceleration correction is, in this case, activated via the command **GCA** and **GDE** , when the site where the scale was adjusted is different to where it is now installed and when the gravitational acceleration factors are not identical.

GCA

G Correction Factor
(G factor correction, calibration site)

Property	Contents	Note
Command string	**GCA**	
No. of parameters	1	
Parameter range	P1 = 97000 ... 99000	
Factory setting	98104	
Response time	< 10 ms	
Password protection	Yes	
Relevant to verification	Yes	
Parameter protection	With command **TDD**1;	
Master input	**GCA**(P1);	
DIS response	0crlf	On input OK
Master query	**GCA**?;	
DIS response	P1crlf	P1 = 7 character

Note: ( ) Required parameters, < > optional parameters on parameter input.
DIS responds with ?CRLF, if the input or the query is incorrect.

Function:

This command is used to correct for the effect of gravitational acceleration when the site where the scale is adjusted is not identical to the installation site and when the gravitational acceleration factors (g) are different.

Parameter description:

When queried, the value is output in 6 digits with a positive or negative sign (e.g. 098102 CRLF).

The correction is deactivated with GCA = GDE.

Calculation of the internal correction factor:

The internal GF parameter is automatically reset (GDE := GCA) when

• the characteristic curve **LDW** / **LWT** is measured again.

Typical input example:

Adjustment site = Darmstadt → g = 9.8104
Installation site = Tokyo → g = 9.7977
__GF = 1.001285__

GDE

Gravitation Correction Destination
G factor correction, destination

Property	Contents	Note
Command string	**GDE**	
No. of parameters	1	
Parameter range	P1 = 97000 ... 99000	
Factory setting	98104	
Response time	< 10 ms	
Password protection	Yes	
Relevant to verification	Yes	
Parameter protection	With command **TDD**1;	
Master input	**GDE**(P1);	
DIS response	0crlf	On input OK
Master query	**GDE**?;	
DIS response	P1crlf	P1 = 7 character

Note: ( ) Required parameters, < > optional parameters on parameter input.
DIS responds with ?CRLF, if the input or the query is incorrect.
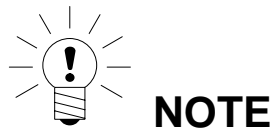
Function:

When queried, the value is output in 6 digits with a positive or negative sign (e.g. 098104 CRLF).

The correction is deactivated with GCA = GDE.

See command GCA.

You can adapt the DIS characteristic curve with the command pair **LDW**/**LWT** to your particular requirements.

Using the command **CWT** , the user characteristic curve can also be set with partial load.

NOTE

The characteristic curve commands**LDW** and **LWT** must be input or executed in the following order: **LDW** and then **LWT**. The input data are only offset when both these parameters have been entered or measured in pairs.

After the scale is adjusted, the range **LDW** → **LWT** is assigned to the following number ranges:

Output on max. capacity	NOV
ASCII	NOV value

Calculation of the internal correction factor:

Setting the scale characteristic curve with LDW, LWT (for max. capacity adjustment)

Action	Command sequence
Enter the password, e.g.	**SPW"000";**
Loading with scale zero load	**LDW(P1);**
Loading with scale max. capacity	**LWT(P2);**

Setting the user characteristic curve with LDW, LWT
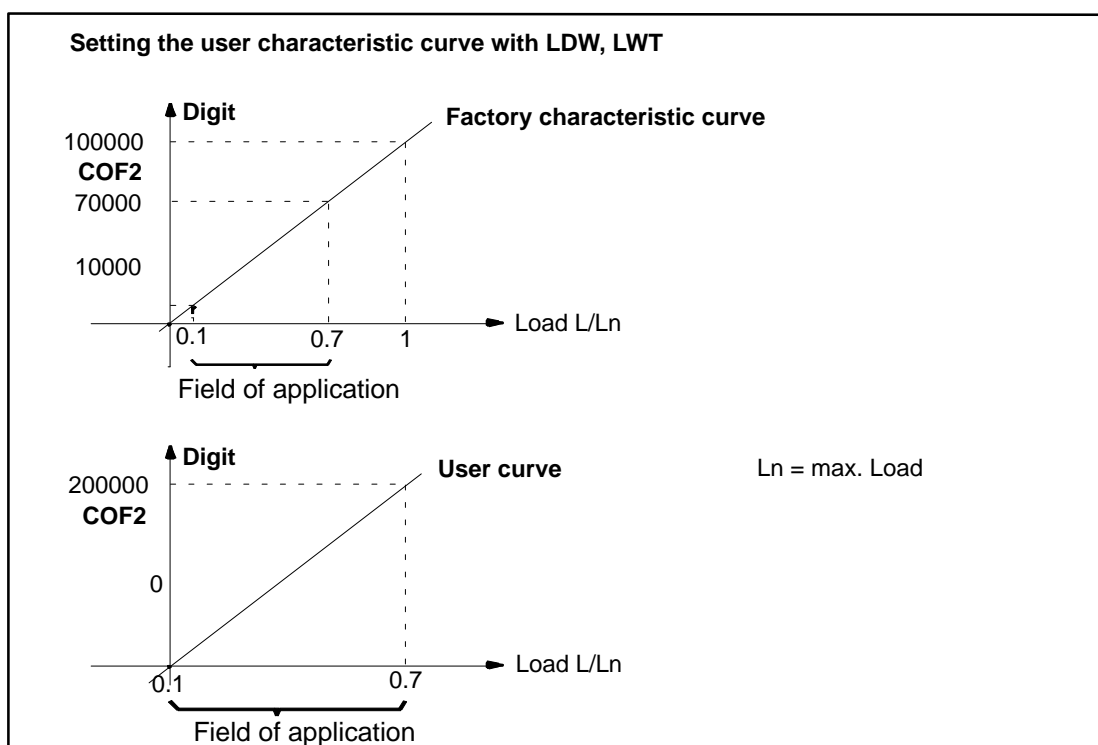
Fig. 4: Setting the user characteristic curve

LDW

Load Cell Deadload Weight
(Scale characteristic curve zero point)

Property	Contents	Note
Command string	**LDW**	
No. of parameters	1	
Parameter range	P1 = 0 ... ±3000000	
Factory setting	0	
Response time	< 10 ms for input or query	
	< 4.2 s for measurement (LDW;)	
Password protection	Yes	
Relevant to verification	Yes	
Parameter protection	After input of **LWT with TDD1;**	
Master input	**LDW**<P1>;	
DIS response	0crlf	On input OK
Master query	**LDW**;	On measurement, only possible if LFT=0
DIS response	0crlf	After measurement
Master query	**LDW**?;	
DIS response	P1crlf (P1 = 7 digits plus sign)	P1 = 8 characters

Note: ( ) Required parameters, < > optional parameters on parameter input.
DIS responds with ?CRLF, if the input or the query is incorrect.

Function:

When measuring, the actual input signal (e.g. scale not loaded, but with deadload weight) is assigned to the internal measured value, the output value 0 digits.

Parameter description:

When queried, the value is output in 7 digits with a positive or negative sign (e.g. –0000246 CRLF).

The user characteristic curve is deactivated at LDW = 0 and LWT = 1000000.

The **LDW** value is not converted via **NOV** .

There are two options for zero point adjustment:

**1. Adopting the zero point of the user characteristic curve with LDW
(reaction time < 4.2 s):**

The scale is not loaded. Adopt the zero point with the command LDW;
The transducer electronics measure the input signal between ± 3 mV/V or the zero load of the scale, store the measured value and offset it, but only after the parameter for LWT is entered.

2.Manual input of the user curve zero point via LDW (reaction time < 10 ms):

Use the command LDW<zero point> to enter the value for the zero point of the scale. The value entered is stored, but only offset after the parameter for LWT is entered.

If the LDW/LWT adjustment is not being executed with 100 % of the input signal, the CWT value (calibration weight) must be set first.

LWT

Load Weight

(Scale characteristic curve, full scale)

Property	Contents	Note
Command string	**LWT**	
No. of parameters	1	
Parameter range	P1 = 0 ... ±3000000	
Factory setting	1000000	
Response time	< 10 ms for input or query	
	< 4.2 s for measurement	
Password protection	Yes	
Relevant to verification	Yes	
Parameter protection	With command **TDD**1;	
Master input	**LWT**(P1);	For input, only possible if LFT=0
DIS response	0crlf	On input OK
Master input	**LWT**;	For input, only possible if LFT=0
DIS response	0crlf	After measurement
Master query	**LWT**?;	
DIS response	P1crlf? (P1 = 7 digits plus sign)	P1 = 8 characters

Note: ( ) Required parameters, < > optional parameters on parameter input.
DIS responds with ?CRLF, if the input or the query is incorrect.

Function:

When measuring, the actual input signal (e.g. loaded scale = max. capacity) is assigned to the internal measured value, the output value 1000000 digits.

Parameter description:

When queried, the value is output in 7 digits with a positive or negative sign (e.g. –0950246 CRLF).

The user characteristic curve is deactivated at LDW = 0 and LWT = 1000000.

The LWT value is not converted via **NOV** .

Adopting the nominal value of the user characteristic curve with LWT (reaction time < 4.2 s):

1. The scale is loaded at max. capacity.

2. Using the command LWT;, the AED/FIT measures an input signal between ± 3.0 mV/V or at max. capacity and offsets this measured value with the previously entered value for LDW to a new characteristic curve.

Manual input of the user curve full scale via LWT (reaction time < 10 ms):

1. Enter the LDW value.

2. Use the command LWT<nominal value> to enter the measured value for the max. capacity.The value entered is stored and offset with the previously measured or entered LDW value.

If the LDW/LWT adjustment is not being executed with 100 % of the input signal, the CWT value (calibration weight) must be set first.

Manual input of nominal value via LWT:

1. Use the command **SPW** to enter your password.

2. Set the legal–for–trade switch to **LFT** = 0.

3. Reset the correction factor: **GCA** = **GDE**

4. The scale is not loaded.

5. Query the measurement output (**MSV?**).

6. Enter the **LDW** value.

7. Load the scale with maximum capacity.

8. Query the measurement output (**MSV?**).

9. Enter the measured value for the maximum capacity via the command **LWT<Maximum capacity>**.
   The input value is stored and offset with the previously measured or input **LDW** value.

10. Save the new characteristic curve with **TDD**1;.

NOTE

The characteristic curve commands **LDW** and **LWT** must be input or executed in the following order: **LDW** and then **LWT**. The input data are only offset when both these parameters have been entered or measured in pairs.

With partial load adjustment (measurement):

The LWT value is offset to 100% according to the input CWT value, the CWT value is then reset to its 100% value (= 1000000).

CWT

Calibration Weight

(Weight for partial load adjustment)

Property	Contents	Note
Command string	**CWT**	
No. of parameters	1	
Parameter range	P1 = 50000 ... 1200000 (5 % ... 120 %)	1000000 = 100 %
Factory setting	1000000 (100%)	
Response time	< 10 ms	
Password protection	Yes	
Relevant to verification	Yes	
Parameter protection	With command **TDD**1;	
Master input	**CWT**(P1);	
DIS response	0crlf	On input OK
Master query	**CWT**?;	
DIS response	P1crlf	P1 = 7 characters

Note: ( ) Required parameters, < > optional parameters on parameter input.
DIS responds with ?CRLF, if the input or the query is incorrect.

Function:

If you cannot apply 100 % of the input signal when adjusting the user characteristic curve, then the **CWT** command also gives you the opportunity to adjust the DIS with an input signal in the range 5 % to 120 % of the required nominal value (partial load calibration).

Parameter description:

P1 is a 7 digit decimal number in the range 50000 to 1200000 (=5 % ... 120 %).
When P1 = 1000000 (= 100 %), this partial load calibration is deactivated.

P1 is a 7 digit decimal number in the range 50000 to 1200000 (=5 % ... 120 %) in not
legal−for−trade applications.

In legal−for−trade applications, the partial load calibration must be implemented with a load
of = 20% of the nominal value.

P1 is the percentage of the maximum capacity with which the next **LDW** / **LWT** adjustment
must be carried out.

Example:

*The scale characteristic curve **LDW/LWT** of a scale is adjusted with 15 kg = 15000 d.
However, only a 10 kg balancing weight is available for the adjustment. Please proceed as
follows:*

1. *Set the **CWT** value to 666667 for the adjustment (corresponds to 66%).*

2. *Set the **NOV** value to 15000 for the adjustment.*

3. *Carry out an **LDW/LWT**–adjustment.
   After the adjustment, the DIS will output the measured value 10000 digit at 10 kg and
   15000 digit at 15 kg.*

4. *Set the increment to **RSN**5 and the decimal sign to **DPT**3. With a maximum capacity of 15
   kg, this gives a partial number of 3000d = e and a display of 15.000.*

NOTE

After an adjustment, the **LDW** and **LWT** values can be read out. They correspond to
parameters as if the adjustment was carried out at maximum capacity (and not at partial
load). If you need to enter the values for **LDW** and **LWT** again at a later time, you must first
enter **CWT = 1000000** and then the **LDW** value to be read out, followed by the value read
out for **LWT**.

NOV

Nominal Output Value
(Resolution of the scale characteristic curve)

Property	Contents	Note
Command string	**NOV**	
No. of parameters	1	
Parameter range	P1 = 100 ... 5000000	
Factory setting	10000	
Response time	< 10 ms	
Password protection	Yes	
Relevant to verification	Yes	
Parameter protection	With command **TDD**1;	
Master input	**NOV**(P1);	
DIS response	0crlf	On input OK
Master query	**NOV**?;	
DIS response	P1crlf	P1 = 7 characters

Note: ( ) Required parameters, < > optional parameters on parameter input.
DIS responds with ?CRLF, if the input or the query is incorrect.

Function:

The **NOV** value is used to scale the output value during measurement output. ASCII measurement output is scaled at the factory to 10000. If a measurement output of e.g. 2000 digits is required at maximum capacity, the nominal value **NOV2000**; must be set with this command. The input parameters are not changed by this scaling.

The tare value lies on the **NOV** characteristic curve and is output in this scaling.

Measured value output format at maximum capacity	NOV $\geqq$ 100
ASCII	**NOV value**

ENU **Engineering Unit**
(Unit of measurement)

Property	Contents	Note
Command string	**ENU**	
No. of parameters	1	
Parameter range	P1: 4 ASCII characters	Put in " "
Factory setting	""	No unit
Response time	< 10 ms	
Password protection	Yes	
Relevant to verification	Yes	
Parameter protection	With command **TDD**1;	
Master input	**ENU**"xxxx"	
DIS response	0crlf	On input OK
Master query	**ENU**?;	
DIS response	P1crlf	P1 = 4 characters

Note: ( ) Required parameters, < > optional parameters on parameter input.
DIS responds with ?CRLF, if the input or the query is incorrect.

Function:

This command is used to input a unit of measurement.

NOTE

The quotation marks "" are necessary for input. They are not output. They are only used to mark the text.

RSN

Resolution

(Display resolution, increment)

Property	Contents	Note
Command string	**RSN**	
No. of parameters	1	
Parameter range	P1 = 1, 2, 5, 10, 20, 50,100 [d]	
Factory setting	1 [d]	
Response time	< 10 ms	
Password protection	Yes	
Relevant to verification	Yes	
Parameter protection	With command **TDD**1;	
Master input	**RSN**(P1);	
DIS response	0crlf	On input OK
Master query	**RSN**?;	
DIS response	P1crlf	P1 = 3 characters

Note: ( ) Required parameters, < > optional parameters on parameter input.
DIS responds with ?CRLF, if the input or the query is incorrect.

Function:

This command specifies the increment of the measurement output. The following functions are affected by the increment:

- Standstill recognition**(MTD)**

- Zero tracking**(ZTR)**

- Measuring range monitoring

- Zero on start−up **(ZSE)**

- Measurement resolution

DPT

Decimal Point
(Position of decimal point)

Property	Contents	Note
Command string	**DPT**	
No. of parameters	1	
Parameter range	P1 = 0 ... 6	
Factory setting	0	
Response time	< 10 ms	
Password protection	Yes	
Relevant to verification	Yes	
Parameter protection	With command **TDD**1;	
Master input	**DPT**(P1);	
DIS response	0crlf	On input OK
Master query	**DPT**?;	
DIS response	P1crlf	P1 = 1 characters

Note: ( ) Required parameters, < > optional parameters on parameter input.
DIS responds with ?CRLF, if the input or the query is incorrect.

Function:

This command specifies the number of decimal places for the measurement output.

DPT0: xxxxxxx. (no decimal point)

DPT1: xxxxxx.x

DPT2: xxxxx.xx

DPT3: xxxx.xxx

DPT4: xxx.xxxx

DPT5: xx.xxxxx

DPT6: x.xxxxxx

MTD

Motion Detection

(Motion detection)

Property	Contents	Note
Command string	**MTD**	
No. of parameters	1	
Parameter range	P1 = 0 ... 4	
Factory setting	0	
Response time	< 10 ms	
Password protection	Yes	
Relevant to verification	Yes	
Parameter protection	With command **TDD**1;	
Master input	**MTD**(P1);	
DIS response	0crlf	On input OK
Master query	**MTD**?;	
DIS response	P1crlf	P1 = 2 characters

Note: ( ) Required parameters, < > optional parameters on parameter input.
DIS responds with ?CRLF, if the input or the query is incorrect.

Function:

MTD0:	OFF	(motion detection is deactivated, unit is always displayed)
MTD1:	0.25 d/s	
MTD2:	0.5 d/s	
MTD3:	1.0 d/s	(must be set for legal–for–trade applications)
MTD4:	2.0 d/s	
MTD5:	3.0 d/s	

When the standstill conditions are met, the selected unit (**ENU**) is displayed.

The unit Digit (d) is based on the nominal value (**NOV**) and the selected increment (**RSN**).

Example:

RSN = 5, NOV = 15000, ENU = g, weighing range = 15000 g

At MTD3, the standstill condition is met when the weight deviation is less than 5 g/s.

At MTD4, the standstill condition is met when the weight deviation is less than 10 g/s.

MRA

Multi Range Mode
(2–range scale display)

Property	Contents	Note
Command string	**MRA**	
No. of parameters	1	
Parameter range	P1 = 0 ... NOV (5000000)	0 = deactivated
Factory setting	0	
Response time	< 10 ms	
Password protection	Yes	
Relevant to verification	Yes	
Parameter protection	With command **TDD**1;	
Master input	**MRA**(P1);	
DIS response	0crlf	On input OK
Master query	**MRA**?;	
DIS response	P1crlf	P1 = 8 characters

Note: ( ) Required parameters, < > optional parameters on parameter input.
DIS responds with ?CRLF, if the input or the query is incorrect.

Function:

This command is used to set up the scale as a one or two range scale. **MRA0**; deactivates the 2–range mode. Use **MRA** > 0 ... **NOV** to specify the changeover point between range 1 and 2. When the 2–range mode is activated, then the set **RSN** increment applies for range 1. The increment for range 2 is then automatically the next increment.

Examples:

RSN = 2: *Range 1 with increment 2, range 2 with increment 5*

RSN = 5: *Range 1 with increment 5, range 2 with increment 10*

When the scale is unloaded, the display changes back to the increment of range 1.

MRB   **Multi Range Mode 2**
               (3–range scale display)

Property	Contents	Note
Command string	**MRB**	
No. of parameters	1	
Parameter range	P1 = 0 ... NOV (5000000)	0 = deactivated
Factory setting	0	
Response time	< 10 ms	
Password protection	Yes	
Relevant to verification	Yes	
Parameter protection	With command **TDD**1;	
Master input	**MRB**(P1);	
DIS response	0crlf	On input OK
Master query	**MRB**?;	
DIS response	P1crlf	P1 = 8 characters

Note: ( ) Required parameters, < > optional parameters on parameter input.
DIS responds with ?CRLF, if the input or the query is incorrect.

Function:

This command is used to set up the scale as a one, two or three range scale. **MRB0**;
deactivates the 3–range mode. Use **MRA** < **MRB** ... **NOV** to specify the changeover point
between range 2 and 3. When the 3–range mode is activated, then the set **RSN** increment
applies for range 1. The increment for range 2 is then automatically the next increment and
the next one again is for range 3.

Examples (0 < MRA < MRB < NOV):

RSN = 2:   *Range 1 with increment 2, range 2 with increment 5, range 3*
             with increment 10

RSN = 5:   *Range 1 with increment 5, range 2 with increment 10, range 3*
             with increment 20

When the scale is unloaded, the display changes back to the increment of range 1.

3.3 Linearization settings

The DIS has the ability of reducing the linearity deviation of the scale. The DIS works with a 3rd order polynomial. Two additional points between dead load (**LDW**) and maximum capacity(**LWT**) must be used for this correction.

These commands must be set after the scale is adjusted (**LDW**, **LWT**, **NOV**).

- Measured value of the correction **LIM**
- Weight value for the correction **LIN**

Four value pairs are required to calculate the coefficients for a 3rd order polynomial:

Weight	Measured value	Note
0	0	Dead load removed
LIN1	LIM1	First point
LIN2	LIM2	Second point
NOV	NOV	Maximum capacity

These two additional points must therefore lie in the range 0 ... NOV. In addition, the following conditions must be met:

0 < LIM1 < LIM2 < NOV

0 < LIN1 < LIN2 < NOV

LIM   **Linearization Measured Values**
                           (Linearization curve of input values)

Property	Contents	Note
Command string	**LIM**	
No. of parameters	2	
Parameter range	P1 = 1, 2	Value 1 or
	P2 = 0... NOV (±3000000)	2 parameters
Factory setting	P2 = 0	
Response time	< 10 ms	
Password protection	Yes	
Relevant to verification	Yes	
Parameter protection	With command **TDD**1;	
Master input	**LIM**(P1),<P2>;	
DIS response	0crlf	On input OK
Master query	**LIM**(P1)?;	
DIS response	P2 crlf	P2= 6 characters

Note: ( ) Required parameters, < > optional parameters on parameter input.

Function:

The LIM values are the input values of the linearization curve.

Conditions: 0 < LIM1 < LIM2 < NOV

Example:

LIM1,12345;   *The measured weight value is input*

LIM1;   *The weight value is measured by the DIS*

For further information, refer to the **LIN** command.

LIN

Linearization Nominal Values
(Linearization curve of output values)

Property	Contents	Note
Command string	**LIN**	
No. of parameters	2	
Parameter range	P1 = 1, 2	Value 2 parameter
	P2 = 0... NOV (3000000)	
Factory setting	P2 = 0	
Response time	< 10 ms	
Password protection	Yes	
Relevant to verification	Yes	
Parameter protection	With command **TDD**1;	
Master input	**LIN**(P1),(P2);	
DIS response	0crlf	On input OK
Master query	**LIN**(P1)?;	
DIS response	P2 crlf	P2= 6 characters

Note: ( ) Required parameters, < > optional parameters on parameter input.

Function:

The LIM values are the required output values of the linearization curve.

The LIN values are the values that should be displayed for the applied weight. The LIM values are the actual values measured for the applied weight.

Example:

Curve for unloaded scale = 0 scale loaded with maximum capacity = 10.000kg(10000)

The linearity error should be compensated for at 2.5kg and 7kg.

Use command LIN 1 to input 2500 (2.5kg) and the command LIM 1 to acquire the measured value for the 2.5kg load.

Then use command LIN 2 to input 7000 (7kg) and the command LIM 2 to acquire the measured value for the 7kg load.

The linearity compensation is calculated from the 4 values pairs for 0, LIN1/LIM1, LIN2/LIM2, nominal value. Both value pairs LIN1/LIM1, LIN2/LIM2 must always be input (measured). The value pairs for 0 and nominal value cannot be input.

Conditions: 0 < LIN1 < LIN2 < NOV

Setting the linearization:

- Use the command **SPW** to enter your password.
- Set the legal–for–trade switch to **LFT** = 0.
- The scale is adjusted (**LDW**, **LWT**, **NOV**...).
- Switch off the previous linearization: LIN1=0, LIN2=0, LIM1=0 LIM2=0.
- Load the scale with the first known weight (Point1).
- Enter the LIN1 value (weight without decimal point).

  There are two options for the **LIM1** value

  a) • Query the measurement output **MSV?**).

     • Enter the **LIM1** value (weight without decimal point), <MSV value>.

  b) • Have the **LIM1**1 value measured **LIM1**;

- Load the scale with the second known weight (Point2).
- Enter the **LIN2** value (weight without decimal point).
- Query the measurement output **MSV?**).

  There are two options for the **LIM2** value

  a) • Query the measurement output **MSV?**).

     • Enter the **LIM2** value (weight without decimal point), **LIM2,**<MSV value>.

  b) • Have the **LIM2** value measured **LIM2**;

- Save the new values with using **TDD**1 to EEPROM

Switch off the previous linearization:

Enter the default values:

Enter the password (**DPW**).

Switch off legal–for–trade (**LFT**0; if necessary)

LIN1,0;

LIN2,0;

LIM1,0;

LIM2,0;

TDD1;

3.4 Settings for the measuring mode

These commands should be set before data output.

- Filter selection, limit frequencies   **ASF**
- Filter mode   **FMD**
- High Speed Mode   **HSM**
- Automatic zero tracking   **ZTR**
- Zero on start–up   **ZSE**

ASF

Messverstärkerfilter (Amplifier Filter)
(Filter selection Limit frequencies)

Property	Contents	Note
Command string	**ASF**	
No. of parameters	1	
Parameter range	P1 = 0 ... 10	
Factory setting	5	
Response time	< 10 ms	
Password protection	No	
Relevant to verification	No	
Parameter protection	With command **TDD**1;	
Master input	**ASF**(P1);	
DIS response	0crlf	On input OK
Master query	**ASF**?;	
DIS response	P1 crlf	P1 = 2 characters

Note: ( ) Required parameters, < > optional parameters on parameter input.
DIS responds with ?CRLF, if the input or the query is incorrect.

Function:

This command selects a digital filter. This influences the filter performance of the DIS (measurement signal bandwidth).

The limit frequency of the filter determines the settling time. The higher the filter index, the better the filter effect, but the longer the settling time when changing the weight. The filter setting should be chosen to be as low as possible, while still being able to ensure non−operation (standstill) at a weight that does not change.

Mean−value calculation influences the overall settling time of the DIS. The total settling time is also dependent on the mechanical construction of the transducer, on the dead load of the scale and on the weight to be weighed.

Parameter description:

With ASF0, the filter is deactivated.

The measured signal filtering occurs in the load cells, please refer to the descriptions of the load cells or measurement chain used for the filter properties.

When setting and selecting the filter, the commands **HSM**, **ASF** and **FMD** must be taken into account.

FMD   **Filtermodus (Filter Mode)**
(Selection of filter mode)

Property	Contents	Note
Command string	**FMD**	
No. of parameters	1	
Parameter range	P1 = 0 ... 4	
Factory setting	0	
Response time	< 10 ms	
Password protection	No	
Relevant to verification	No	
Parameter protection	With command **TDD**1;	
Master input	**FMD**(P1);	
DIS response	0crlf	On input OK
Master query	**FMD**?;	
DIS response	P1 crlf	P1 = 1 characters

Note: ( ) Required parameters, < > optional parameters on parameter input.
DIS responds with ?CRLF, if the input or the query is incorrect.

Function:

FMD0:   Standard filters (IIR 2nd order low–pass filters)

FMD1:   3–stage fast–settling digital filters (FIR low–pass filters)

FMD2:   IIR 8th order low–pass filters

FMD3:   Fast–settling digital filters (IIR 4th order low–pass filters)

FMD4:   Fast–settling digital filters (FIR low–pass filters)

The measured signal filtering occurs in the load cells, please refer to the descriptions of the load cells or measurement chain used for the filter properties.

When setting and selecting the filter, the commands **HSM**, **ASF** and **FMD** must be taken into account.

HSM

High Speed Mode
(High speed mode)

Property	Contents	Note
Command string	**HSM**	
No. of parameters	1	
Parameter range	P1 = 0/1 (0 = Off, 1 = On)	
Factory setting	0	Deactivated
Response time	< 10 ms	
Password protection	No	
Relevant to verification	No	
Parameter protection	With command **TDD**1;	
Master input	**HSM**(P1);	
DIS response	0crlf	On input OK
Master query	**HSM**?;	
DIS response	P1 crlf	P1 = 1 characters

Note: ( ) Required parameters, < > optional parameters on parameter input.
DIS responds with ?CRLF, if the input or the query is incorrect.

Function:

HSM=0   The connected load cells are set at standard measuring rates.
          AED,FIT   at 600 MW/s

          AD104,AD105,C16i   at 100 MW/s

HSM=1   The connected load cells are set at doubled measuring rates.
          AED,FIT   at 1200 MW/s

          AD104,AD105,C16i   at 200 MW/s

ZTR

Nullnachlauf (Zero Tracking)
(Automatic zero tracking)

Property	Contents	Note
Command string	**ZTR**	
No. of parameters	1	
Parameter range	P1 = 0/1 (0 = Off, 1 = On)	
Factory setting	0	Deactivated
Response time	< 10 ms	
Password protection	Yes	
Relevant to verification	Yes	
Parameter protection	With command **TDD**1;	
Master input	**ZTR**(P1);	
DIS response	0crlf	On input OK
Master query	**ZTR**?;	
DIS response	P1 crlf	P1 = 1 characters

Note: ( ) Required parameters, < > optional parameters on parameter input.
DIS responds with ?CRLF, if the input or the query is incorrect.

Function:

Automatic zero tracking occurs for a gross or net measured value < 0.5 d in the range ±2% of the nominal value of the scale (**NOV**). The maximum reset speed is 0.5 d/s when the scale is at standstill. The unit Digit (d) is based on the nominal value (**NOV**) and the selected increment (**RSN**).

ZSE

Nullstellen (Zero Setting)
(Zero setting on start–up)

Property	Contents	Note
Command string	**ZSE**	
No. of parameters	1	
Parameter range	P1 = 0 ... 4	
Factory setting	0	Deactivated
Response time	< 10 ms	
Password protection	Yes	
Relevant to verification	Yes	
Parameter protection	With command **TDD**1;	
Master input	**ZSE**(P1);	
DIS response	0crlf	On input OK
Master query	**ZSE**?;	
DIS response	P1 crlf	P1 = 2 characters

Note: ( ) Required parameters, < > optional parameters on parameter input.
DIS responds with ?CRLF, if the input or the query is incorrect.

Function:

After switching on the voltage, during a RESET or after an **RES** command, zero setting is carried out after a standstill of approx. 2.5 s in the selected range. Any change to the zero on start–up range only takes effect after the voltage cut–in or after the **RES** command.

If there is no standstill or if the gross value falls outside the selected limits, zero setting does not occur. The internal zero memory is always cleared before automatic zeroing. If the gross value at standstill falls within the selected range, the gross value is accepted into the zero memory. Zero memory cannot be read out. The standstill condition is specified with **MTD**. The unit Digit (d) is relates to the nominal value (**NOV**) and the increment (**RSN**).

Parameter description:

ZSE0: Zeroing deactivated

ZSE1: Zeroing range ± 2 % of the **NOV** value

ZSE2: Zeroing range ± 5 % of the **NOV** value

ZSE3: Zeroing range ± 10 % of the **NOV** value

ZSE4: Zeroing range ± 20 % of the **NOV** value

3.5   Commands for measuring mode

Before starting measuring mode, the scale should be adjusted (Section 3.3) and the necessary settings for the measuring mode should have been saved (Section 3.4).

- Measurement output   **MSV?**
- Zero setting gross value (+/–2 %)   **CDL**
- Tare mode   **TAR**
- Tare value   **TAV**
- Gross / net selection   **TAS**
- Manual tare function   **PTM**
- Manual tare value   **PTV**

The taring is a subtractive taring.

MSV

Messwert (Measured Value)
(Measurement query)

Property	Contents	Note
Command string	**MSV?**	
No. of parameters	–	
Parameter range	–	
Factory setting	–	
Response time	< 10 ms	
Password protection	No	
Relevant to verification	No	
Parameter protection	No data to protect	
Master query	**MSV**?;	
DIS response	See description	

Note: ( ) Required parameters, < > optional parameters on parameter input.
DIS responds with ?CRLF, if the input or the query is incorrect.

Function:

The measured values are defined as before (see commands **NOV** and **RSN**) and output in ASCII format. The maximum scope for the measured values is :

For ASCII measurement output: ASCII   ±5000000

The output length is 9 characters.

The measured value is output in relation to the particular measuring range (**NOV**). The measured value can be a net or gross measured value (**TAS**).

Preparing for measurement output:

1. Define the **output scaling** via the **NOV** command.

2. Define the **display resolution** via the **RSN** command.

3. Define the **position of the decimal point** via the **DPT** command.

4. Define the **operating mode** via the **MRA** and **MRB** command.

5. Define **the digital filter mode** via the **FMD** command.

6. Define the **digital filter** via the **ASF** command.

Output scaling is defined by the parameter of the **NOV** command.

Measured value output format at maximum capacity	NOV w 100
ASCII	NOV value

The measured value is saved in the output buffer independently of the measurement query.

ASCII output:

The ASCII output length is 16 byte (incl. CRLF) irrespective of content:

9 characters 1 – 9	1 characters 10	4 characters 11 – 14	1 characters 15,16
Measured value (Sign, measured value with decimal sign)	Space	Adjustable E.g. kg (see ENU command)	crlf
9 x '–' , when outside the display range for LFT > 0		Only for standstill, otherwise 4 spaces	Delimiter

The display range is defined as follows:

LFT = 0:   −160 x NOV ... + 160 x NOV   (cannot be checked)

LFT = 1:   −2 % ... + NOV + 9 d   (legal–for–trade, OIML, R76)

LFT = 2:   −2 % ... + NOV + 5 %   (legal–for–trade, NTEP)

NOV is the output scaling (NOV w 100). The percentages relate to NOV.

The informatio (d) relates to the set increment (**RSN**).
RN = 2 –> 9 d = 18 Digit (d).

CDL

Clear Dead Load
(Zeroing)

Property	Contents	Note
Command string	**CDL**	
No. of parameters	–	
Parameter range	–	
Factory setting	–	
Response time	< 10 ms	
Password protection	No	
Relevant to verification	No	
Parameter protection	No data to protect	
Master input	**CDL**;	
DIS response	**0crlf**	On input OK

Note: ( ) Required parameters, < > optional parameters on parameter input.

Function:

The command **CDL**; initiates a zero balance of the gross value, when this lies in the range of ±2 % (or ±20 % when LFT=0) of the weighing range (**NOV**) and a standstill has occured. If one of the two conditions is not met, zeroing does not take place.

A CDL?; query is not permitted.

TAR

Tare

(Taring with the gross actual value)

Property	Contents	Note
Command string	**TAR**	
No. of parameters	–	
Parameter range	–	
Factory setting	–	
Response time	< 10 ms	
Password protection	No	
Relevant to verification	No	
Parameter protection	No data to protect	
Master input	**TAR**;	
DIS response	0crlf	On input OK

Note: ( ) Required parameters, < > optional parameters on parameter input.

Function:

The **TAR**; command tares the actual measured value. After taring, the system changes back to the net measured value (**TAS0**;). The actual value is stored in the tare memory (see also the **TAV** command) and subtracted from the measured value and all subsequent measured values.

Taring is only permissible in legal–for–trade applications (KFT > 0) when the standstill conditions are met.

Permissible tare range:

LFT = 0: ±100 % of NOV
LFT > 0:   0... NOV

A TAR?; query is not permitted.

The stored tare value can be read out with **TAV?** The tare value is lost when switching off unless it has been saved with TDD1;.

TAV

Tare Value
(Tare value)

Property	Contents	Note
Command string	**TAV**	
No. of parameters	1	
Parameter range	P1 = 0 ... NOV	
Factory setting	0	
Response time	< 10 ms	
Password protection	No	
Relevant to verification	No	
Parameter protection	With command **TDD**1	
Master input	**TAV**(P1);	
DIS response	0crlf	On input OK
Master query	**TAV**?;	
DIS response	X crlf	X = 8 characters
	(X = actual 7 digits tare value with sign)	

Note: ( ) Required parameters, < > optional parameters on parameter input.

Function:

The tare value can be preset or a tare value saved with the tare function (**TAR**) is output.

The value, scaled with the parameter **NOV**, lies on the **LDW**/**LWT** characteristic curve (0 ... *NOV*). After the characteristic curve is input with the commands **LDW**, **LWT** the tare memory is cleared (content = 0).

When the tare value is input, the display changes to the net weight.

Query: TAV?;

The content of the tare memory is output. The tare value is converted to the **NOV** value.

In legal–for–trade applications (**LFT** > 0) the tare range is restricted to 0 ... 100 % of **NOV**
Permissible tare range:

LFT = 0: $\pm$ 100 % of **NOV**

LFT > 0:   0 ... **NOV**

Example:

NOV3000;		*(Scale scaling, scale maximum capacity = 3000)*
TAS1;		*(Gross output activated)*
MSV?;	*1500 LF*	*(Measured value at 50 % of maximum capacity of scale)*
TAR;		*(Tare and select net output)*
TAV?;	*1500 LF*	*(Query tare value)*
MSV?;	*0 LF*	*(Net measured value)*
TAS?;	*0 LF*	*(Net is activated)*
TAS1;		*(Select gross)*
MSV?;	*3000 LF*	*(Measured value at 100 % = maximum capacity of scale)*
TAV?;	*1500 LF*	*(Query tare value, unchanged)*

TAS

Tare Set

(Gross/net selection)

Property	Contents	Note
Command string	**TAS**	
No. of parameters	1	
Parameter range	P1 = 0/1 (0 = net, 1 = gross)	
Factory setting	1	
Response time	< 10 ms	
Password protection	No	
Relevant to verification	No	
Parameter protection	With command **TDD**1	
Master input	**TAS**(P1);	
DIS response	0crlf	On input OK
Master query	**TAS**?;	
DIS response	P1 crlf	P1 = 1 characters

Note: ( ) Required parameters, < > optional parameters on parameter input.

Function:

This command selects the measurement output (**MSV?**).

TAS0: Net measured value

The value in tare memory is subtracted from the actual measured value.

TAS1: Gross measured value

The value in tare memory is not offset. The tare value remains unchanged by the gross/net selection.

PTM

Pretare Mode
(Manual tare function)

Property	Contents	Note
Command string	**PTM**	
No. of parameters	1	
Parameter range	P1 = 0/1 (0 = off, 1 = on)	
Factory setting	1	
Response time	< 10 ms	
Password protection	Yes	
Relevant to verification	No	
Parameter protection	With command **TDD**1	
Master input	**PTM**(P1);	
DIS response	0crlf	On input OK
Master query	**PTM**?;	
DIS response	P1 crlf	P1 = 1 characters

PTM = 1:   Manual tare function activated.

Each time net is selected, the input manual tare value is used and shown in the NET PT display. Taring with the TAR command overwrites the manual tare value and only the NET display is shown.

PTV   **Pretare Value**

(Manual tare value)

Property	Contents	Note
Command string	**PTV**	
No. of parameters	1	
Parameter range	P1 = 0 ... NOV	
Factory setting	0	
Response time	< 10 ms	
Password protection	Yes	
Relevant to verification	No	
Parameter protection	With command **TDD**1	
Master input	**PTV**(P1);	
DIS response	0crlf	On input OK
Master query	**PTV**?;	
DIS response	X crlf	X = 8 characters
	(X = actual 7 digits tare value with sign)	

Note: ( ) Required parameters, < > optional parameters on parameter input.

Function:

The manual tare value can be preset and is offset as the tare value when the manual tare mode **PTM** is activated. If the manual tare value is offset, the net value is marked with NET PT in the display and on printouts.

3.6   Special functions

- Password commands   **DPW**, **SPW**
- Amplifier reset   **RES**
- Amplifier identification   **IDN**
- Store / Restore all parameters   **TDD**
- Manufacturer's designation   **NAM**
- Memory error   **ERR?**

The DIS has password protection for legal–for–trade parameters.

When the password is **not** activated with **SPW**, the parameters of a protected function can be read out but not changed. A new password can be entered with the command **DPW**.

DPW   **Define Password**
(Define password)

Property	Contents	Note
Command string	**DPW**	
No. of parameters	1	
Parameter range	P1= string with max. 7 ASCII characters	
Factory setting	"HBM"	
Response time	< 10 ms	
Password protection	No	
Relevant to verification	Yes	
Parameter protection	With command **TDD**1	
Master input	**DPW**("P1");	
DIS response	0crlf	On input OK

Note: ( ) Required parameters, < > optional parameters on parameter input.

Function:

The command stores the new password. A query is not possible. The new password must be activated after it has been entered with the **SPW** command.

The password function is case−sensitive.

A DPW? query is not permitted.

SPW

Set Password

(Write enable for all password−protected parameters)

Property	Contents	Note
Command string	**SPW**	
No. of parameters	1	
Parameter range	P1= string with max. 7 ASCII characters	Must agree with P1 from DPW
Factory setting	"HBM"	
Response time	< 10 ms	
Password protection	No	
Relevant to verification	No	
Parameter protection	–	
Master input	**SPW**("P1");	
DIS response	0crlf	On input OK

Note: ( ) Required parameters, < > optional parameters on parameter input.

Function:

The command **SPW** with the correctly entered password (by the **DPW** command) authorizes data input with all commands. The command **SPW** with an incorrect password inhibits data input for protected commands. A password is not necessary for output.

The use of protected commands is also inhibited after **RES** or power−up.

An SPW? query is not permitted.

Kapitel 2.6 contains an overview of protected commands.

RES   **Restart**
                   (Reset electronics)

Property	Contents	Note
Command string	**RES**	
No. of parameters	–	
Parameter range	–	
Factory setting	–	
Response time	< 4 s	
Password protection	No	
Relevant to verification	No	
Parameter protection	–	
Master input	**RES**;	No response

Note: ( ) Required parameters, < > optional parameters on parameter input.

Function:

The command **RES** initiates the start–up of the device (warm start). This command does not generate a response. All parameters are set exactly as they were stored with the last **TDD**1 command, i.e. the EEPROM values are transferred to the RAM memory.

An RES? query is not permitted.

IDN

Identification

(Identification of electronics and serial number)

Property	Contents	Note
Command string	**IDN?**	
No. of parameters	1	
Parameter range	P1 = Type, 15 ASCII characters	
Factory setting	HBM,DIS2116,xxxxxxx,P1yy crlf	Response to IDN?;
Response time	< 10 ms	
Password protection	No	
Relevant to verification	No	
Parameter protection	With command **TDD**1	
Master input	IDN("P1")	
DIS response	0crlf	On input OK
Master query	**IDN?**;	
DIS response	HBM,P1,xxxxxxx,P1yy crlf	P1 = 15 characters
	Pyy is the program version number xxxxxxx is the serial number	32 characters + delimiter

Note: ( ) Required parameters, < > optional parameters on parameter input.

Function:

An identification string is output (32 characters + delimiter).

Sequence: Manufacturer, electronics, serial number, software version.

A fixed number of characters are output. The manufacturer is always output with 3 characters, the electronics with 15 characters, the serial number with 7 characters and the version number with 4 characters (each separated by a comma).

Only the manufacturer can enter the serial number (any ASCII characters).

NAM   **Manufacturer ID**

(Manufacturer identification)

Property	Contents	Note
Command string	**NAM**	
No. of parameters	1	
Parameter range	P1 = 3 ASCII characters	
Factory setting	HBM	
Response time	< 10 ms	
Password protection	Yes	
Relevant to verification	Yes	
Parameter protection	With command **TDD**1	
Master input	**NAM**("P1");	
DIS response	0crlf	On input OK
Master query	**NAM?;**	
DIS response	**P1 crlf**	P1 = 3 characters + delimiter

Note: ( ) Required parameters, < > optional parameters on parameter input.

Function:

Entering a manufacturer identification. The manufacturer identification must have no more than 3 characters and must be entered as a string in quotes.

Input:

NAM („HBM");

TDD

Transmit Device Data

(Protect device parameters)

Property	Contents		Note
Command string	**TDD**		
No. of parameters	1		
Parameter range	P1 = 0, 1, 2		
	0 = Establish factory settings		
	1 = Protect actual parameters		
	2 = Activate protected parameters		
Factory setting	–		
Response time	< 0.2 s		
Password protection	TDD0;	YES	
	TDD1;,TDD2;	No	
Relevant to verification	TDD0;	YES	
	TDD1;,TDD2;	No	
Parameter protection	No data to protect		
Master input	**TDD**(P1);		
DIS response	0crlf		On input OK

Note: ( ) Required parameters, < > optional parameters on parameter input.

Function:

This command is used to store all parameters. The DIS has two memorys. The customized parameters are stored safe from power failure in the first memory. The second memory contains the legal parameters.

Content of the first memory:
ASF, BD1, BD2, BD3, BD4, WMD, FMD, TAV, TAS, ESC, PES, PID?, PLB, PLE, PRT, PST, MTD, LIV, BFC, MAL, DPW

Content of the second memory (legal parameters):
GCA, GDE, CWT, LDW, LWT, NOV, RSN, MRA, MRB, MTD, ENU, DPT, LIN, LIM, ZSE, ZTR, LFT, TCR)

When LFT > 0, then only the parameters in the first memory are stored.

When LFT = 0, then the parameters of both memorys are stored.

A TDD? query is not permitted.

When the parameters are entered, changed settings are only saved in the RAM initially, so they are not safe from power failure. Store the settings that have been changed in the working memory with the command **TDD**1 on the SD card so that they are safe from power failure.

TDD0, Restoring the factory settings:

This command restores the parameters of the factory settings:

Unchanged parameter:

Commands for communication:	**BD1 ... BD4, PA2 ... PA4,** **FC2 ... FC4, PT3, PT4, TWC**
Commands for external display:	**EPT**, **EDL**, **PAU**, **EDC**, **ECH**, **SCH**, **ECC**, **SCC**
Commands for print settings:	**ESC**, **PES**, **PLB**, **PLE** **PRT**, **PST**, **PFF**, **PRC**
Commands for settings function keys:	**BFC**, **DCO**, **LAG**, **MAL**, **WMD**

All other parameters are, as described in this manual, set to the factory settings values.

NOTE

After TDD0, the scale must be adjusted again. The legal–for–trade switch is deactivated (OFF). The calibration counter is increased by one.

ERR

Error Status

(Error status)

Property	Contents	Note
Command string	**ERR?**	
No. of parameters	–	
Parameter range	–	
Factory setting	–	
Response time	< 10 ms	
Password protection	No	
Relevant to verification	No	
Parameter protection	–	
Master query	**ERR**?;	
DIS response	P1 crlf	P1 = 5 characters

Note: ( ) Required parameters, < > optional parameters on parameter input.

Function:

The error code has a range of 0 ... 99999 (ERR = 0 = no error). After the error status is read out, the error memory is set to zero.

The description of errors can be found in Chapter 20.2 in the Operating Manual.

3.7   Commands for legal for trade applications

The commands are used to monitor changes to legal−for−trade parameters via the standard counter.

- Legal−for−trade switch   **LFT**
- Legal−for−trade counter   **TCR?**

The legal−for−trade parameters are:
GCA, **GDE**, **CWT**, **LDW**, **LWT**, **NOV**, **RSN**, **MRA**, **MRB**, **MTD**, **ENU**, **DPT**, **LIN**, **LIM**, **ZSE**, **ZTR**, **LFT**, **TCR**)

When the legal−for−trade switch is set to LFT > 0, no changes can be made to legal−for−trade parameters. **Before changing legal−for−trade parameters, the password must be activated (DPW, SPW) and LFT set to zero.** Every LFT change increases the calibration counter (**TCR**) (which cannot be reset) by 1.

After verification, set the LFT to a value greater than zero. Then read the LFT counter and note the value on the type plate of the scale.

LFT

Legal for Trade

(Legal–for–trade switch)

Property	Contents	Note
Command string	**LFT**	
No. of parameters	1	
Parameter range	P1 = 0 ... 4	
	0 = Industrial applications (not legal–for–trade)	
	1 = Legal–for–trade application OIML III (R76) switched on	
	2 = Legal–for–trade application OIML IIII	ordenary accuracy weighing machines up to 1000d
	3 = Legal–for–trade application NTEP switched on	
	4 = Legal–for–trade application NTEPIIIL	US truckscales up to 10000d
Factory setting	0	Deactivated
Response time	< 10 ms	
Password protection	Yes	
Relevant to verification	Yes	
Parameter protection	With command **TDD**1	
Master input	**LFT**(P1);	
DIS response	0crlf	On input OK
Master query	**LFT?;**	
DIS response	P1 crlf	P1 = 1 characters

Note: ( ) Required parameters, < > optional parameters on parameter input.

Function:

Each time the **LFT** command is changed, the legal–for–trade counter (**TCR**) is increased by 1.

When LFT > 0 (legal for trade applications), parameter input is blocked for the following commands:

SZA, **SFA**, **GCA**, **GDE**, **CWT**, **LDW**, **LWT**, **NOV**, **RSN**, **MRA**, **MRB**, **MTD**, **ENU**, **DPT**, **LIN**, **LIM**, **ZSE**, **ZTR**

This means that every change to these legal–for–trade parameters can be detected by the legal–for–trade counter **TCR**, which cannot be reset.

The display range is defined as follows:

LFT = 0:   −160 x NOV .... + 160 x NOV   (cannot be checked)

LFT = 1,2:   −2 % ... + NOV + 9 d   (legal−for−trade, OIML, R76)
LFT = 3,4:   −2 % ... + NOV + 5 %   (legal−for−trade, NTEP)

Permissible tare range:

LFT = 0:   ± 100 % vom NOV
LFT > 0:   0 ... NOV

TCR

Trade Counter

(Legal−for−trade (calibration) counter)

Property	Contents	Note
Command string	**TCR?**	
No. of parameters	–	
Parameter range	–	
Factory setting	unchanged	
Response time	< 10 ms	
Password protection	No	
Relevant to verification	Yes	
Parameter protection	–	
Master query	**TCR?;**	
DIS response	xxxxx crlf	7 characters

Note: ( ) Required parameters, < > optional parameters on parameter input.

Function:

This counter, which cannot be reset, marks parameter changes in legal−for−trade commands (see command **LFT**). The maximum counter count is 9999999. Once this count is reached the counter stops and the legal−for−trade mode cannot be switched on again. This situation can only be remedied at the factory.

ENC

Encryption
(Encrypted transmission of measurements)

Property	Content	Note
Command string	**ENC**	
No. of parameters	1	
Parameter range	P1 = 0 (Off)/1(On)	
Factory default	0	Off
Reaction time	< 10 ms	
Password protection	Yes	
Relevant to legal for trade	Yes	
Parameter backup	With command **TDD**1	
Input Master	**ENC**(P1);	
Response DIS	0crlf	On entry of OK
Query Master	**ENC?;**	
Response DIS	P1 crlf	P1 = 1 character

Note: ( ) required parameters, < > optional parameters for parameter input.

Function:

Use this command to enable encrypted transmission of measurements for manipulation–safe data transmission.

Encryption is enabled as soon as legal for trade (LFT>0) is set.

In the encryted mode for legal–for–trade applications, every measurement of the connected digital load cells is encrypted for transmission and, in addition, provided with information about the load cell.

DIS checks the authenticity of each measurement and disables the display, if necessary.

3.8   Commands for setting up an external display

The commands are used to set up communication with the external display via the fourth serial connection (COM4).

- Number of start characters   **SCC**
- Number of delimiters   **ECC**
- Start character   **SCH**
- Delimiter   **ECH**
- CRC character   **EDC**
- Output length   **EDL**
- Decimal point   **EPT**
- Update rate   **PAU**

An external display can be connected via the fourth serial connection.

Baud rate:	1200 ... 115200
Parity bit:	none / even / odd
Type:	RS232
Update rate:	adjustable 10ms..2500ms
Protocol:	no protocol (send only); Hardware protocol (DTR) Software protocol (DC1/DC3/DC4)

The protocol must be defined in the parameter menu (COMMUNICATION/EXT−DISPLAY (COM4)) or via the command **PT4**.

SCC

External display: Number of start characters (External Display: Start Character Count)
(Protocol of external display, definition of number of start characters)

Property	Contents	Note
Command string	**SCC**	
No. of parameters	1	
Parameter range	0 ... 15	
Factory setting	0	
Response time	< 10 ms	
Password protection	No	
Relevant to verification	No	
Parameter protection	With command **TDD**1	
Master input	**SCC**(P1);	
DIS response	0crlf	On input OK
Master query	**SCC?;**	
DIS response	P1crlf	2 characters

Note: ( ) Required parameters, < > optional parameters on parameter input.

Function:

This command defines the number of start characters in the output string.

SCC = 0:	No start character is defined
SCC = 1 ... 15	Up to 15 start characters can be input
The individual characters are set via the parameter SCH.

Examples:

SCC1;
SCH1,2:   *The start character is STX (= 02hex).*

SCC5;
SCH1,83;
SCH2,84
SCH3,65;
SCH4,82;
SCH5,84;   *The start sequence 'START' is transmitted*

ECC **External display: Number of end characters (External Display: End Character Count)**

(Protocol of external display, definition of number of end characters)

Property	Contents	Note
Command string	**ECC**	
No. of parameters	1	
Parameter range	0 ... 5	
Factory setting	0	
Response time	< 10 ms	
Password protection	No	
Relevant to verification	No	
Parameter protection	With command **TDD**1	
Master input	**ECC**(P1);	
DIS response	0crlf	On input OK
Master query	**ECC?;**	
DIS response	P1crlf	2 characters

Note: ( ) Required parameters, < > optional parameters on parameter input.

Function:

This command defines the number of end characters in the output string.

ECC = 0:	No end character is defined
ECC = 1 ... 5	Up to 5 end characters can be input The individual characters are set via the parameter ECH.

Examples:

ECC1;
ECH1,3:   *The end character is ETX (= 03hex).*

ECC3;
ECH1,69;
ECH2,78;
ECH3,68;   *The end sequence 'END' is transmitted*

SCH

External display: Start character

(Protocol of external display, definition of start characters)

Property	Contents	Note
Command string	**SCH**	
No. of parameters	2	
Parameter range	P1: 1 ... 15	
	P2: 0 ... 255	
Factory setting	0	
Response time	< 10 ms	
Password protection	No	
Relevant to verification	No	
Parameter protection	With command **TDD**1	
Master input	**SCH**(P1),(P2);	
DIS response	0crlf	On input OK
Master query	**SCH?(P1);**	
DIS response	P1crlf	3 characters

Note: ( ) Required parameters, < > optional parameters on parameter input.

Function:

This command defines the start characters in the output string. Input is decimal.

The number of sent start characters is specified via the command SCC.

When SCC = 0, no start character is sent.

Examples:

SCH1,2:   *The first start character is STX (= 02hex).*

SCH15,83:   *The 15th start character is 'S' (= 53hex).*

ECH

External display: End character

(Protocol of external display, definition of end characters)

Property	Contents	Note
Command string	**ECH**	
No. of parameters	2	
Parameter range	P1: 1 ... 5	
	P2: 0 ... 255	
Factory setting	0	
Response time	< 10 ms	
Password protection	No	
Relevant to verification	No	
Parameter protection	With command **TDD**1	
Master input	**ECH**(P1),(P2);	
DIS response	0crlf	On input OK
Master query	**ECH?(P1);**	
DIS response	P1crlf	3 characters

Note: ( ) Required parameters, < > optional parameters on parameter input.

Function:

This command defines the end characters in the output string. Input is decimal.

The number of sent end characters is specified via the command ECC.

When ECC = 0, no end character is sent.

Examples:

ECH1,3:   The first end character is ETX (= 03hex).

ECH5,69:   The 5th end character is 'E' (= 45hex).

EDC   **External display: Checksum**

               (Protocol of external display, definition of checksum)

Property	Contents	Note
Command string	**EDC**	
No. of parameters	1	
Parameter range	0,1	
Factory setting	0	
Response time	< 10 ms	
Password protection	No	
Relevant to verification	No	
Parameter protection	With command **TDD**1	
Master input	**EDC**(P1);	
DIS response	0crlf	On input OK
Master query	**EDC?;**	
DIS response	P1crlf	3 characters

Note: ( ) Required parameters, < > optional parameters on parameter input.

Function:

This command defines the checksum in the output string.

EDC = 0:   No checksum is defined (the telegram is 1 byte shorter).

EDC = 1:   A checksum is calculated.

The checksum is the XOR function: The first byte is the first start character (**SCH**) and the last byte is the last end character (**ECH**).

EDL

External Display: Length
(Setting the maximum length of the external display)

Property	Contents	Note
Command string	**EDL**	
No. of parameters	1	
Parameter range	P1 = 0..8	0 = deactivated
Factory setting	0	
Response time	< 10 ms	
Password protection	No	
Relevant to verification	No	
Parameter protection	With command **TDD**1	
Master input	**EDL**(P1);	
DIS response	0crlf	On input OK
Master query	**EDL?;**	
DIS response	P1crlf	P1 = 1 characters

Note: ( ) Required parameters, < > optional parameters on parameter input.

Function:

This parameter can be used to limit the number of characters for the measured value in the telegram.

When EDL = 0, the measured value is always output with a total of 9 characters. If necessary, spaces are added to the left.
These leading spaces can be suppressed by setting EDL>0.

If the number of places in EDL is insufficient to display all relevant places, decimal places will also be removed.

If the measured value can no longer be correctly displayed, '––––' is output.

EDL0:No limit, the measured value is output with 9 characters

EDL>0:   The measured value is reduced to the set number of places.

Examples:

EDL6:   The measured value is output with 6 characters

EPT

External display: Decimal point

(Protocol of external display, decimal point display)

Property	Contents	Note
Command string	**EPT**	
No. of parameters	1	
Parameter range	0..2	
Factory setting	0	
Response time	< 10 ms	
Password protection	No	
Relevant to verification	No	
Parameter protection	With command **TDD**1	
Master input	**EPT**(P1);	
DIS response	0crlf	On input OK
Master query	**EPT?;**	
DIS response	P1crlf	1 characters

Note: ( ) Required parameters, < > optional parameters on parameter input.

Function:

This command defines the decimal point in the output string.

EPT = 0:   No decimal point is output (the telegram is 1 byte shorter).

EPT = 1:   The decimal point is output as a point.

EPT = 2:   The decimal point is output as a comma.

.

PAU

External display: Pause

(Setting the update rate of the external display)

Property	Contents	Note
Command string	**PAU**	
No. of parameters	1	
Parameter range	P1 = 1..255	0 = deactivated
Factory setting	0	
Response time	< 10 ms	
Password protection	No	
Relevant to verification	No	
Parameter protection	With command **TDD**1	
Master input	**PAU**(P1);	
DIS response	0crlf	On input OK
Master query	**PAU?**	
DIS response	P1crlf	P1 = 1 characters

Note: ( ) Required parameters, < > optional parameters on parameter input.

Function:

This command sets the update rate in 10ms increments:

PAU1:   Update rate 10ms

PAU200:   Update rate 2s

3.9   Commands for print function settings

- Print protocol   **PRT**
- Escape sequence   **ESC**
- Number of empty lines before printing   **PLB**
- Number of spaces in each line   **PES**
- Print ID counter   **PID?**
- Printer strings   **PST**
- Number of empty lines after printing   **PLE**

The print function must be activated to start a printout (**FC3**).

The printer can be connected either via USB or via the third serial connection.

Baud rate: 1200 ... 115200

Parity bit: none / even / odd

Type: RS232

Protocol: Hardware protocol (DTR)
                  Software protocol (DC1/DC3/DC4)

The protocol must be defined in the parameter menu
(COMMUNICATION/PRINTER/PROTOCOL) or via the command **PT3**.

The various printouts are described in Part 1 of the manual.

PRT　　　**Print**

(Output of measured value into alibi memory and printout, if necessary)

Property	Contents	Note
Command string	**PRT**	
No. of parameters	1	
Parameter range	P1: 0 ... 5	
Factory setting	0	
Response time	< 10 ms	
Password protection	Yes	
Relevant to verification	No	
Parameter protection	With command **TDD**1	
Master input	**PRT**(P1);	
DIS response	0crlf	On input OK
Master query	**PRT?;**	
DIS response	P1crlf	1 characters

Note: ( ) Required parameters, < > optional parameters on parameter input.

Function:

When a printer is connected and the print function (**FC3**) is activated, this command automatically starts a printout for the various print protocols.

P1 = 0:　　Print function is deactivated.

P1 = 1:　　Actual measured value: Gross or net and tare

　　　　　　When the legal–for–trade mode is set (**LFT** >0), then the output is stored in the alibi memory and the printout, if necessary, is only implemented when the standstill condition is met within 5s.

P1 = 2:　　Gross or net weighing1 and tare for vehicle scale

P1 = 3:　　Gross or net weighing2 and tare for vehicle scale

P1 = 4:　　Gross or net weighing1, weighing2, result (weighing2–weighing1) and tare for vehicle scale

P1 = 5:　　Gross or net result (weighing2–weighing1) and tare for vehicle scale

ESC

Escape sequences

(Escape sequences for the print protocol)

Property	Contents	Note
Command string	**ESC**	
No. of parameters	2	
Parameter range	P1: 0 ... 9	
	P2: 0 ... 255	
Factory setting	0	
Response time	< 10 ms	
Password protection	Yes	
Relevant to verification	No	
Parameter protection	With command **TDD**1	
Master input	**ESC**(P1),(P2);	
DIS response	0crlf	On input OK
Master query	**ESC?(P1);**	
DIS response	P1crlf	3 characters

Note: ( ) Required parameters, < > optional parameters on parameter input.

Function:

The Escape sequences are used to set the printer (see printer manual).

The DIS has two Escape sequences:

Sequence 1: ESC ESC0, ESC1, ESC2, ESC3, ESC4
Sequence 2: ESC ESC5, ESC6, ESC7, ESC8, ESC9

When the ESC character is set to zero (ESCx,0), this character is not transferred.

To deactivate sequence 1, the command ESC0,0 must be sent.
To deactivate sequence 2, the command ESC5,0 must be sent.

PLB

Print Empty Lines Before Printing

(Print empty lines before printing)

Property	Contents	Note
Command string	**PLB**	
No. of parameters	1	
Parameter range	P1: 0 ... 99	
Factory setting	0	
Response time	< 10 ms	
Password protection	No	
Relevant to verification	No	
Parameter protection	With command **TDD**1	
Master input	**PLB**(P1);	
DIS response	0crlf	On input OK
Master query	**PLB?;**	
DIS response	P1crlf	2 characters

Note: ( ) Required parameters, < > optional parameters on parameter input.

Function:

P1 defines the number of empty lines at the start of printing.

PES   **Print Empty Spaces**

(Print empty spaces in each line)

Property	Contents	Note
Command string	**PES**	
No. of parameters	1	
Parameter range	P1: 0 ... 99	
Factory setting	0	
Response time	< 10 ms	
Password protection	No	
Relevant to verification	No	
Parameter protection	With command **TDD**1	
Master input	**PES**(P1);	
DIS response	0crlf	On input OK
Master query	**PES?;**	
DIS response	P1crlf	2 characters

Note: ( ) Required parameters, < > optional parameters on parameter input.

Function:

P1 defines the number of spaces (blanks) at the start of each new line.

PID — Print Identification Counter

(ID counter for the print protocol)

Property	Contents	Note
Command string	**PID**	
No. of parameters	0/1/2	
Parameter range	0 ... 9.999.999	
Factory setting	0	
Response time	< 10 ms	
Password protection	No	
Relevant to verification	No	
Parameter protection	–	
Master input	**–**	
DIS response	–	
Master query	**PID?(,P1(,P2));**	
DIS response	see below	6 characters

Note: ( ) Required parameters, < > optional parameters on parameter input.

Function:

The print identification counter is the identifier of a measurement in the alibi memory (SD memory card).

On each printout (PRT) the current measurement in the alibi memory is archived and the print identification counter is incremented by one.

The counter cannot be written to.

The command delivers the current print ID or results of a particular print ID in binary or ASCII format according to choice

Description of response

1. Read print ID

Master query	**PID?;**
DIS response	xxxxxxx crlf

Example:

PID?;
0000012;   There are 12 measurements in the alibi memory

2. Binary output

Master query	**PID?(P1);**
DIS response	<100 characters>

Parameter P1 contains the print ID.

The DIS2116 responds with a block of 100 bytes. The last byte contains a checksum based on the first 99 bytes.

Data content	Data type	Offset	Length
Print ID counter	U32	0	4
Date – day	U08	4	1
Date – month	U08	5	1
Date – year	U08	6	1
Time – hour	U08	7	1
Time – minute	U08	8	1
Mode	U08	9	1
Decimal point	U08	10	1
Measured value 1	S32	11	4
Measured value 2	S32	15	4
Tare value 1	S32	19	4
Tare value 2	S32	23	4
Status 1	S32	27	4
Status 2	S32	31	4
Unit	CH[4]	35	4
Truck license tag	CH[10]	39	10
Truck loading	CH[10]	59	10
Truck process	CH[10]	79	10
Checksum	U08	99	1

CH[x]: Zero terminated field with ASCII characters length x

The checksum is calculated by concatenating the first 99 bytes via XOR.

Checksum = response[0] XOR response[1] XOR … XOR response[98]

Example:

PID?12;
<Response: 100 bytes>   The data of the 12th measured value in binary format

3. ASCII output

Master query   **PID?(P1),(P2);**
DIS response   According to P2

Parameter P1 contains the print ID.

Parameter P2 specifies the content.

P2	Data content	Character count	Example of response*
0	Print ID counter	7	*0000002*
1	Total measured value	7	*0005200*
2	Date/time	14	*27.04.09 14:50*
3	Mode	1	*1*
4	Decimal point	2	*03*
5	Measured value 1	7	*8400*
6	Measured value 2	7	*3300*
7	Tare value 1	7	*1000*
8	Tare value 2	7	*1000*
9	Status 1	10	*27*
10	Status 2	10	*31*
11	Unit	4	*kg*
12	Truck license tag	10	*DA–HM 123*
13	Truck loading	10	*1–DIS2116*
14	Truck process	10	*A432.639*

* Final character is crlf in each case

Examples:

PID?12,2;
27.04.09 11:48 crlf   *Date/time of 12th measurement*

PID?12,1;
0005612 crl   *Measured value;*

PID?12,4;
02 crlf   *Decimal point*

PID?12,11;
kg   crlf   *Unit*

On 27.04.09 at 11:48 the measured value 56.12 kg was stored in the alibi memory.

Description of data content

Print ID counter

Measured value identifier

Mode

The mode is set via the operation type (WMD).

0 = standard measured value (measurement 1 only)
1 = vehicle weigh station (measurement 1/measurement 2)

Total measured value

Mode 0: Measured value 1
Mode 1: Difference between measurement 1 and measurement 2

Date/time

Date and time of measurement

Decimal point

Number of decimal places for all measured and tare values

Measured value 1/measured value 2

Measured values (measured value 2 only in mode 1)

Tare value 1/tare value 2

Tare values of the measurements (tare value 2 only in mode 1)
Whether the measured values are gross or net is described in the status

Status 1/status 2

Status of the measurements (status 2 only in mode 1)

Bit	Meaning	Bit	Meaning
0	Gross/net	15	Overflow
1	True zero	16	Display range overrun
3	Standstill	18	System error
4	Limit value 1	19	Error
5	Limit value 2		
6	Measuring range 1		
7	Measuring range 2		
8	Preset tare		

Unit

Unit of measurement for all measured and tare values

Truck license tag

Mode 1 only: License tag of the vehicle

Truck loading

Mode 1 only: Characteristics of the loading

Truck process

Mode 1 only: Characteristics of the process

PST

Print Strings

(Print strings for the print protocol)

Property	Contents	Note
Command string	**PST**	
No. of parameters	2	
Parameter range	P1 = 0 ... 2	
	P2 = String with 30 characters	
Factory setting	Empty string	
Response time	< 10 ms	
Password protection	No	
Relevant to verification	No	
Parameter protection	With command **TDD**1	
Master input	**PST**(P1)," P2 ";	
DIS response	0crlf	On input OK
Master query	**PST?(P1);**	
DIS response	P2 crlf	Max. 32 characters

Note: ( ) Required parameters, < > optional parameters on parameter input.

Function:

The DIS has three print strings (P1=0 ... 2). All ASCII characters can be used for P2 (20hex ... 7f hex).

PLE

Print Empty Lines at the End of Printing
(Printing of blank lines at the end of the print job)

Property	Content	Note
Command string	**PLE**	
No. of parameters	1	
Parameter range	P1: 0 ... 99	
Factory default	0	
Reaction time	< 10 ms	
Password protection	No	
Relevant to legal for trade	No	
Parameter backup	With command **TDD**1	
Input Master	**PLE**(P1);	
Response DIS	0crlf	On entry of OK
Query Master	**PLE?;**	
Response DIS	P1 crlf	2 characters

Note: ( ) required parameters, < > optional parameters for parameter input.

Function:

P1 defines the number of blank lines at the end of the print job.

PFF

Print Form Feed

(Automatic form feed at the end of the print job)

Property	Content	Note
Command string	**PFF**	
No. of parameters	1	
Parameter range	P1:0/1	
Factory default	1	
Reaction time	< 10 ms	
Password protection	No	
Relevant to legal for trade	No	
Parameter backup	With command **TDD**1	
Input Master	**PFF**(P1);	
Response DIS	0crlf	On entry of OK
Query Master	**PFF?;**	
Response DIS	P1crlf	2 characters

Note: ( ) required parameters, < > optional parameters for parameter input.

Function:

This command activates a form feed at the end of the print job. The command for ejecting the page is sent to the printer.

PRC   **Print Copies**
            (Number of additional copies to be printed)

Property	Content	Note
Command string	**PRC**	
No. of parameters	1	
Parameter range	0..3	
Factory default	0	
Reaction time	< 10 ms	
Password protection	No	
Relevant to legal for trade	No	
Parameter backup	With command **TDD**1	
Input Master	**PRC**(P1);	
Response DIS	0crlf	On entry of OK
Query Master	**PRC?;**	
Response DIS	P1crlf	1 characters

Note: ( ) required parameters, < > optional parameters for parameter input.

Function:

Use this command to specify the number of additional copies for automatically printing several copies of a printout.

P1 = 0:   No additional copy, only one printout is made

…

P1 = 3:   3 additional copies, a total of 4 printouts is made

3.10 Commands for setting the function keys and the parameter menus

- Access level to parameter menu   **MAL**
- Function keys function   **BFC**
- Scale operating mode   **WMD**
- Display language   **LAG**
- Display contrast   **DCO**

MAL

Menu Access Level

(Access level at the "Parameter" menu)

Property	Contents	Note
Command string	**MAL**	
No. of parameters	1	
Parameter range	P1: 0 ... 4	
Factory setting	4	
Response time	< 10 ms	
Password protection	Yes	
Relevant to verification	No	
Parameter protection	With command **TDD**1	
Master input	**MAL**(P1);	
DIS response	0crlf	On input OK
Master query	**MAL?;**	
DIS response	P1crlf	1 characters

Note: ( ) Required parameters, < > optional parameters on parameter input.

Function:

This command defines access to the parameter menu of the DIS:

P1	Access at menu level
0	INFORMATION, FUNCTION TEST, MODE
1	Like Level 0 plus PRINT
2	Like Level 1 plus LIMIT VALUE
3	Like Level 2 plus PRINT PROTOCOL
4	Like Level 3 plus FILTER, COMMUNICATION, CLOCK, FUNCTION KEYS, DISPLAY
5	Like Level 4 plus SCALE CONFIGURATION, SCALE PARAMETERS, OFF−CENTER LOAD COMPENSATION, FACTORY SETTINGS

BFC   Function Keys, Function (Key Function)

(Activate function keys)

Property	Contents	Note
Command string	**BFC**	
No. of parameters	2	
Parameter range	P1: 1 … 5	
	P2: 0/1	
Factory setting	0	
Response time	< 10 ms	
Password protection	No	
Relevant to verification	No	
Parameter protection	With command **TDD**1	
Master input	**BFC**(P1),(P2);	
DIS response	0crlf	On input OK
Master query	**BFC?(P1);**	
DIS response	P2 crlf	1 characters

Note: ( ) Required parameters, < > optional parameters on parameter input.

Function:

This command activates the function keys.

P1 = 1:   Function key ZEROING

P1 = 2:   Function key TARING

P1 = 3:   Function key GROSS/NET

P1 = 4:   Function key 10–FOLD RESOLUTION

P1 = 5:   Function key PRINT

The parameter P2 specifies whether the function key is activated/deactivated:

P2 = 0:   Function key deactivated

P2 = 1:   Function key activated

WMD   **Weighing Mode**
                 (Activating the vehicle scale function)

Property	Contents	Note
Command string	**WMD**	
No. of parameters	1	
Parameter range	P1 = 0/1	0 = deactivated
Factory setting	0	
Response time	< 10 ms	
Password protection	Yes	
Relevant to verification	No	
Parameter protection	With command **TDD**1	
Master input	**WMD**(P1);	
DIS response	0crlf	On input OK
Master query	**WMD?;**	
DIS response	P1crlf	P1 = 1 characters

Note: ( ) Required parameters, < > optional parameters on parameter input.

Function:

This command activates the vehicle scale:

WMD0:   Normal mode (non−automatic scale)

WMD1:   Vehicle scale

LAG

Language

(Setting the display language)

Property	Contents	Note
Command string	**LAG**	
No. of parameters	1	
Parameter range	P1 = 0/1	
Factory setting	0 (English)	
Response time	< 10 ms	
Password protection	Yes	
Relevant to verification	No	
Parameter protection	With command **TDD**1	
Master input	**LAG**(P1);	
DIS response	0crlf	On input OK
Master query	**LAG?;**	
DIS response	P1crlf	P1 = 1 characters

Note: ( ) Required parameters, < > optional parameters on parameter input.

Function:

This command sets the display language:

LAG0:   English

LAG1:   Deutsch

DCO   **Display Contrast**

(Setting the display contrast)

Property	Contents	Note
Command string	**DCO**	
No. of parameters	1	
Parameter range	P1 = 0 ... 20	
Factory setting	10	
Response time	< 10 ms	
Password protection	Yes	
Relevant to verification	No	
Parameter protection	With command **TDD**1	
Master input	**DCO**(P1);	
DIS response	0crlf	On input OK
Master query	**DCO?;**	
DIS response	P1crlf	P1 = 2 characters

Note: ( ) Required parameters, < > optional parameters on parameter input.

Function:

The display contrast has 20 adjustment levels

DCO0:   Minimum contrast

DCO19:   Maximum contrast

3.11   Commands for limit value switch settings

- Limit value switch   **LIV**

LIV

Limit values
(Limit value switch)

Property	Contents	Note
Command string	**LIV**	
No. of parameters	5	
Parameter range	P1 = 1 ... 2, P2 = 0, 1, 2, P3 = 0/1	
	P4 = P5 = 0 ... NOV	
Factory setting	x, 0, 0, 0, 0 for all limit values	Deactivated
Response time	< 10 ms	
Password protection	No	
Relevant to verification	No	
Parameter protection	With command **TDD**1	
Master input	**LIV**(P1),<P2>,<P3>,<P4>,<P5>;	
DIS response	0crlf	On input OK
Master query	**LIV?(P1);**	
DIS response	P1,P2,P3,P4,P5 crlf	P1, P2, P3 = 1 character,
		P4, P5 = 8 characters each

Note: ( ) Required parameters, < > optional parameters on parameter input.

Function:

The DIS contains 2 limit value switches with selectable hysteresis. These can monitor gross or net measured values. The monitoring speed depends upon the output rate. Monitoring is always implemented, even when there is no communication via the serial interface.

Parameter description:

Input: LIV(P1),(P2),< P3, P4, P5>;

P1:   Number of limit value switches (1/2)

P2:   Limit value monitoring on/off

    0=OFF

    1= ON

P2:   Input signal of limit value switch (0, 1)
    0= Net measured value
    1= Gross measured value

P4:   Activation level (= ON_Level):
    P3 = 0 ... NOV

P5:   Deactivation level (= OFF_Level)
    P4 = 0 ... NOV

Example:

LIV1,1,0,9000,1000;

The command in the example sets limit value 1 (P1 = 1).
the limit value monitoring is active (P2 = 1).
The limit value 1 switches to he net measured value (P3 =0).
Limit value 1 activates at a gross measured value > 9000 (P4 = 9000) and deactivates at a gross measured value < 1000 (P5 = 1000).

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