Operating Manual

English

DIS2116

Communication commands

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1 Safety instructions

Appropriate use

The device is to be used exclusively as a scale component and for directly related control tasks within the application limits detailed in the specifications. Use for any purpose other than the above is deemed to be non-designated use.

Any person instructed to carry out installation, commissioning or operation of the device must have read and understood the Operating Manual and in particular the technical safety instructions.

In the interests of safety, the device should only be operated by qualified personnel and as described in the Operating Manual. It is also essential to comply with the legal and safety requirements for the application concerned during use. The same applies to the use of accessories.

The device is not intended for use as a safety component. Please also refer to the "Additional safety precautions" section. Proper and safe operation requires proper transportation, correct storage, siting and mounting, and careful operation.

Operating conditions

- Protect the device from direct contact with water.
- Protect the device from moisture and weather such as rain or snow. The protection class of the device is IP20 (DIN EN 60529), the protection class of the front panel is IP65.
- Do not expose the device to direct sunlight.
- Protect the device against shock and impact loading and severe vibration.

- Comply with the maximum permissible ambient temperatures and the data on maximum humidity as stated in the specifications.
- The device must not be modified from the design or safety engineering point of view except with our express agreement. In particular, any repair or soldering work on motherboards (exchanging components) is prohibited. When exchanging complete modules, use only original parts from HBM.
- The device is delivered from the factory with a fixed hardware and software configuration. Changes can only be made within the possibilities documented in the manuals.
- The device is designed for use in industrial environments and meets Class A in accordance with DIN EN 55011.
- The device is maintenance free.
- Please note the following points when cleaning the housing:
  - Disconnect the device from all current and voltage supplies before cleaning it.
  - Clean the housing with a soft, slightly damp (not wet!) cloth. *Never* use solvent as this could damage the labeling or the housing.
  - When cleaning, ensure that no liquid gets into the device or connections.
- In accordance with national and local environmental protection and material recovery and recycling regulations, old equipment that can no longer be used must be disposed of separately and not with normal household garbage.

Qualified personnel

Qualified persons means persons entrusted with the installation, fitting, commissioning and operation of the product who possess the appropriate qualifications for their function.

This includes people who meet at least one of the three following requirements:

- Knowledge of the safety concepts of measurement and automation technology is a requirement and as project personnel, they must be familiar with these concepts.
- As measurement or automation plant operating personnel, they have been instructed how to handle the machinery. They are familiar with the operation of the equipment and technologies described in this documentation.
- As commissioning engineers or service engineers, they have successfully completed the training to qualify them to repair the automation systems. They are also authorized to activate, ground and label circuits and equipment in accordance with safety engineering standards.

Working safely

- The device must not be directly connected to the power supply system. The supply voltage must be between 10 and 30 V_{DC}.
- Error messages should only be acknowledged once the cause of the error is removed and no further danger exists.
- Automation equipment and devices must be designed in such a way that adequate protection or locking

against unintentional actuation is provided (e.g. access checks, password protection, etc.).

- For those devices operating in networks, safety precautions must be taken both in terms of hardware and software, so that a line break or other interruptions to signal transmission do not cause undefined states or loss of data in the automation device.
- After making settings and carrying out activities that are password-protected, ensure that any controls that may be connected remain in a safe condition until the switching performance of the device has been tested.

Additional safety precautions

Additional safety precautions to meet the requirements of the relevant national and local accident prevention regulations must be taken in plants where malfunctions could cause major damage, loss of data or even personal injury.

The scope of supply and performance of the device covers only a small area of measurement and weighing technology. Before starting up the device in a system, a project planning and risk analysis must first be implemented, taking into account all the safety aspects of measurement and automation technology so that residual risks are minimized. This particularly concerns personal and machine protection. In the event of a fault, the relevant precautions must establish safe operating conditions.

General dangers of failing to follow the safety instructions

The device is state of the art and failsafe. The device may give rise to residual dangers if it is inappropriately installed or operated.

2 Markings used

Important instructions are specifically identified:

Symbol	Significance
 **Important**	This marking draws your attention to *important* information about the product or about handling the product.
 **Tip**	This marking indicates tips for use or other information that is useful to you.
Emphasis *See …*	Italics are used to emphasize and highlight text and identify references to sections, diagrams, or external documents and files.

3 Introduction

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

- Digital filtering
- Digital off-center load compensation
- Adjusting the scale characteristic curve, linearization
- Single, dual or triple-range display
- Output scaling of measured values
- Range monitoring of display values (OIML, NTEP)
- Zero balance (± 2%), tare balance
- Gross/net selection
- Standstill recognition
- Zero on start-up
- Automatic zero tracking
- Legal-for-trade switch with calibration counter
- Gravitational acceleration correction via adjustable factor
- Storage of parameters on an SD card
- Password protection of parameters
- 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 restored at any time by using the command TDD0.

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

4 DIS 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**)
- Scale adjustment and output formatting
  (**CWT**, **LDW**, **LWT**, **NOV**, **RSN**, **MRA**, **MRB**, **MTD**, **ENU**, **DPT**)
- Settings for linearization
  (**LIN**, **LIM**)
- Gravitational acceleration correction
  (**GCA**, **GDE**)
- Settings for measuring mode
  (**ASF**, **FMD**, **HSM**, **ZSE**, **ZTR**)
- Commands for measuring mode
  (**MSV?**, **MSS?**, **TAR**, **TAS**, **TAV**, **CDL**, **PTM**, **PTV**)
- Special functions
  (**TDD**, **RES**, **DPW**, **SPW**, **IDN**, **NAM**, **ERR**, **STD**, **AST**)
- Commands for legal-for-trade mode
  (**LFT**, **TCR?**, **ENC**)
- External display
  (**SCC**, **SCH**, **ECC**, **ECH**, **EDC**, **EPT**, **EDL**, **PAU**)
- Print settings
  (**ESC**, **PES**, **PFF**, **PID?**, **PLB**, **PLE**, **PRC**, **PRT**, **PST**)
- Function keys, language and contrast settings
  (**BFC**, **DCO**, **LAG**, **MAL**, **WMD**)
- Commands for limit value switches
  (**LIV**)

4.1 Detailed menu structure and commands

This section describes the relationship between the **Parameters** menu (see Operating Manual Part 1) and the commands.

Access level	Parameter menu	Second menu level	Third menu level	Command
0	**INFORMATION**			
		SCALE		
		TARE VALUE		TAV?
		WEIGHING RESULT		-
		BUS SCAN		-
		ERROR LIST		-
		SOFTWARE INFO		IDN?
		GRAPHIC		-
			OSCILLOSCOPE	
			CENTER OF GRAVITY	-
1	**PRINT**			
		MEASURED VALUE		PRT
		PARAMETERS		
			SCALE PARAMETERS	PRT
			DIS PARAMETERS	PRT
			BUS SCAN RESULT	PRT
2	**LIMIT VALUE**			
		LIMIT VALUE 1		LIV
			INPUT SIGNAL	LIV

Access level	Parameter menu	Second menu level	Third menu level	Com-mand
			ACTIVATION LEVEL	LIV
			DEACTIVATION LEVEL	LIV
		LIMIT VALUE 2		LIV
			INPUT SIGNAL	LIV
			ACTIVATION LEVEL	LIV
			DEACTIVATION LEVEL	LIV
4	**FILTER**			
		FILTER MODE		FMD
		CUT-OFF FREQUENCY		ASF
4	**COMMUNICA-TION**			
		Load cells (COM1)		
			BAUD RATE	BD1
			2-WIRE COMM.	TWC
		PC/PLC (COM2)		
			FUNCTION	FC2
			BAUD RATE	BD2
			PARITY	PA2
		PRINTER (COM3)		
			FUNCTION	FC3
			BAUD RATE	BD3
			PARITY	PA3
			PROTOCOL	PT3
		EXT. DISPLAY (COM4)		

Access level	Parameter menu	Second menu level	Third menu level	Command
			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 marker	EPT
			PAUSE [10 ms]	PAU
			MEASURED VALUE LENGTH	EDL
3	**PRINT PROTOCOL**			
		PRINTOUT NUMBER		PID?
		USER-DEFINED LINE 1		PST
		USER-DEFINED LINE 2		PST
		USER-DEFINED LINE 3		PST
		BLANK LINES ABOVE		PLB
		BLANK LINES BELOW		PLE
		SPACES		PES
		PAGE FEED		PFF

Access level	Parameter menu	Second menu level	Third menu level	Com-mand
		PRINT COPIES		PRC
		ESCAPE1 (CHARACTER 1)		ESC
		ESCAPE1 (CHARACTER 2)		ESC
		ESCAPE1 (CHARACTER 3)		ESC
		ESCAPE1 (CHARACTER 4)		ESC
		ESCAPE1 (CHARACTER 5)		ESC
		ESCAPE2 (CHARACTER 1)		ESC
		ESCAPE2 (CHARACTER 2)		ESC
		ESCAPE2 (CHARACTER 3)		ESC
		ESCAPE2 (CHARACTER 4)		ESC
		ESCAPE2 (CHARACTER 5)		ESC
3	**MODE**			
		AUTOM. DAYLIGHT SAVING TIME		AST
4	**CLOCK**			
		Date		
			DAY	STD
			MONTH	STD
			YEAR	STD
		TIME		

Access level	Parameter menu	Second menu level	Third menu level	Com-mand
			MODE	STD
			MINUTES	STD
			HOURS	STD
4	**FUNCTION KEYS**			
		SET TO ZERO		BFC
		TARE		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**			
		BUS SCAN		
		LOAD CELL		
			LOAD CELL AD-DRESS	
			MEASURED VALUE	
			LOAD CELL TEST	
		SEGMENT		

Access level	Parameter menu	Second menu level	Third menu level	Com-mand
			SEGMENT NUMBER	
			MEASURED VALUE	
		COM1		
		COM2		
		COM3		
		COM4		
		SD CARD		
		DISPLAY		
		KEYS		
0	**MODE**			
		LANGUAGE		**LAG**
		ACCESS LEVEL		**MAL**
		LEGAL-FOR-TRADE CAPABILITY		**LFT**
		ENCRYPTION		**ENC**
		OPERATING MODE		**WMD**
5	**SCALE CON-FIGURATION**			
		NUMBER OF SEGMENTS		
		SEGMENT 1		
			NUMBER OF LOAD CELLS	
			SERIAL NUMBER LC11	
5	**SCALE PARA-METERS**			
		PARAMETERS		

Access level	Parameter menu	Second menu level	Third menu level	Com-mand
			MANUFACTURER	NAM
			IDENTIFICATION	IDN
			LOAD CELL SAMPLE RATE	HSM
			UNIT	ENU
			DECIMAL MARKER	DPT
			NOMINAL VALUE	NOV
			MULTI-RANGE 1	MRA
			MULTI-RANGE 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
		INPUT CHARACTERISTIC CURVE		
			CALIBRATION WEIGHT	CWT
			ZERO LOAD	LDW
			MAXIMUM CAPACITY	LWT

Access level	Parameter menu	Second menu level	Third menu level	Com-mand
		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 PARA-METER	
5	**OFF-CENTER LOAD COM-PENSATION**			
		MEASURE		
			MODE	

Access level	Parameter menu	Second menu level	Third menu level	Com-mand
			CALIBRATION WEIGHT	
			SEGMENT 1	
		INPUT SEGMENT 1		
			Correction value	
5	**FACTORY SETTINGS**			
		DIS2116		**TDD0**
		LOAD CELLS		
		DATABASE		
			DELETE YARD LIST	
			DATABASE REPAIR	

4.2 Command format

Commands are not case-sensitive, so either format can be used.

Every command sequence must be completed with an end character. Use either a line feed (LF, ASCII 10 = $0xA_{hex}$) or a semicolon (;) for this. If an end character is all that is sent to the DIS, the DIS input buffer is cleared.

Each command consists of the command shortform, one or more parameters and the end character. Parameters in round brackets are mandatory, parameters in pointed brackets (<>) are optional and can be omitted.

Important

The brackets themselves are not entered, they are only used for marking.

All *texts* must be enclosed in quotes, preceding zeros are suppressed in numeric input.

Responses are output as ASCII characters and end with crlf (CR = Carriage Return, ASCII 13 and LF = Line Feed, ASCII 10).

Example: MSV?;

You can output a measured value with this command.

All ASCII characters $\leq 20_{hex}$ (20_{hex} = blank) can be used between the command shortform, parameters and end characters. The following characters can be used for commands and parameters:

Blank, +, -, . (point), , (comma), " (high double quotes), 0 … 9, A … Z, a … z.

For an input text (string, e.g. PST command), the input range comprises $0x1F_{hex}$ (blank) to $0x7E_{hex}$ (~). Always enclose text in high double quotes (").

Important

When you send a query, you must wait for the response before sending the next command.
When you send an input command, you must wait at least 10 milliseconds before sending the next query or entry.

4.3 Responses to commands

Important

The response times indicated for the commands do not include the times for transmission over the interface, i.e. they do not include the transmission time of the command to the DIS, or the transmission time of a response from the DIS.

4.3.1 Responses to entries

Important

It does not matter whether the input is valid or invalid, there is no response to entries.

Tip

So after making an entry, you should use a query to check the correct execution.

Example

Sent	*Significance*
ASF3;	*Sets the filter to level 3.*
	After sending the command you must wait for at least 10 milliseconds before sending the next query.
ASF?;	*Queries the last input command.*
	Now wait for the response before sending the next query or the next command.

Important

If the parameter is a legal-for-trade parameter and legal-for-trade mode is switched on, this parameter is not changed and the response to the command is ?crlf.
Also see section 5.7,
Commands for legal-for-trade applications, page 110.

4.3.2 Responses to parameter queries

For a parameter query, simply add a question mark to the command. The responses are output as ASCII characters and end with crlf (cr = carriage return, ASCII 13 and lf = line feed, ASCII 10). The output length of a response is always the same for every command.

Example

Send query:	*ASF?;*
DIS response:	*03crlf*

Important

When you send a query, you must wait for the response before sending the next command.

4.3.3 Responses to incorrect or unknown commands

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

4.4 Output types for measured values

The response to measured value queries (**MSV?**) is a 7-digit measured value plus a sign and a decimal marker, followed by a blank, 4 characters for the unit, and the end character.

Command	DIS response	Number of bytes
MSV?	±00010.50␣kg␣␣crlf	14 + 2

4.5 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 entered by the **SPW** command, correspondingly protected input commands will not be executed. A query is always possible.

4.6 Command overview (in alphabetical order)

Significance of column abbreviations:
PW: Command is password-protected (see **DPW**/**SPW**)
LFT: Command is a legal-for-trade parameter (see **LFT**)

Com-mand	PW	LFT	Function	Page
ASF			Filter selection	76
AST			Automatic daylight saving time	107
BD1			Baud rate COM1 (load cells)	31
BD2			Baud rate COM2 (computer)	35
BD3			Baud rate COM3 (printer)	40
BD4			Baud rate COM4 (external display)	45
BFC			Function key settings	144
CDL			Set to zero	90
CWT	X	X	Calibration weight	59
DCO			LCD display contrast	147
DPT	X	X	Decimal point	65
DPW			Password definition	98
ECC			Number of end characters	119
ECH			End character definition	120
EDC			Checksum	122
EDL			Measured value length	123
EPT			Decimal marker	124
ESC	X		Printer escape sequence	129
ENC	X	X	Encryption	114
ENU	X	X	Unit of measurement	63
ERR?			Error query	109

Com-mand	PW	LFT	Function	Page
FC2			Function COM2 (computer)	35
FC3			Function COM3 (printer)	39
FC4			Function COM4 (external display)	43
FMD			Filter mode	78
GCA	X	X	Gravitational acceleration factor (adjustment)	49
GDE	X	X	Gravitational acceleration factor (application)	50
HSM			Load cell sample rate	80
IDN?	X		Electronics identification with serial number	101
LAG			Language setting	146
LDW	X	X	Scale characteristic curve, zero point	54
LFT	X		Legal-for-trade mode	111
LIM	X	X	Linearization, measured value	71
LIN	X	X	Linearization, output values	72
LIV	X		Limit value switches	148
LWT	X	X	Scale characteristic curve, full scale	56
MAL	X		Access authorization	142
MRA	X	X	Multi-range switching point 1	68
MRB	X	X	Multi-range switching point 2	69
MSS?			Measured value status	88
MSV?			Data output	86
MTD	X	X	Motion detection	66
NOV	X	X	Nominal output value	62
PA2			Parity COM2 (computer)	38
PA3			Parity COM3 (printer)	41
PA4			Parity COM4 (external display)	46
PAU			Pause [10 ms]	125

Com-mand	PW	LFT	Function	Page
PES			Number of spaces in each line (printing)	131
PFF			Printer form feed	140
PID?			Print number (counter)	132
PLB			Blank lines before printout	130
PLE			Blank lines after printout	139
PRC			Print copies	141
PRT	X		Print protocol	127
PST			Printer strings	138
PT3			Protocol COM3 (printer)	42
PT4			Protocol COM4 (external display)	47
PTM	X		Manual tare mode	95
PTV	X		Manual tare input	96
RES			Electronics reset	100
RSN	X	X	Display resolution	64
SCC			Number of start characters	116
SCH			Definition of start characters	117
SPW			Write enable for all password-protected parameters	99
STD			Set time and date	108
TAR;			Tare	91
TAS			Gross/net selection	92
TAV			Tare value	93
TCR?			Calibration counter	113
TDD	X	X	Read/protect settings in EEPROM	104
TWC			Communication COM1 (load cells)	33
WMD	X		Scale operating mode	145

Com-mand	PW	LFT	Function	Page
ZSE	X	X	Zero on start-up	83
ZTR	X	X	Automatic zero tracking	82

5 Individual command descriptions

5.1 interface commands

You must configure the interface to set up communication between the DIS and a PC. The following commands are available to help you:

Interface	Function	Command
COM1	Change baud rate	BD1
	Change communication (2-wire/4-wire mode)	TWC
COM2	Change baud rate	BD2
	Change parity	PA2
	Change function	FC2
COM3	Change baud rate	BD3
	Change parity	PA3
	Change function	FC3
	Change protocol	PT3
COM4	Change baud rate	BD4
	Change parity	PA4
	Change function	FC4
	Change protocol	PT4

Background information: Serial interface characteristics

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

The DIS interface is an asynchronous serial interface, that is to say, data are transferred bit by bit, one after the other and asynchronously. Asynchronous means that transmission works without a clock signal.

A start bit is set before each data byte. Then come the word bits (D0 … D7), and, depending on the setting, one parity bit for the transmission check and a stop bit.

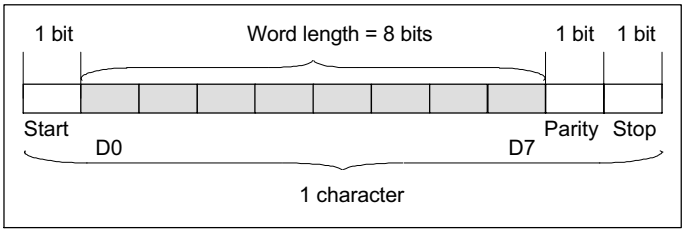

Fig. 5.1 The composition of a character

As the data are transferred serially, the speed of transmission must match the speed of reception. 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 bits per second is called the baud rate.

5.1.1 COM1 interface commands

BD1

Baud rate COM1

Sets the baud rate for serial communication at COM1.

Property	Contents	Note
Command	**BD1**	
No. of parameters	1	
Parameter range	P1 = 9600, 19200, 38400, 57600, 115200	P1 in baud
Factory setting	38400 baud	
Response time	< 10 ms	
Password protection	No	
Inhibited in legal-for-trade mode	No	
Parameter protection	With TDD1;	
Send command	BD1(P1);	
DIS response	0crlf	Input is OK
Send query	BD1?;	
DIS response	P1crlf	P1 = 6 characters

Important

When you change the baud rate of the COM1 interface, the baud rate in the connected load cells changes automatically, the change is saved power failsafe in the load cells and a bus scan is run at the new baud rate.
The parity of the COM1 interface (load cell connection) cannot be changed.

Example

Sent	***Response***	***Significance***
BD1?;	*9600crlf*	*Current baud rate is 9600 baud.*
BD1 38400;	*0crlf*	*Input is OK, COM1 is working at a speed of 38400 baud, parity is unchanged.*

TWC

Two-wire communication COM1

Changes communication with the load cells (COM1 interface) to 2-wire bus mode (half duplex). This operating mode is required when you connect the AD105c or measuring chains with the AD105c.

Property	Contents	Note
Command	**TWC**	
No. of parameters	1	
Parameter range	P1 = 0, 1	0: Full duplex 1: Half duplex
Factory setting	0	
Response time	< 10 ms	
Password protection	No	
Inhibited in legal-for-trade mode	No	
Parameter protection	With TDD1;	
Send command	TWC(P1);	
DIS response	0crlf	Input OK
Send query	TWC?;	
DIS response	P1crlf	P1 = 1 character

Example

Sent	*Response*	*Significance*
TWC?;	*1crlf*	*2-wire communication activated for AD105c.*
TWC 0;	*0crlf*	*New configuration is full duplex, baud rate and parity are unchanged.*

5.1.2 COM2 interface commands

FC2

Function COM2

Deactivates the COM2 interface.

Important

The interface can then only be activated via the front panel or keyboard.
No commands are executed and no responses are given when an interface is inactive.

Property	Contents	Note
Command	**FC2**	
No. of parameters	1	
Parameter range	P1 = 0, 1	0: Off 1: On
Factory setting	0	
Response time	< 10 ms	
Password protection	No	
Inhibited in legal-for-trade mode	No	
Parameter protection	With TDD1;	
Send command	FC2(P1);	
DIS response	0crlf	Input OK
Send query	FC2?;	
DIS response	P1crlf	P1 = 1 character

Example

Sent	*Response*	*Significance*
FC2?;	*1crlf*	*PC/PLC interface COM2 is activated.*
FC2 0;	*none*	*COM2 interface is deactivated and cannot be activated by a command.*

BD2

Baud rate COM2

Sets the baud rate for serial communication of the COM2 interface (PC/PLC interface).

Property	**Contents**	**Note**
Command	**BD2**	
No. of parameters	1	
Parameter range	P1 = 1200, 2400, 4800, 9600,19200, 38400, 57600, 115200	P1 in baud
Factory setting	9600 baud	
Response time	< 10 ms	
Password protection	No	
Inhibited in legal-for-trade mode	No	
Parameter protection	With TDD1;	
Send command	BD2(P1);	
DIS response	0crlf	Input OK

Property	Contents	Note
Send query	BD2?;	
DIS response	P1crlf	P1 = 6 characters

Important

When you change the baud rate, communication is initially no longer possible. You also have to change the PC over to the new baud rate.
For the baud rate change to become permanent, you must use the TDD1 command to save it. It is not possible to set a baud rate that is not supported by the partner station. If the new baud rate is not saved, the DIS will return to the previously valid baud rate after a reset or a power-up.

Example

Sent	*Response*	*Significance*
BD2?;	*9600crlf*	*Current baud rate is 9600 baud,*
BD2 38400;	*0crlf*	*Entry is OK, COM2 is working at 38400 baud, parity is unchanged*

PA2

Parity COM2

Sets the parity for serial communication of the PC/PLC interface COM2.

Property	Contents	Note
Command	**PA2**	
No. of parameters	1	
Parameter range	P1 = 0, 1, 2	0: None, 1: Even, 2: Odd parity
Factory setting	1	Even parity
Response time	< 10 ms	
Password protection	No	
Inhibited in legal-for-trade mode	No	
Parameter protection	With TDD1;	
Send command	PA2(P1);	
DIS response	0crlf	Input OK
Send query	PA2?;	
DIS response	P1crlf	P1 = 1 character

Example

Sent	*Response*	*Significance*
PA2?;	*1crlf*	*Even parity is active.*
PA2 2;	*0crlf*	*Parity changes to odd, the baud rate is unchanged.*

5.1.3 Interface commands COM3

FC3

Function COM3

Defines the operation of interface COM3.

Property	Contents	Note
Command	**FC3**	
No. of parameters	1	
Parameter range	P1 = 0, 1, 2	0: Print function is deactivated 1: Printing via RS-232 2: Printing via USB
Factory setting	0	Print function off
Response time	< 10 ms	
Password protection	No	
Inhibited in legal-for-trade mode	No	
Parameter protection	With TDD1;	
Send command	FC3(P1);	
DIS response	0crlf	Input OK
Send query	FC3?;	
DIS response	P1crlf	P1 = 1 character

BD3

Baud rate COM3

Sets the baud rate for printer port COM3.

Property	Contents	Note
Command	**BD3**	
No. of parameters	1	
Parameter range	P1 = 1200, 2400, 4800, 9600,19200, 38400, 57600, 115200	P1 in baud
Factory setting	9600 baud	
Response time	< 10 ms	
Password protection	No	
Inhibited in legal-for-trade mode	No	
Parameter protection	With TDD1;	
Send command	BD3(P1);	
DIS response	0crlf	Input OK
Send query	BD3?;	
DIS response	P1crlf	P1 = 6 characters

Example

Sent	*Response*	*Significance*
BD3?;	*9600crlf*	*Current baud rate is 9600 baud.*
BD3 38400;	*0crlf*	*Entry is OK, COM3 is working at 38400 baud, parity is unchanged.*

PA3

Parity COM3

Sets the parity for printer port COM3.

Property	Contents	Note
Command	**PA3**	
No. of parameters	1	
Parameter range	P1 = 0, 1, 2	0: None, 1: Even, 2: Odd parity
Factory setting	1	Even parity
Response time	< 10 ms	
Password protection	No	
Inhibited in legal-for-trade mode	No	
Parameter protection	With TDD1;	
Send command	PA3(P1);	
DIS response	0crlf	Input OK
Send query	PA3?;	
DIS response	P1crlf	P1 = 1 character

Example

Sent	*Response*	*Significance*
PA3?;	*1crlf*	*Even parity is active.*
PA3 2;	*0crlf*	*Parity changes to odd, the baud rate is unchanged.*

PT3

Protocol COM3

The command defines the protocol for printer port COM3.

Property	Contents	Note
Command	**PT3**	
No. of parameters	1	
Parameter range	P1 = 0, 1	0: Hardware protocol (DTR) 1: Software protocol (DC1/DC3/DC4)
Factory setting	0	Hardware protocol (DTR)
Response time	< 10 ms	
Password protection	No	
Inhibited in legal-for-trade mode	No	
Parameter protection	With TDD1;	
Send command	PT3(P1);	
DIS response	0crlf	Input OK
Send query	PT3?;	
DIS response	P1crlf	P1 = 1 character

5.1.4 Interface commands COM4

FC4

External display function

Definition of output text (telegram) for external display at COM4

Property	Contents	Note
Command	**FC4**	
No. of parameters	1	
Parameter range	P1 = 0 … 5	See Tab. 5.1
Factory setting	0	
Response time	< 10 ms	
Password protection	No	
Inhibited in legal-for-trade mode	No	
Parameter protection	With TDD1;	
Send command	FC4(P1);	
DIS response	0crlf	Input OK
Send query	FC4?;	
DIS response	P1crlf	P1 = 1 character

FC40	no external display	
FC41	Text 1: Gross or net value + unit	(≦19 characters)
FC42	Text 2: Gross or net value + unit and tare value	(≦28 characters)
FC43	Text 3: Weighing result + unit	(≦19 characters)
FC44	Text 4: Gross or net value	(≦9 characters)
FC45	Text 5: Gross or net value + unit + status	(≦17 characters)

Tab. 5.1 Output text definition

A description of the texts can be found in Part 1 of the Operating Manual.

BD4

Baud rate COM4

The command sets the baud rate for the external display at COM4.

Property	Contents	Note
Command	**BD4**	
No. of parameters	1	
Parameter range	P1 = 1200, 2400, 4800, 9600,19200, 38400, 57600, 115200	P1 in baud
Factory setting	9600 baud	
Response time	< 10 ms	
Password protection	No	
Inhibited in legal-for-trade mode	No	
Parameter protection	With TDD1;	
Send command	BD4(P1);	
DIS response	0crlf	Input OK
Send query	BD4?;	
DIS response	P1crlf	P1 = 6 characters

Example

Sent	*Response*	*Significance*
BD4?;	*9600crlf*	*Current baud rate is 9600 baud.*
BD4 38400;	*0crlf*	*Entry is OK, COM4 is working at 38400 baud, parity is unchanged.*

PA4

Parity COM4

The command sets the parity for the COM4 interface (external display).

Property	**Contents**	**Note**
Command	**PA4**	
No. of parameters	1	
Parameter range	P1 = 0, 1, 2	0: None, 1: Even, 2: Odd parity
Factory setting	1	Even parity
Response time	< 10 ms	
Password protection	No	
Inhibited in legal-for-trade mode	No	
Parameter protection	With TDD1;	
Send command	PA4(P1);	
DIS response	0crlf	Input OK
Send query	PA4?;	
DIS response	P1crlf	P1 = 1 character

Example

Sent	*Response*	*Significance*
PA4?;	*1crlf*	*Even parity is active.*
PA4 2;	*0crlf*	*Parity changes to odd, the baud rate is unchanged.*

PT4

External display protocol

The command defines the protocol for the COM4 interface (external display).

Property	**Contents**	**Note**
Command	**PT4**	
No. of parameters	1	
Parameter range	P1 = 0, 1, 2	0: No protocol (send only) 1: Hardware protocol (DTR) 2: Software protocol (DC1/DC3/DC4)
Factory setting	0	No protocol
Response time	< 10 ms	
Password protection	No	
Inhibited in legal-for-trade mode	No	
Parameter protection	With TDD1;	
Send command	PT4(P1);	
DIS response	0crlf	Input OK
Send query	PT4?;	
DIS response	P1crlf	P1 = 1 character

5.2 Scale characteristic curve and output scaling

The DIS is only suitable for operation with digital load cells, e.g. type C16i. With these load cells, a factory characteristic curve is stored in the load cell for the DIS to work with. With the factory characteristic curve, an unloaded digital load cell delivers a measured value of 0 and one loaded with the maximum capacity delivers a measured value of 1000000 (internal) digits. So this factory characteristic curve in the load cell should not be changed.

Internal digits are converted into units of weight, e.g. kg, t etc., via a user characteristic curve with the commands **LDW** and **LWT**.

Function	*Command*
Adjusting the scale characteristic curve	**LDW**, **LWT**
Partial load parameters for LDW, LWT	**CWT**
Measured value scaling	**NOV**
Unit of weight	**ENU**
Digit / increment	**RSN**
Decimal point	**DPT**
Motion detection	**MTD**
Dual-range display	**MRA**
Triple-range display	**MRB**
Gravitational acceleration correction	**GCA**, **GDE**

Activate a gravitational acceleration correction with commands **GCA** and **GDE**, when the location where the scale was adjusted is not the same as the place of installation and the gravitational accelerations of the two locations are different.

5.2.1 Gravitational acceleration correction

GCA

G correction factor

Gravitational acceleration at the load cell adjustment location. The command is used to correct the effect of gravitational acceleration when the location where the scale was adjusted (g in P1 of GCA), is not the same as the place of installation (g in P1 of GDE).

Property	Contents	Note
Command	**GCA**	
No. of parameters	1	
Parameter range	P1 = 970000 … 990000	
Factory setting	981040	9.8104 (Darmstadt)
Response time	< 10 ms	
Password protection	Yes	
Inhibited in legal-for-trade mode	Yes	
Parameter protection	With TDD1;	
Send command	GCA(P1);	
DIS response	0crlf	Input OK
Send query	GCA?;	
DIS response	P1crlf	P1 = blank and 6 digits without a sign, e.g. 981029crlf.

Correction is deactivated if:

- you specify the same parameter for GCA and **GDE**,
- you measure the characteristic curve again with **LDW** / **LWT** .

GDE

Gravitation correction destination

Gravitational acceleration at the place of load cell installation. The command is used to correct the effect of gravitational acceleration, when the location where the scale was adjusted (g in P1 of **GCA**), is not the same as the place of installation (g in P1 of GDE).

Property	Contents	Note
Command	**GDE**	
No. of parameters	1	
Parameter range	P1 = 970000 … 990000	g at the place of installation
Factory setting	98104	
Response time	< 10 ms	
Password protection	Yes	
Inhibited in legal-for-trade mode	Yes	
Parameter protection	With TDD1;	
Send command	GDE(P1);	
DIS response	0crlf	Input OK

Property	Contents	Note
Send query	GDE?;	
DIS response	P1crlf	P1 = blank and 6 digits without a sign, e.g. 979770crlf.

Example

- Adjustment location: Darmstadt → g = 9.8104 (**GCA**)
- Place of installation: Tokyo → g = 9.7977 (GDE).

Correction is deactivated if:

- you specify the same parameter for GCA and GDE,
- you measure the characteristic curve again with **LDW** / **LWT** .

5.2.2 Adjusting the scale characteristic curve with maximum capacity

You can adapt the DIS characteristic curve (user characteristic curve) to meet your requirements with the command pair **LDW**/**LWT**. You can also use the **CWT** command to set the characteristic curve with partial load.

Important

*The entry of a user characteristic curve is only permitted when not in legal-for-trade mode (**LFT** = 0).*

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

Important

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

Once the scale has been adjusted, the range **LDW** → **LWT** is assigned to the number range 0 to 1000000.

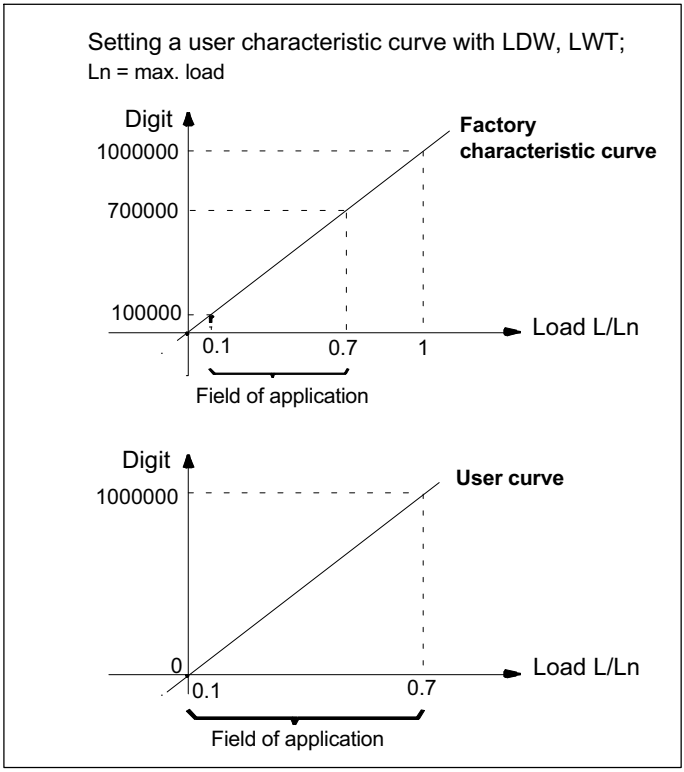

Fig. 5.2 Setting a user characteristic curve

With the settings from Fig. 5.2, the DIS converts the scaling of the load cells from 0 to 1000000 to the range 0 to NOV value (default 10000).

LDW

Load cell deadload weight

When measuring, the current input signal (scale not loaded, but with deadload weight) is assigned to the output value 0 digits (scale characteristic curve zero point). The command is only permitted when not in legal-for-trade mode (**LFT** = 0).

Property	Contents	Note
Command	**LDW**	
No. of parameters	1	
Parameter range	P1 = 0 … ±3000000	
Factory setting	0	
Response time	< 10 ms	
Password protection	Yes	
Inhibited in legal-for-trade mode	Yes	
Parameter protection	After input of LWT with TDD1;	
Send command	LDW<P1>;	
DIS response	0crlf	Input OK
Send command	LDW;	
DIS response	0crlf	Response after measurement
Send query	LDW?;	
DIS response	P1crlf	P1 = 7 digits plus a sign, e.g. -0000246crlf.

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

Important

Should the LDW/LWT adjustment not be carried out with 100% of the load, you must enter the CWT value (calibration weight) first.

There are two ways to perform a zero balance:

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

► Unload the scale.

► Adopt the zero point with the command LDW.

The transducer electronics measure the zero load of the scale (input signal between ±3 mV/V) and store the measured value, only offsetting it once the parameter for LWT is entered.

2. Manual entry of the zero point of the user characteristic curve via LDW (response time < 20 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 once the parameter for LWT is entered.

Deactivate the user characteristic curve with LDW = 0 and LWT = 1000000.

LWT

Load weight

When measuring, the current input signal (scale loaded with maximum capacity) is assigned to the output value 1000000 digits (scale characteristic value full scale). The command is only permitted when not in legal-for-trade mode (LFT = 0).

Property	Contents	Note
Command	**LWT**	
No. of parameters	1	
Parameter range	P1 = 0 … ±3000000	
Factory setting	1000000	
Response time	< 10 ms for entry or query	
Password protection	Yes	
Inhibited in legal-for-trade mode	Yes	
Parameter protection	After input of LWT with TDD1;	
Send command	LWT(P1);	
DIS response	0crlf	Input OK
Send command	LWT(P1);	
DIS response	0crlf	Response after measurement
Send query	LWT?;	
DIS response	P1crlf	P1 = 7 digits plus a sign, e.g. +0987365crlf.

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

Important

Should the LDW/LWT adjustment not be carried out with 100% of the load, you must enter the CWT value (calibration weight) first.

There are two ways to perform a nominal value adjustment:

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

► Load the scale with maximum capacity.

► Adopt the measured value with the command LWT.

The transducer electronics measure the maximum capacity of the scale (input signal between ±3 mV/V), store the measured value and offset it against the value for LDW to a new characteristic curve.

2. Manual input of the nominal value of the user characteristic curve via LWT (response time < 1.5 s):

► Use the command LWT<nominal value> to enter the value for the nominal value of the scale, see example below.

The entered value is stored and offset against the value for LDW to a new characteristic curve.

Example: manual input of the nominal value

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

► Use **LFT0** to set the legal-for-trade switch to *not* legal for trade.

- ► Reset the correction factor (parameters of **GCA** = parameters of **GDE**).
- ► Unload the scale.
- ► Query the measured value (**MSV?**).
- ► Enter the value as the **LDW** value.
- ► Load the scale with maximum capacity.
- ► Query the measured value (**MSV?**).
- ► Use the command **LWT<maximum capacity>** to enter the measured value for the maximum capacity.

  The entered value is stored and offset against the LDW value.
- ► Protect the new characteristic curve with **TDD1**.

Deactivate the user characteristic curve with LDW = 0 and LWT = 1000000.

5.2.3 Adjusting the scale characteristic curve with partial load

The LWT value is offset in accordance with the entered CWT value (partial load value as a percentage of the maximum capacity).

CWT

Calibration weight

Calibration weight for partial load adjustment.
If you do not have 100% of the maximum capacity available for the adjustment, you can also adjust the DIS with an input signal in the range of 10% to 120% of the required nominal value.

Property	Contents	Note
Command	**CWT**	
No. of parameters	1	
Parameter range	P1 = 50000 … 1200000 (5% … 120%)	Percentage of maximum capacity with which the LDW/LWT adjustment is carried out
Factory setting	1000000	100%
Response time	< 10 ms	
Password protection	Yes	
Inhibited in legal-for-trade mode	Yes	
Parameter protection	With TDD1;	
Send command	CWT(P1);	

Property	Contents	Note
DIS response	0crlf	Input OK
Send query	CWT?;	
DIS response	P1crlf	P1 = 7 characters in the range 50000 … 1200000

Important

In legal-for-trade mode, you have to carry out the partial load calibration with a load of at least 20% of the nominal value.

With P1 = 1000000 (= 100 %), you deactivate partial load calibration.

Example

The scale characteristic curve LDW/LWT of a scale should go as far as 15 kg = 15000 d. But there is only a 10 kg balancing weight available for the adjustment.

Proceed as follows:

- ► Set the CWT value to 666667 for the adjustment (corresponds to 66%).
- ► Set the **NOV** value to 15000 for the adjustment.
- ► Perform an LDW/LWT adjustment.

  After the adjustment, 10000 digits at 10 kg and 15000 digits at 15 kg are output as the measured values.
- ► Set the digit/increment to **RSN5** and the decimal point to **DPT3**.

With a maximum capacity of 15 kg, this gives 3000 d (= n_{LC}) as the number of divisions and 15.000 as the display value.

Important

After an adjustment, the LDW and LWT values can be read out. They correspond to the parameters that would be produced in an adjustment with the maximum capacity (and not with the partial load). If you need to enter the values for LDW and LWT again later on, you must first enter CWT = 1000000 and then the LDW value that has been read out, and finally, the value read out for LWT.

Use **ENU**"kg"; to set the unit to kg.

NOV

Nominal output value

You can use the NOV value to scale the output measured values. The output of ASCII measured values is set to 10000 at the factory. For example, if you want a measurement output of 2000 digits at maximum capacity, enter NOV2000. The input parameters LDW/LWT are not changed by this scaling.

Property	Contents	Note
Command	**NOV**	
No. of parameters	1	
Parameter range	P1 = 100 … 5000000	
Factory setting	10000	
Response time	< 10 ms	
Password protection	Yes	
Inhibited in legal-for-trade mode	Yes	
Parameter protection	With TDD1;	
Send command	NOV(P1);	
DIS response	0crlf	Input OK
Send query	NOV?;	
DIS response	P1crlf	P1 = 7 characters

ENU

Engineering unit

Sets the unit to be used.

Property	Contents	Note
Command	**ENU**	
No. of parameters	1	
Parameter range	P1 = 4 ASCII characters	P1 in double quotes
Factory setting	""	No unit
Response time	< 10 ms	
Password protection	Yes	
Inhibited in legal-for-trade mode	Yes	
Parameter protection	With TDD1;	
Send command	ENU"xxxx"	
DIS response	0crlf	Input OK
Send query	ENU?;	
DIS response	P1crlf	P1 = 4 characters (if the unit has less characters, blanks are added)

Important

The quotes ("") are an essential part of the input. They are not part of the output nor are they displayed, they only serve to mark the unit as text.

RSN

Resolution

Specifies the digit/increment and thus the resolution of the measurement output. The following functions are affected by the increment:

- Standstill recognition (**MTD**)
- Zero tracking (**ZTR**)
- Monitoring the display range (see **MSV?**)
- Zero on start-up (**ZSE**)

Property	Contents	Note
Command	**RSN**	
No. of parameters	1	
Parameter range	P1 = 1, 2, 5, 10, 20, 50,100	P1 is the increment in digits
Factory setting	1	
Response time	< 10 ms	
Password protection	Yes	
Inhibited in legal-for-trade mode	Yes	
Parameter protection	With TDD1;	
Send command	(P1);	
DIS response	0crlf	Input OK
Send query	RSN?;	
DIS response	P1crlf	P1 = 3 characters

DPT

Decimal marker (decimal point)

Specifies the number of decimal places for the measurement output.

Property	Contents	Note
Command	**DPT**	
No. of parameters	1	
Parameter range	P1 = 0 … 6	Position of the decimal marker
Factory setting	0	
Response time	< 10 ms	
Password protection	Yes	
Inhibited in legal-for-trade mode	Yes	
Parameter protection	With TDD1;	
Send command	DPT(P1);	
DIS response	0crlf	Input OK
Send query	DPT?;	
DIS response	P1crlf	P1 = 1 character

Examples

Sent	*Response*	*Significance*
DPT0	*xxxxxxx.*	*(no decimal marker)*
DPT1	*xxxxxx.x*	*1 decimal place*
DPT2	*xxxxx.xx*	*2 decimal places*
DPT5	*xx.xxxxx*	*5 decimal places*
DPT6	*x.xxxxxx*	*6 decimal places*

MTD

Motion detection

Activates or deactivates motion detection and specifies the standstill condition.

Property	Contents	Note
Command	**MTD**	
No. of parameters	1	
Parameter range	P1 = 0 … 4	See Tab. 5.2
Factory setting	0	
Response time	< 10 ms	
Password protection	Yes	
Inhibited in legal-for-trade mode	Yes	
Parameter protection	With TDD1;	
Send command	MTD(P1);	
DIS response	0crlf	Input OK
Send query	MTD?;	
DIS response	P1crlf	P1 = 2 characters

MTD0	OFF	Motion detection is deactivated, the unit is always displayed.
MTD1	0.25 d/s	d/s = digits per second
MTD2	0.5 d/s	
MTD3	1.0 d/s	Compulsory in legal-for-trade mode.

MTD4	2.0 d/s
MTD5	3.0 d/s

Tab. 5.2 Parameter values for P1

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

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

Examples

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

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

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

MRA

Multi-range mode 1

Switches between single-range or dual range balance and specifies the changeover point between ranges 1 and 2. Dual-range mode is deactivated with MRA0.

Condition: 0 < MRA < MRB < **NOV**

Property	Contents	Note
Command	**MRA**	
No. of parameters	1	
Parameter range	P1 = 0 … NOV (5000000)	0: Deactivated
Factory setting	0	
Response time	< 10 ms	
Password protection	Yes	
Inhibited in legal-for-trade mode	Yes	
Parameter protection	With TDD1;	
Send command	MRA(P1);	
DIS response	0crlf	Input OK
Send query	MRA?;	
DIS response	P1crlf	P1 = 8 characters

As soon as dual-range mode is activated, the set **RSN** increment for range 1 is applied. The increment for range 2 is then automatically adapted (next digit value).

Examples

Sent	*Significance*
RSN2	*Range 1 with increment 2, range 2 with increment 5*
RSN5	*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

Switches between single-range, dual-range or triple-range balance and specifies the changeover point between ranges 2 and 3. Triple-range mode is deactivated with MRB0.

Condition: 0 < MRA < MRB < **NOV**

Property	Contents	Note
Command	**MRB**	
No. of parameters	1	
Parameter range	P1 = 0 … NOV (5000000)	0: Deactivated; the parameter must be greater than that specified at MRA
Factory setting	0	
Response time	< 10 ms	
Password protection	Yes	
Inhibited in legal-for-trade mode	Yes	

Property	Contents	Note
Parameter protection	With TDD1;	
Send command	MRB(P1);	
DIS response	0crlf	Input OK
Send query	MRB?;	
DIS response	P1crlf	P1 = 8 characters

As soon as triple-range mode is activated, the set **RSN** increment for range 1 applies. The increment for range 2 is then automatically the next value for the increment and for range 3, the next but one.

Examples

Sent	*Significance*
RSN2	*Range 1 with increment 2, range 2 with increment 5, range 3 with increment 10*
RSN5	*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.

5.3 Linearization settings

With the DIS, you have the opportunity to reduce 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.

Only use the commands after adjusting the scale with **LDW**, **LWT**, **NOV**:

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

Overall, 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

The two additional points must fall in the range between 0 and NOV. The following two conditions must also be met:

- $0 < LIM1 < LIM2 < NOV$
- $0 < LIN1 < LIN2 < NOV$

LIM

Linearization measured values

Input values of the linearization curve LIM values are the values measured for the applied weight, also see **LIN**.

Condition: $0 < LIM1 < LIM2 <$ **NOV**

Property	Contents	Note
Command	**LIM**	
No. of parameters	2	
Parameter range	P1 = 1, 2 P2 = 0 … NOV (±3000000)	P1 = 1 for LIM1, P1 = 2 for LIM2; P2 is absent: Calibration
Factory setting	P2 = 0	
Response time	< 10 ms	
Password protection	Yes	
Inhibited in legal-for-trade mode	Yes	
Parameter protection	With TDD1;	
Send command	LIM(P1)<,P2>;	
DIS response	0crlf	Input OK
Send query	LIM(P1)?;	
DIS response	P2crlf	P2= 6 characters

Examples

Sent	***Significance***
LIM1,12345;	*The weight value (12345) is specified.*
LIM1;	*The weight value is measured by the DIS.*

LIN

Linearization nominal values

Linearization curve output values LIN values are the values to be displayed for the applied weight.

Condition: 0 < LIN1 < LIN2 < **NOV**

Property	Contents	Note
Command	**LIN**	
No. of parameters	2	
Parameter range	P1 = 1, 2 P2 = 0 … NOV (3000000)	P1 = 1 for LIN1, P1 = 2 for LIN2; P2 = weight value
Factory setting	P2 = 0	
Response time	< 10 ms	
Password protection	Yes	
Inhibited in legal-for-trade mode	Yes	
Parameter protection	With TDD1;	
Send command	LIN(P1)<,P2>;	
DIS response	0crlf	Input OK
Send query	LIN(P1)?;	
DIS response	P2crlf	P2= 6 characters

Linearity compensation is calculated from the 8 values pairs for 0, LIN1/LIM1, LIN2/LIM2, and NOV. The two value pairs LIN1/LIM1 and LIN2/LIM2 must always be specified, but they can be entered or measured. The value pairs for 0 and nominal value cannot be entered, they must be measured.

Example

Characteristic curve of the unloaded scale = 0, that of the scale loaded with maximum capacity = 10,000 kg (10000).

The linearity deviation should be compensated at 2.5 kg and 7 kg.

Enter the command LIN1,2500 (2.5 kg) and use command LIM1; to acquire the measured value for the 2.5 kg load.

Then enter the command LIN2,7000 (7 kg) and use the command LIM 2; to acquire the measured value for the 7 kg load.

Setting the linearization

- ► Use the command **SPW** to enter your password.
- ► Set the legal-for-trade switch (**LFT**) to 0.
- ► Adjust the scale (**LDW**, **LWT**, **NOV**, …).
- ► Reset any other linearization values that may be present: LIN1=LIN2=LIM1=LIM2=0.
- ► Load the scale with the first weight (point 1).
- ► Enter the LIN1 value (weight without decimal point).

  Two options are available for the LIM1 value:

  a) Query the measured value (**MSV?**) and enter it as the LIM1 value (weight without decimal point, LIM1,<MSV value>;).

  b) Measure the LIM1 value directly (LIM1;).
- ► Load the scale with the second weight (point 2)
- ► Enter the LIN2 value (weight without decimal point).

  Two options are available for the LIM2 value:

a) Query the measured value (**MSV?**) and enter it as the LIM2 value (weight without decimal point, LIM2,<MSV value>;).

b) Measure the LIM2 value directly (LIM2;).

► Use TDD1 to protect the new values in the EEPROM.

Switching off linearization

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

► Set the legal-for-trade switch (**LFT**) to 0.

► To reset linearization, use LIN1,0;LIN2,0;LIM1,0;LIM2,0;TDD1;.

5.4 Settings for measuring mode

Specify the following settings before data output.

Function	*Command*
Filter choice, cut-off frequencies	ASF
Filter mode	FMD
High-speed mode (sample rate)	HSM
Automatic zero tracking	ZTR
Zero on start-up	ZSE

ASF

Amplifier filter

Selects a digital filter. This establishes filter behavior and the bandwidth of the measurement signal.

Filter setting and selection are also defined by the commands **HSM** and **FMD**.

Property	Contents	Note
Command	**ASF**	
No. of parameters	1	
Parameter range[1]	P1 = 0 … 10	0: Off, 1 … 10: See footnote 1
Factory setting	5	
Response time	< 10 ms	
Password protection	No	
Inhibited in legal-for-trade mode	No	
Parameter protection	With TDD1;	

Property	Contents	Note
Send command	ASF(P1);	
DIS response	0crlf	Input OK
Send query	ASF?;	
DIS response	P1crlf	P1 = 2 characters

[1] The bandwidths and properties of the filter depend on the connected transducers and are described in the relevant manuals.

The cut-off frequency of the filter determines the settling time. The higher the filter index, the better the filter effect, but also the longer the settling time when the weight changes. Choose as low a filter setting as possible, so that a steady measured value (standstill) can be achieved at a constant weight.

The mean-value calculation influences the overall settling time of the DIS. The settling time also depends on the mechanical construction of the transducer, the dead load of the scale and the weight to be weighed.

FMD

Filter mode

Selects the filter mode.

Filter setting and selection are also defined by the commands **HSM** and **ASF**.

Property	Contents	Note
Command	**FMD**	
No. of parameters	1	
Parameter range[1]	P1 = 0 … 4	See footnote 1 and Tab. 5.3
Factory setting	0	
Response time	< 10 ms	
Password protection	No	
Inhibited in legal-for-trade mode	No	
Parameter protection	With TDD1;	
Send command	FMD(P1);	
DIS response	0crlf	Input OK
Send query	FMD?;	
DIS response	P1crlf	P1 = 1 character

[1] The bandwidths and properties of the filter depend on the connected transducers and are described in the relevant manuals.

FMD0	Standard filter (IIR 2nd order low-pass filter)
FMD0	Standard filter (IIR 2nd order low-pass filter)
FMD1	3-stage fast-settling digital filter (FIR low-pass filter)
FMD2	IIR 8th order low-pass filter
FMD3	Fast-settling digital filter (IIR 4th order low-pass filter)
FMD4	Fast-settling digital filter (FIR low-pass filter)

Tab. 5.3 Significance of parameter P1 (filter mode)

HSM

High-speed sample rate (high-speed mode)

Specifies whether the standard or high-speed sample rate is used.

Property	Contents	Note
Command	**HSM**	
No. of parameters	1	
Parameter range	P1 = 0, 1	0: Off, 1: On, see Tab. 5.4
Factory setting	0	Deactivated
Response time	< 10 ms	
Password protection	No	
Inhibited in legal-for-trade mode	No	
Parameter protection	With TDD1;	
Send command	HSM(P1);	
DIS response	0crlf	Input OK
Send query	HSM?;	
DIS response	P1crlf	P1 = 1 character

HSM0	The connected load cells use standard sample rates	
	AED, FIT	600 mv/s
	AD104, AD105,C16i	100 mv/s
HSM1	The connected load cells use double the sample rates	
	AED, FIT	1200 mv/s
	AD104, AD105,C16i	200 mv/s

Tab. 5.4 Significance of parameter P1 (high-speed mode)

ZTR

Zero tracking

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 a standstill. The d unit (digit) is based on the nominal value (**NOV**) and the digit/increment (**RSN**).

Property	Contents	Note
Command	**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	
Inhibited in legal-for-trade mode	Yes	
Parameter protection	With TDD1;	
Send command	ZTR(P1);	
DIS response	0crlf	Input OK
Send query	ZTR?;	
DIS response	P1crlf	P1 = 1 character

ZSE

Zero setting (zero balance)

Sets the range of zero setting. When switching on the voltage, during a RESET or after the **RES** command, zero setting is carried out after a standstill of about 2.5 s, if the gross value falls within the selected range. Any change to the zero on start-up range only takes effect once the voltage is switched on, or after a **RES**.

The internal zero memory is cleared before automatic zero setting. Zero memory cannot be read out.

Property	Contents	Note
Command	**ZSE**	
No. of parameters	1	
Parameter range	P1 = 0 … 4	See Tab. 5.5
Factory setting	0	Deactivated
Response time	< 10 ms	
Password protection	Yes	
Inhibited in legal-for-trade mode	Yes	
Parameter protection	With TDD1;	
Send command	ZSE(P1);	
DIS response	0crlf	Input OK
Send query	ZSE?;	
DIS response	P1crlf	P1 = 2 characters

ZSE0	Zero setting deactivated
ZSE1	Range of zero setting ± 2 % of NOV value
ZSE2	Range of zero setting ± 5 % of NOV value
ZSE3	Range of zero setting ± 10 % of NOV value
ZSE4	Range of zero setting ± 20 % of NOV value

Tab. 5.5 Significance of parameter P1 (range of zero setting)

Use **MTD** to specify the standstill condition. The digit unit (d) is based on the nominal value (**NOV**) and the digit/increment (**RSN**).

5.5 Commands for measuring mode

Adjust the scale before starting measuring mode (sections 5.2, page 48, and 5.3, page 71) and specify the settings for measuring mode (section 5.4, page 76).

Function	*Command*
Measurement output	**MSV?**
Measured value status	**MSS?**
Gross value zero setting (±2 %)	**CDL**
Tare mode	**TAR**
Tare value	**TAV**
Gross/net selection	**TAS**
Manual tare mode	**PTM**
Value for manual tare	**PTV**

Taring is subtractive taring.

MSV

Measured value

Output of the current measured value. As defined with **NOV** and **RSN**, the measured value is output in ASCII format. The maximum scope of the measured values is ±5000000, the output length is 16 bytes (including crlf).

Property	Contents	Note
Command	**MSV?**	
No. of parameters	-	
Parameter range	-	
Factory setting	-	
Response time	< 10 ms	
Password protection	No	
Inhibited in legal-for-trade mode	No	
Parameter protection	No data to protect	
Send query	MSV?;	
DIS response	P1crlf	Input OK, for P1 see Tab. 5.6

Characters 1 - 9	Character 10	Characters 11 - 14	Characters 15, 16
Measured value (sign, measured value and decimal point)	Space	Adjustable, e.g. kg (see command **ENU**)	crlf
9 x '-' , if outside the display range for LFT > 0		Unit only at standstill, otherwise 4 blank spaces	End label

Tab. 5.6 Characters included in P1

The measured value is based on the particular measuring range (output scaling **NOV**). For NOV ≥ 100, the NOV value is output at maximum capacity. The value can be a net or gross measured value (**TAS**), it is stored in the output buffer independently of the measured value query.

Display range in different modes of operation in legal-for-trade mode (**LFT**):

LFT0	-160%[1] … + 160%	The range is not checked
LFT1	-2%[1] … + NOV + 9 d[2]	Legal for trade, OIML III, R76
LFT2	-2%[1] … + NOV + 9 d[2]	Legal for trade, OIML IIII
LFT3	-2%[1] … + NOV + 5%	Legal for trade, NTEP
LFT4	-2%[1] … + NOV + 5%	Legal for trade, NTEP IIIL

[1] The percentages relate to NOV
[2] d relates to the set resolution (increment **RSN**): Correspondingly for RSN2, 9 d = 18 digits.

Preparing measured value output

- ► Define the *output scaling* via **NOV**.
- ► Define the *display resolution* via **RSN**.
- ► Define the *position of the decimal marker* via **DPT**.
- ► Define the *operating mode* via **MRA** and **MRB**.
- ► Define the *digital filter mode* via **FMD**.
- ► Define the *digital filter* via **ASF**.

MSS

Measured value status

Query the status of measurement output. The status is a 32-bit value and is output as a 7-digit decimal number.

Property	Contents	Note
Command	**MSS**	
No. of parameters	-	
Parameter range	-	
Factory setting	-	
Response time	< 10 ms	
Password protection	No	
Inhibited in legal-for-trade mode	No	
Parameter protection	No data to protect	
Send query	MSS?;	
DIS response	P1crlf	7 characters, see Tab. 5.7

Status bit position	Status bit content	Comments
0	Net/gross	0: Net measured value, 1: Gross measured value, see **TAS**.
1	True zero	1: True zero is present.
2	Reserved	
3	Standstill	The measured values fall within the standstill range defined with **MTD**.
4	Limit value 1	Status of limit value 1, see **LIV**.
5	Limit value 2	Status of limit value 2, see **LIV**.

Status bit position	Status bit content	Comments
6-7	Measuring range	00: Measuring range 1, 10: Measuring range 2, 11: Measuring range 3, see **MRA** and **MRB**.
8	Manual tare	1: Gross measured value for manual tare, see **PTM**.
9-14	Reserved	
15	Overflow	Overload.
16	Display range	Display range exceeded, see **MSV?**.
17-18	Reserved	
19	Error status	1: Error present in error status, see **ERR?**.
20	Connection error	1: Connection to transducer interrupted.

Tab. 5.7 Status bit significance; position 0 is the least significant bit

CDL

Clear dead load (zero balance)

Performing a zero balance of the gross value if this is in the ±2 % range (or ±20 % for LFT0) of the weighing range (**NOV**), and standstill has occurred. If one of the two conditions is violated, zero setting does not take place.

The CDL?; query is not permitted.

Property	Contents	Note
Command	**CDL**	
No. of parameters	-	
Parameter range	-	
Factory setting	-	
Response time	< 10 ms	
Password protection	No	
Inhibited in legal-for-trade mode	No	
Parameter protection	No data to protect	
Send command	CDL	
DIS response	0crlf	Input OK

TAR

Tare

Taring the current measured value. The current value is stored in the tare buffer (also see **TAV**) and subtracted from all the subsequent measured values. After taring, the system changes back to the net measured value (**TAS0**).

In legal-for-trade mode (**LFT**), taring is only performed if the standstill condition is met.

The TAR?; query is not permitted. You can read out the stored tare value with **TAV?**.

Property	Contents	Note
Command	**TAR**	
No. of parameters	-	
Parameter range	-	
Factory setting	-	
Response time	< 10 ms	
Password protection	No	
Inhibited in legal-for-trade mode	No	
Parameter protection	With TDD1;	The current tare value is protected
Send command	TAR;	
DIS response	0crlf	Input OK

Permitted tare range

LFT with P1 = 0	±100% of NOV
LFT with P1 > 0	0 … NOV

TAS

Tare set

Switches measurement output (**MSV?**) between gross and net measured values (the value in the tare buffer is subtracted from the current measured value).

Property	Contents	Note
Command	**TAS**	
No. of parameters	1	
Parameter range	P1 = 0, 1	0: Net, 1: Gross
Factory setting	1	
Response time	< 10 ms	
Password protection	No	
Inhibited in legal-for-trade mode	No	
Parameter protection	With TDD1;	
Send command	TAS(P1);	
DIS response	0crlf	Input OK
Send query	TAS?;	
DIS response	P1crlf	P1 = 1 character

TAV

Tare value

Entering or querying the tare value (TAR). In legal-for-trade mode, e.g. in legal-for-trade applications (LFT > 0), the tare range is restricted to 0 … 100% of NOV. The tare value is converted to the NOV value.

After a tare value is entered, the display changes to the net weight.

Property	Contents	Note
Command	**TAV**	
No. of parameters	1	
Parameter range	P1 = 0 … NOV	
Factory setting	0	
Response time	< 10 ms	
Password protection	No	
Inhibited in legal-for-trade mode	No	
Parameter protection	With TDD1;	
Send command	TAV(P1);	
DIS response	0crlf	Input OK
Send query	TAV?;	
DIS response	Xcrlf	X = 8 characters: the current 7-digit tare value with a sign

NOV has been used to scale the LDW/LWT user characteristic curve (0 … NOV) and this is where the value lies. The tare buffer is cleared (content = 0) when a user characteristic curve is entered.

Permitted tare range

LFT with P1 = 0	±100% of NOV
LFT with P1 > 0	0 … NOV

Example

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

PTM

Pretare mode (manual tare mode)

Selects manual tare mode. After selecting net measured value, the entered manual tare value (PTV) is used. The net value is then marked in the display and in the printout with NET PT.

Taring with TAR overwrites the manual tare value and only the net value is displayed.

Property	Contents	Note
Command	**PTM**	
No. of parameters	1	
Parameter range	P1 = 0, 1	0: Off, 1: On
Factory setting	1	
Response time	< 10 ms	
Password protection	Yes	
Inhibited in legal-for-trade mode	No	
Parameter protection	With TDD1;	
Send command	PTM(P1);	
DIS response	0crlf	Input OK
Send query	PTM?;	
DIS response	P1crlf	P1 = 1 character

PTV

Pretare value (manual tare value)

Sets the manual tare value. When manual tare mode is activated (**PTM**), this is offset as the tare value. The net value is then marked in the display and in the printout with NET PT.

Property	Contents	Note
Command	**PTV**	
No. of parameters	1	
Parameter range	P1 = 0 … NOV	
Factory setting	0	
Response time	< 10 ms	
Password protection	Yes	
Inhibited in legal-for-trade mode	No	
Parameter protection	With TDD1;	
Send command	PTV(P1);	
DIS response	0crlf	Input OK
Send query	PTV?;	
DIS response	Xcrlf	X = 8 characters, the current 7-digit tare value with a sign

5.6 Special functions

Function	*Command*
Password commands	**DPW**, **SPW**
Amplifier reset	**RES**
Amplifier identification	**IDN**
Store/restore all parameters	**TDD**
Name of manufacturer	**NAM**
Automatic daylight saving time	**AST**
Set date/time	**STD**
Error memory	**ERR?**

The DIS has password protection for legal-for-trade parameters. These specifically protected commands are marked in the PW column in the overview in section 4.6 on page 25. If the password is *not yet* activated with **SPW**, the parameters of a protected function can be read out, but not changed. Use **DPW** to enter a new password.

DPW

Define password

Stores a new password. You must activate the new password once it has been entered with **SPW**.

Important

The password function is case-sensitive.

The DPW?; query is not permitted.

Property	Contents	Note
Command	**DPW**	
No. of parameters	1	
Parameter range	P1 = text	P1 in double quotes, max. 7 ASCII characters
Factory setting	"HBM"	
Response time	< 10 ms	
Password protection	No	
Inhibited in legal-for-trade mode	Yes	
Parameter protection	With TDD1;	
Send command	DPW("P1");	
DIS response	0crlf	Input OK

SPW

Set password

Allows all password-protected commands or parameters to be used when you enter the correct password (**DPW**). If the password is incorrect, data entry is inhibited for protected commands. A password is not necessary for output. These specifically protected commands are marked in the PW column in the overview in section 4.6 on page 25.

The use of protected commands is always inhibited after **RES** or power-up.

The SPW?; query is not permitted.

Property	Contents	Note
Command	**SPW**	
No. of parameters	1	
Parameter range	P1 = text	P1 in double quotes, max. 7 ASCII characters that must match P1 of DPW
Factory setting	"HBM"	
Response time	< 10 ms	
Password protection	No	
Inhibited in legal-for-trade mode	No	
Parameter protection	-	
Send command	SPW("P1");	
DIS response	0crlf	Input OK

RES

Restart

Initiates a device restart (warm start).

This command does not generate a response. All the parameters are set as they were stored with the last TDD1; command, that is to say, the EEPROM values are transferred to the RAM.

The RES?; query is not permitted.

Property	Contents	Note
Command	**RES**	
No. of parameters	-	
Parameter range	-	
Factory setting	-	
Response time	< 4 s	
Password protection	No	
Inhibited in legal-for-trade mode	No	
Parameter protection	-	
Send command	RES;	No response

IDN

Identification

Identification text output (32 characters + delimiter). Sequence: manufacturer, electronics type, serial number, software version.

Property	Contents	Note
Command	**IDN?**	
No. of parameters	1	
Parameter range	P1 = type	P1 in double quotes, 15 ASCII characters
Factory setting	HBM,**DIS2116**, xxxxxxx,Pyyyy crlf	The factory setting for P1 is DIS2116, this is the only part that you can change
Response time	< 10 ms	
Password protection	No	
Inhibited in legal-for-trade mode	No	
Parameter protection	With TDD1;	
Send command	IDN("P1")	P1 = my scale
DIS response	0crlf	Input OK

Property	Contents	Note
Send query	IDN?;	
DIS response	HBM,my scale , xxxxxxx, Pyyyycrlf	P1 = 15 characters (with added blanks), xxxxxxx is the serial number, Pyyyy is the program version number

A fixed number of characters are output. The manufacturer is always output with 3 characters, parameter P1 always with 15 characters, the serial number always with 7 characters and the version number always with 4 characters (each separated by a comma). So 32 characters plus the delimiter are always output.

NAM

Name (manufacturer ID)

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

Property	Contents	Note
Command	**NAM**	
No. of parameters	1	
Parameter range	P1 = text	P1 in double quotes, 3 ASCII characters
Factory setting	"HBM"	
Response time	< 10 ms	
Password protection	Yes	
Inhibited in legal-for-trade mode	Yes	
Parameter protection	With TDD1;	
Send command	NAM("P1");	
DIS response	0crlf	Input OK
Send query	NAM?;	
DIS response	P1crlf	P1 = 3 characters

TDD

Transmit device data

Protects or loads stored parameters.

The DIS has two memories. The first memory is where customized parameters are stored. The second memory contains the legal-for-trade parameters. In legal-for-trade mode (see **LFT**), only the parameters of the first memory are stored, otherwise the parameters of both memories are stored.

The TDD?; query is not permitted.

Important

When TDD0 is executed, the calibration counter is increased by one and you must adjust the scale again.

Property	Contents	Note
Command	**TDD**	
No. of parameters	1	
Parameter range	P1 = 0, 1, 2	0: Restore factory setting 1: Protect current parameters 2: Activate protected parameters
Factory setting	-	
Response time	< 0.2 s	
Password protection	TDD0; Yes TDD1; No TDD2; No	

Property	Contents	Note
Inhibited in legal-for-trade mode	TDD0; Yes TDD1; No TDD2; No	
Parameter protection	No data to protect	
Send command	TDD(P1);	
DIS response	0crlf	Input OK

When parameters are entered, changed settings are only saved in the RAM initially, so they are not safe from power failure. So for power failsafe storage of the changed settings, use TDD1.

Contents of the first memory:

Parameters of commands **ASF**, **BD1**, **BD1**, **BD3**, **BD4**, **WMD**, **FMD**, **TAV**, **TAS**, **ESC**, **PES**, **PID?**, **PLB**, **PLE**, **PRT**, **PST**, **MTD**, **LIV**, **BFC**, **MAL**, **DPW.**

Contents of the second memory (legal-for-trade parameters):

Parameters of commands **GCA**, **GDE**, **CWT**, **LDW**, **LWT**, **NOV**, **RSN**, **MRA**, **MRB**, **MTD**, **ENU**, **DPT**, **LIN**, **LIM**, **ZSE**, **ZTR**, **LFT**, **TCR.**

Restoring the factory setting (TDD0)

With a few exceptions, this command restores the factory setting parameters. The unchanged parameters are:

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

AST

Automatic summer time (automatic daylight saving time)

Activates the automatic summer/winter time setting. The change to summer time takes place on the last Sunday in March and the change to winter time on the last Sunday in October.

Property	Contents	Note
Command	**AST**	
No. of parameters	1	
Parameter range	P1 = 0, 1	0: Deactivate daylight saving 1: Activate daylight saving
Factory setting	0	
Response time	< 10 ms	
Password protection	No	
Inhibited in legal-for-trade mode	No	
Parameter protection	With TDD1;	
Send command	AST(P1);	
DIS response	0crlf	Input OK
Send query	AST?;	
DIS response	P1crlf	P1 = 1 character

Examples

Sent	*Response*	*Significance*
AST1;	*0crlf*	*Activate daylight saving*
AST?;	*1crlf*	*Daylight saving is active*

STD

Set time and date

Sets the date and the time. The entry format is hh:mm:ss,DD:MM:YY.

Property	Contents	Note
Command	**STD**	
No. of parameters	2	
Parameter range	P1: 00:00:00 … 23:59:59 P2: 01.01.00 … 31.12.99	
Factory setting	unchanged	
Response time	< 10 ms	
Password protection	No	
Inhibited in legal-for-trade mode	No	
Parameter protection	With TDD1;	
Send command	STD<P1><,P2>;	
DIS response	0crlf	Input OK
Send query	STD?;	
DIS response	P1,P2crlf	P1: Time P2: Date

Examples

Sent	*Significance*
STD11:10:30,18.04.2014;	*Set date and time*
STD11:10:30;	*Set new time*
STD,18.04.2014;	*Set new date*

ERR

Error status

Reads out the error status.

Property	Contents	Note
Command	**ERR?**	
No. of parameters	-	
Parameter range	-	
Factory setting	unchanged	
Response time	< 10 ms	
Password protection	No	
Inhibited in legal-for-trade mode	No	
Parameter protection	-	
Send command	ERR?;	
DIS response	P1crlf	P1 = 5 characters

The error number lies in the range from 0 … 99999 (0 = no error). After read out, the error memory is set to 0.

An accurate description of the respective error numbers can be found in Part 1 of the Operating Manual.

5.7 Commands for legal-for-trade applications

In legal-for-trade mode, the commands are used to monitor changes to legal-for-trade parameters via the calibration counter.

Function	*Command*
Legal-for-trade switch (selecting legal-for-trade mode)	LFT
Calibration counter	TCR

The parameters inhibited in legal-for-trade mode 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 activated with a value greater than zero, you can *no longer* make changes to legal-for-trade parameters. First you have to enter the password (DPW, SPW) and deactivate the legal-for-trade counter with LFT0.

Important

Every LFT change increases the calibration counter (TCR), which cannot be reset, by 1.

Tip

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

LFT

Legal for trade

Legal-for-trade switch: selects legal-for-trade mode. Every **LFT** status change increases the calibration counter (**TCR**) by 1.

In legal-for-trade mode (LFT > 0), parameter entry is inhibited for the following commands:

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

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

Property	Contents	Note
Command	**LFT**	
No. of parameters	1	
Parameter range	P1 = 0 … 4	See Tab. 5.8
Factory setting	0	Industrial use
Response time	< 10 ms	
Password protection	Yes	
Inhibited in legal-for-trade mode	Yes	
Parameter protection	With TDD1;	
Send command	LFT(P1);	
DIS response	0crlf	Input OK
Send query	LFT?;	
DIS response	P1crlf	P1 = 1 character

Parameter	Significance
0	Industrial use (not legal-for-trade)
1	Legal-for-trade application OIML III (R76)
2	Legal-for-trade application OIML IIII (ordinary accuracy weighing machine up to 1000 d)
3	Legal-for-trade application NTEP
4	Legal-for-trade application NEPT IIIL (US truck scales up to 10000 d)

Tab. 5.8 Significance of parameter P1 (application type)

Display range in the different operating modes:

LFT0	-160%[1] … + 160%	The range is not checked
LFT1	-20 d[2] … + NOV + 9 d	Legal for trade, OIML III, R76
LFT2	-20 d[2] … + NOV + 9 d	Legal for trade, OIML IIII
LFT3	-2%[1] … + NOV + 5%	Legal for trade, NTEP
LFT4	-2%[1] … + NOV + 5%	Legal for trade, NTEP IIIL

[1] The percentages relate to NOV
[2] d relates to the set resolution (increment **RSN**): Correspondingly for RSN2, 9 d = 18 digits.

Permitted tare range

LFT with P1 = 0	±100% of NOV
LFT with P1 > 0	0 … NOV

Permitted range of zero setting

LFT with P1 = 0	±20% of NOV
LFT with P1 > 0	±2% of NOV

TCR

Trade counter (calibration counter)

The trade counter (calibration counter) cannot be reset and identifies changes to parameters in the legal-for-trade commands (see **LFT** command).

The maximum counter reading is 9999999. An error message is output at this counter reading and the counter stops. Legal-for-trade mode can then no longer be activated. This situation can only be remedied by HBM Service.

Property	Contents	Note
Command	**TCR?**	
No. of parameters	-	
Parameter range	-	
Factory setting	unchanged	
Response time	< 10 ms	
Password protection	No	
Inhibited in legal-for-trade mode	Yes	
Parameter protection	-	
Send command	TCR?;	
DIS response	Xcrlf	X = 7 characters

The calibration counter can neither be changed, nor reset.

ENC

Encryption

To prevent manipulation of the measured values, transmission can be encrypted.

Important

*Encryption is activated automatically in legal-for-trade mode (**LFT** with parameter P1 > 0).*

Property	Contents	Note
Command	**ENC**	
No. of parameters	1	
Parameter range	P1 = 0, 1	0: Off 1: On
Factory setting	0	Deactivated
Response time	< 10 ms	
Password protection	Yes	
Inhibited in legal-for-trade mode	Yes	
Parameter protection	With TDD1;	
Send command	ENC(P1);	
DIS response	0crlf	Input OK
Send query	ENC?;	
DIS response	P1crlf	P1 = 1 character

In encrypted mode, every measured value of the connected digital load cells is encrypted for transmission and also provided with information about the load cell. The DIS checks the authenticity of each measured value and if necessary, stops the measured value being displayed.

5.8 Commands for setting up an external display

You can connect an external display via the fourth serial interface (COM4). Use the following commands to set up communication with this display. The interface parameters themselves are described in section 5.1.4, on page 43.

Function	*Command*
Number of start characters	SCC
Number of end characters	ECC
Start character	SCH
End character	ECH
CRC character	EDC
Output length	EDL
Decimal marker	EPT
Update rate, adjustable from 10 ms to 2500 ms	PAU

SCC

External display: start character count (number of start characters)

Defines the number of start characters in the output text.

Property	Contents	Note
Command	**SCC**	
No. of parameters	1	
Parameter range	P1 = 0 … 15	0: No start character defined >0: Specify up to 15 characters via **SCH**
Factory setting	0	
Response time	< 10 ms	
Password protection	No	
Inhibited in legal-for-trade mode	No	
Parameter protection	With TDD1;	
Send command	SCC(P1);	
DIS response	0crlf	Input OK
Send query	SCC?;	
DIS response	P1crlf	P1 = 2 characters

Examples

Sent	*Significance*
SCC1; *SCH1,2;*	*The start character is STX (02_{hex}).*
SCC5; *SCH1,83;* *SCH2,84;* *SCH3,65;* *SCH4,82;* *SCH5,84;*	*The "START" text is transmitted as the start sequence*

SCH

External display: start character

Defines the start character in the output text. Specify the number of characters with **SCC**.

Property	Contents	Note
Command	**SCH**	
No. of parameters	2	
Parameter range	P1 = 1 … 15 P2 = 0 … 255	P1: Character position P2: Decimal value of the required ASCII character
Factory setting	0	
Response time	< 10 ms	
Password protection	No	
Inhibited in legal-for-trade mode	No	
Parameter protection	With TDD1;	

Property	Contents	Note
Send command	SCH(P1),(P2);	
DIS response	0crlf	Input OK
Send query	SCH?(P1);	
DIS response	P2crlf	P2 = 3 characters (decimal ASCII value)

Examples

Sent	*Significance*
SCH1,2;	*The first start character is STX (02_{hex}).*
SCH15,83;	*The 15th start character is 'S' (53_{hex}).*

ECC

External display: end character count (number of end characters)

Number of end characters in the output text.

Property	Contents	Note
Command	**ECC**	
No. of parameters	1	
Parameter range	P1 = 0 … 5	0: No end character defined >0: Specify up to 5 characters via **ECH**
Factory setting	0	
Response time	< 10 ms	
Password protection	No	
Inhibited in legal-for-trade mode	No	
Parameter protection	With TDD1;	
Send command	ECC(P1);	
DIS response	0crlf	Input OK
Send query	ECC?;	
DIS response	P1crlf	P1 = 2 characters

Examples

Sent	*Significance*
ECC1; ECH1,3:	*The end character is ETX (03_{hex}).*
ECC3; ECH1,69; ECH2,78; ECH3,68;	*The "END" text is transmitted as the end sequence*

ECH

External display: end character

Defines the end characters in the output text. Specify the number of characters with **ECC**.

Property	**Contents**	**Note**
Command	**ECH**	
No. of parameters	2	
Parameter range	P1 = 1 … 5 P2 = 0 … 255	P1: Character position P2: Decimal value of the required ASCII character
Factory setting	0	
Response time	< 10 ms	
Password protection	No	
Inhibited in legal-for-trade mode	No	
Parameter protection	With TDD1;	
Send command	ECH(P1),(P2);	
DIS response	0crlf	Input OK

Property	Contents	Note
Send query	ECH?(P1);	
DIS response	P2crlf	P2 = 3 characters (decimal ASCII value)

Examples

Sent	*Significance*
ECH1,3;	*The first end character is ETX (03_{hex}).*
ECH5,69;	*The 5th end character is 'E' (45_{hex}).*

EDC

External display: checksum

Defines the checksum for the output text.

Property	Contents	Note
Command	**EDC**	
No. of parameters	1	
Parameter range	P1 = 0, 1	0: No checksum 1: Calculate checksum (produces 1 byte in addition)
Factory setting	0	
Response time	< 10 ms	
Password protection	No	
Inhibited in legal-for-trade mode	No	
Parameter protection	With TDD1;	
Send command	EDC(P1);	
DIS response	0crlf	Input OK
Send query	EDC?;	
DIS response	P1crlf	P1 = 3 characters

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

EDL

External display: length (of character string)

Limits the number of characters for the measured value within the output text.

Property	Contents	Note
Command	**EDL**	
No. of parameters	1	
Parameter range	P1 = 0 … 8	0: Deactivated[1]
Factory setting	0	
Response time	< 10 ms	
Password protection	No	
Inhibited in legal-for-trade mode	No	
Parameter protection	With TDD1;	
Send command	EDL(P1);	
DIS response	0crlf	Input OK
Send query	EDL?;	
DIS response	P1crlf	P1 = 1 character

[1] With EDL0, the measured value is always output with 9 characters. If necessary, spaces are added to the left. Suppress leading blanks with EDL and P1 > 0.

If the number of characters specified is insufficient to display all the relevant places, decimal places will initially be cut. If the measured value is no longer correctly realized, "———" is output.

Example

Sent	***Significance***
EDL6;	*Measurement output with 6 characters*

EPT

External display: decimal point (decimal marker)

Defines the decimal marker in the output text.

Property	Contents	Note
Command	**EPT**	
No. of parameters	1	
Parameter range	P1 = 0 … 2	See Tab. 5.9
Factory setting	0	
Response time	< 10 ms	
Password protection	No	
Inhibited in legal-for-trade mode	No	
Parameter protection	With TDD1;	
Send command	EPT(P1);	
DIS response	0crlf	Input OK
Send query	EPT?;	
DIS response	P1crlf	P1 = 1 character

Parameter	Significance
0	No decimal marker is output (the output text is 1 byte shorter)
1	A point is output as the decimal marker
2	A comma is output as the decimal marker

Tab. 5.9 Significance of parameter P1 (decimal marker definition)

PAU

External display: pause

Sets the update rate in 10 ms steps.

Property	Contents	Note
Command	**PAU**	
No. of parameters	1	
Parameter range	P1 = 0 … 255	0: Deactivated 1: 10 ms … 255: 2.55 s
Factory setting	0	
Response time	< 10 ms	
Password protection	No	
Inhibited in legal-for-trade mode	No	
Parameter protection	With TDD1;	
Send command	PAU(P1);	
DIS response	0crlf	Input OK
Send query	PAU?	
DIS response	P1crlf	P1 = 3 characters

5.9 Commands for print function settings

You can connect a printer either via the USB or via the third serial interface (COM3). Set the output with the following commands. The interface parameters themselves are described in section 5.1.3, on page 39.

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

An accurate description of the printout variants can be found in Part 1 of the Operating Manual.

To start a printout, activate the print function **FC3**.

PRT

Print

When a printer is connected and the print function (FC3) is activated, printout starts for the various print protocols. Otherwise the measured value is written to the alibi memory. In legal-for-trade mode (LFT > 0), output to the alibi memory and/or printout only happen if the standstill condition is met within 5 s.

Property	Contents	Note
Command	**PRT**	
No. of parameters	1	
Parameter range	P1 = 0 … 5	See Tab. 5.10
Factory setting	0	
Response time	< 10 ms	
Password protection	Yes	
Inhibited in legal-for-trade mode	No	
Parameter protection	With TDD1;	
Send command	PRT(P1);	
DIS response	0crlf	Input OK
Send query	PRT?;	
DIS response	P1crlf	P1 = 1 character

Parameter	Significance
0	Print function is deactivated
1	Print current measured values: gross or net and tare values
2	Print gross or net weighing 1 and tare for the vehicle scale
3	Print gross or net weighing 2 and tare for the vehicle scale
4	Print gross or net weighing 1, weighing 2, result (weighing 2 - weighing 1) and tare for the vehicle scale
5	Print gross or net result (weighing 2 - weighing 1) and tare for the vehicle scale

Tab. 5.10 Significance of parameter P1 (print function)

ESC

Escape sequences

Specifies the escape sequences for the printer settings (see printer manual)

ESC characters set to zero (ESCx,0) are not transmitted

Property	Contents	Note
Command	**ESC**	
No. of parameters	2	
Parameter range	P1 = 0 … 9 P2 = 0 … 255	P1: ESC character number P2: Characters of this ESC character number as a decimal ASCII value
Factory setting	0	
Response time	< 10 ms	
Password protection	Yes	
Inhibited in legal-for-trade mode	No	
Parameter protection	With TDD1;	
Send command	ESC(P1),(P2);	
DIS response	0crlf	Input OK
Send query	ESC?(P1);	
DIS response	P1crlf	P1 = 3 characters

The DIS uses two escape sequences (the sequences are output without the blank spaces):

Sequence 1: ESC ESC0 ESC1 ESC2 ESC3 ESC4

Sequence 2: ESC ESC5 ESC6 ESC7 ESC8 ESC9

Use ESC0,0; to deactivate sequence 1 and ESC5,0; to deactivate sequence 2.

PLB

Print empty lines before printing (bank lines)

Specifies the number of blank lines at the start of printing.

Property	Contents	Note
Command	**PLB**	
No. of parameters	1	
Parameter range	P1 = 1 … 99	
Factory setting	0	
Response time	< 10 ms	
Password protection	No	
Inhibited in legal-for-trade mode	No	
Parameter protection	With TDD1;	
Send command	PLB(P1);	
DIS response	0crlf	Input OK
Send query	PLB?;	
DIS response	P1crlf	P1 = 2 characters

PES

Print empty spaces

Defines the number of blanks/spaces at the start of each new line.

Property	Contents	Note
Command	**PES**	
No. of parameters	1	
Parameter range	P1 = 0 … 99	
Factory setting	0	
Response time	< 10 ms	
Password protection	No	
Inhibited in legal-for-trade mode	No	
Parameter protection	With TDD1;	
Send command	PES(P1);	
DIS response	0crlf	Input OK
Send query	PES?;	
DIS response	P1crlf	P1 = 2 characters

PID

Print identification counter

Delivers the current print ID or the results for a particular print ID in binary or ASCII format, according to choice. The print ID is the identifier of a measurement in the alibi memory (SD card). With each printout (PRT), the current measurement in the alibi memory is archived and the print identification counter is incremented by one. The counter stops when the SD card (alibi memory) is full.

The maximum counter reading is 9999999. An error message is output at this counter reading and the counter stops. This situation can only be remedied by HBM Service.

Property	Contents	Note
Command	**PID**	
No. of parameters	0, 1, 2	Mode-dependent, see text
Parameter range	0 … 9999999	
Factory setting	0	
Response time	< 10 ms	
Password protection	No	
Inhibited in legal-for-trade mode	No	
Parameter protection	-	
Send command	-	
DIS response	-	

Property	Contents	Note
Send query	PID?<P1><,P2>;	
DIS response	According to mode	

You have three output options:

1. Read print ID

   Returns the print ID and thus the number of measurements in the alibi memory.

2. Binary data output

   Returns the data of a particular measurement in the alibi memory in binary format.

3. ASCII data output

   Returns individual data items of a particular measurement in the alibi memory as a text (string).

1. Read print ID

No. of parameters	0	
Send query	PID?;	
DIS response	Xcrlf	X = 8 characters

Example

Sent	*Response*	*Significance*
PID?;	*00000012crlf*	*There are 12 measurements in the alibi memory.*

2. Binary data output

No. of parameters	1	
Send query	PID?(P1);	P1: Print ID
DIS response	Xcrlf	X = 100 characters

The DIS 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 marker	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][1]	35	4
Truck number plate	CH[10][1]	39	10
Truck goods	CH[10][1]	59	10
Truck procedure	CH[10][1]	79	10
Checksum	U08	99	1

[1] CH[x]: Field with ASCII characters of length x, followed by a byte with ASCII value 0 as the delimiter.

The checksum is calculated by concatenating the first 99 bytes via XOR: Response[byte1] XOR response[byte2] XOR … XOR response[byte99].

Example

Sent	*Response*	*Significance*
PID?12;	*Xcrlf*	*The data of the 12th measured value are output as a block with 100 bytes, X = 100 bytes.*

3. ASCII data output

No. of parameters 2

P1: Print ID
P2: Specifies what is to be output, see Tab. 5.11

Send query PID?(P1),(P2);

DIS response According to P2

P2	Data content	Character count	Response example
0	Print ID counter	7	0000002crlf
1	Total measured value[1]	7	0005200crlf
2	Date and time	14	27.04.09 14:50crlf
3	Mode[2]	1	1crlf
4	Number of decimal places	2	03crlf
5	Measured value 1[3]	7	0008400crlf
6	Measured value 2[3,4]	7	0003300crlf
7	Tare value 1	7	0001000crlf

P2	Data content	Character count	Response example
8	Tare value 2[4]	7	0001000crlf
9	Status 1	10	0000000027crlf
10	Status 2[4]	10	0000000031crlf
11	Unit	4	kg crlf
12	Truck number plate[4]	10	DA-HM 1234crlf
13	Truck goods[4]	10	1-DIS2116crlf
14	Truck procedure[4]	10	A432.639crlf

1 According to mode:
Measured value 1 for mode 0, difference between measurement 1 and measurement 2 for mode 1.
2 The mode is set via the scale operating mode (**WMD**):
0 = standard (measurement 1 only), 1 = vehicle weighing (measurement 1 and measurement 2).
3 Status bit 0 indicates whether the measured values are gross or net measured values.
4 Mode 1 only.

Tab. 5.11 Significance of parameter P2

Status bit position	Status bit content	Comments
0	Net/gross	0: Net measured value, 1: Gross measured value, see **TAS**.
1	True zero	1: True zero is present.
2	Reserved	
3	Standstill	The measured values fall within the standstill range defined with **MTD**.
4	Limit value 1	Status of limit value 1, see **LIV**.
5	Limit value 2	Status of limit value 2, see **LIV**.

Status bit position	Status bit content	Comments
6-7	Measuring range	00: Measuring range 1, 10: Measuring range 2, 11: Measuring range 3, see **MRA** and **MRB**.
8	Manual tare	1: Gross measured value for manual tare, see **PTM**.
9-14	Reserved	
15	Overflow	Overload.
16	Display range	Display range exceeded, see **MSV?**.
17-18	Reserved	
19	Error status	1: Error present in error status, see **ERR?**.
20	Connection error	1: Connection to transducer interrupted.

Tab. 5.12 Status bit significance; position 0 is the least significant bit

Examples

Sent	*Response*	*Significance*
PID?12,2;	*27.04.09 11:48crlf*	*Date/time of 12th measurement.*
PID?12,1;	*0005612crlf*	*Complete measured value of the 12th measurement.*

PST

Print strings (text)

Specifies the three print string options (P1 = 0 … 2) of the DIS. For P2, you can use all ASCII characters between 20_{hex} (blank space) and $7E_{hex}$ (126_{dec} = ~).

Property	Contents	Note
Command	**PST**	
No. of parameters	2	
Parameter range	P1 = 0 … 2 P2 = text	P1: No. of print string P2 in double quotes, 32 ASCII characters
Factory setting	""	
Response time	< 10 ms	
Password protection	No	
Inhibited in legal-for-trade mode	No	
Parameter protection	With TDD1;	
Send command	PST(P1),("P2");	
DIS response	0crlf	Input OK
Send query	PST?(P1);	
DIS response	P2crlf	P2 = max. 32 characters

PLE

Print empty lines at the end of printing (blank lines after printing)

Specifies the number of blank lines at the end of printing.

Property	Contents	Note
Command	**PLE**	
No. of parameters	1	
Parameter range	P1 = 0 … 99	
Factory setting	0	
Response time	< 10 ms	
Password protection	No	
Inhibited in legal-for-trade mode	No	
Parameter protection	With TDD1;	
Send command	PLE(P1);	
DIS response	0crlf	Input OK
Send query	PLE?;	
DIS response	P1crlf	P1 = 2 characters

PFF

Page feed after printing (Print Form Feed)

Enables a page feed at the end of printing. This ejects the page.

Property	Contents	Note
Command	**PFF**	
No. of parameters	1	
Parameter range	P1 = 0, 1	0: No page feed 1: Send page feed
Factory setting	1	
Response time	< 10 ms	
Password protection	No	
Inhibited in legal-for-trade mode	No	
Parameter protection	With TDD1;	
Send command	PFF(P1);	
DIS response	0crlf	Input OK
Send query	PFF?;	
DIS response	P1crlf	P1 = 1 character

PRC

Print copies

Specifies the number of copies for each printout.

Property	Contents	Note
Command	**PRC**	
No. of parameters	1	
Parameter range	P1 = 0 … 3	0: No copies … 3: 3 copies, i.e. 4 printouts
Factory setting	0	
Response time	< 10 ms	
Password protection	No	
Inhibited in legal-for-trade mode	No	
Parameter protection	With TDD1;	
Send command	PRC(P1);	
DIS response	0crlf	Input OK
Send query	PRC?;	
DIS response	P1crlf	P1 = 1 character

5.10 Commands for setting function keys and parameter menus

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

MAL

Menu access level

Specifies access to the DIS "Parameters" menu

Property	Contents	Note
Command	**MAL**	
No. of parameters	1	
Parameter range	P1 = 0 … 5	See Tab. 5.13
Factory setting	4	
Response time	< 10 ms	
Password protection	Yes	
Inhibited in legal-for-trade mode	No	
Parameter protection	With TDD1;	
Send command	MAL(P1);	
DIS response	0crlf	Input OK
Send query	MAL?;	
DIS response	P1crlf	P1 = 1 character

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 SETTING

Tab. 5.13 Significance of parameter P1 (access control)

BFC

Button function (function key, function)

Activates the function keys.

Property	Contents	Note
Command	**BFC**	
No. of parameters	2	
Parameter range	P1 = 1 … 5 P2 = 0, 1	P1: Function key, see Tab. 5.14 P2 = 0: Deactivated P2 = 1: Activated
Factory setting	0	
Response time	< 10 ms	
Password protection	No	
Inhibited in legal-for-trade mode	No	
Parameter protection	With TDD1;	
Send command	BFC(P1),(P2);	
DIS response	0crlf	Input OK
Send query	BFC?(P1);	
DIS response	P2crlf	P2= 1 character

P1	Function key
1	SET TO ZERO
2	TARE
3	GROSS/NET
4	10-FOLD RESOLUTION
5	PRINT

Tab. 5.14 Significance of parameter P1 (function key)

WMD

Weighing mode

Activates the operating mode as vehicle scale.

Property	Contents	Note
Command	**WMD**	
No. of parameters	1	
Parameter range	P1 = 0, 1	0: Operation as non-automatic weighing instrument 1: Operation as vehicle scale
Factory setting	0	
Response time	< 10 ms	
Password protection	Yes	
Inhibited in legal-for-trade mode	No	
Parameter protection	With TDD1;	
Send command	WMD(P1);	
DIS response	0crlf	Input OK
Send query	WMD?;	
DIS response	P1crlf	P1 = 1 character

LAG

Language

Sets the display language.

Property	Contents	Note
Command	**LAG**	
No. of parameters	1	
Parameter range	P1 = 0 … 7	See Tab. 5.15
Factory setting	0	English
Response time	< 10 ms	
Password protection	Yes	
Inhibited in legal-for-trade mode	No	
Parameter protection	With TDD1;	
Send command	LAG(P1);	
DIS response	0crlf	Input OK
Send query	LAG?;	
DIS response	P1crlf	P1 = 1 character

P1	Language
0	English
1	German
2	Russian
3	French
4	Italian
5	Spanish

P1	Language
6	Catalan
7	Portuguese

Tab. 5.15 Significance of parameter P1 (language)

DCO

Display contrast

Sets the display contrast (21 steps).

Property	Contents	Note
Command	**DCO**	
No. of parameters	1	
Parameter range	P1 = 0 … 20	0: Minimum contrast … 20: Maximum contrast
Factory setting	10	
Response time	< 10 ms	
Password protection	Yes	
Inhibited in legal-for-trade mode	No	
Parameter protection	With TDD1;	
Send command	DCO(P1);	
DIS response	0crlf	Input OK
Send query	DCO?;	
DIS response	P1crlf	P1 = 2 characters

5.11 Command for setting limit value switches

LIV

Limit values

Sets the two limit value switches. They can monitor gross or net measured values. Monitoring is always implemented, even when there is no communication via the serial interface. The speed of response depends on the output rate.

Tip

*Query the status of the limit values with **MSS?**.*

Property	Contents	Note
Command	**LIV**	
No. of parameters	5	
Parameter range	P1 = 1 … 2, P2 = 0, 1, P3 = 0, 1 P4 = P5 = 0 … NOV	See Tab. 5.16
Factory setting	x, 0, 0, 0, 0 for both the limit values	Deactivated
Response time	< 10 ms	
Password protection	No	
Inhibited in legal-for-trade mode	No	
Parameter protection	With TDD1;	

Property	Contents	Note
Send command	LIV(P1)<,P2><,P3><,P4><,P5>;	
DIS response	0crlf	Input OK
Send query	LIV?(P1);	
DIS response	P2,P3,P4,P5crlf	P1, P2, P3 = 1 character each, P4, P5 = 8 characters each

P1	1: Limit value switch 1 2: Limit value switch 2
P2	0: Limit value monitoring off 1: Limit value monitoring on
P3	0: Net measured value is the input signal 1: Gross measured value is the input signal
P4	Activation level (≙ ON_Level, 0 … NOV)
P5	Deactivation level (≙ OFF_Level, 0 … NOV)

Tab. 5.16 Significance of parameters P1 to P5 (limit values)

Example

Sent	***Response***	***Significance***
LIV1,1,0,9000,1000;	*0crlf*	*Sets limit value 1 (P1 = 1), activates monitoring (P2 = 1) and selects net measured value as the input (P3 = 0). The limit value switch activates at a net measured value >9000 (P4) and deactivates at a net measured value <1000 (P5).*

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