LINAX 4000M

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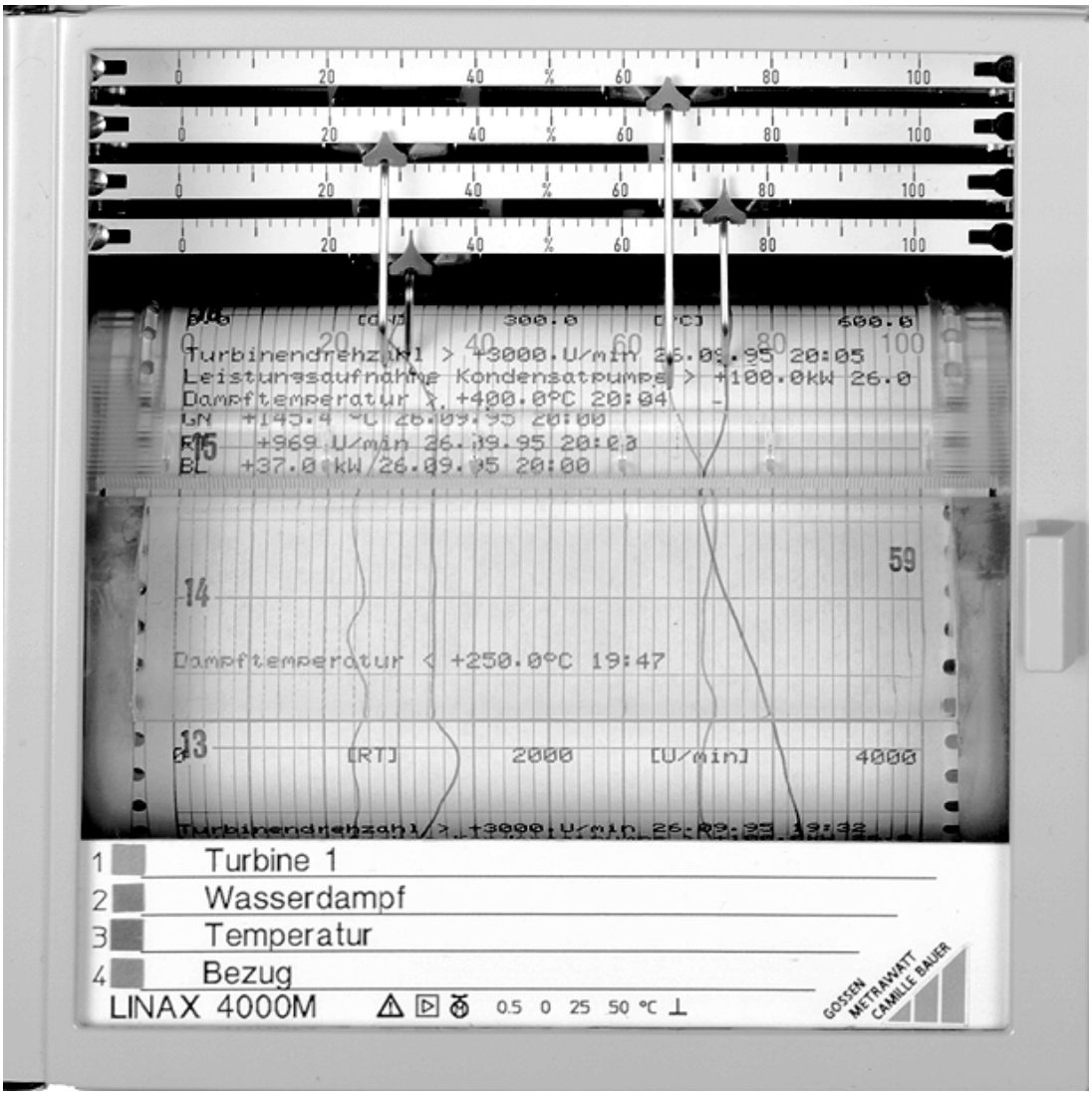


Contents

1 Description

An RS-485 interface is available for data transmission of the continuous-line recorder LINAX 4000M.

Parameterization of the reorder can be made on the operating panel of the LINAX 4000M or with the aid of a PC and the parameterization program PARATOOL L4000M via the interface.

Serial data transmission of the continuous-line recorder LINAX 4000M according to the interface standard RS-485 is with reference to DIN 19 245 part 1. Only a sub-amount of the definitions has been taken into account. Among others, definitions for multimaster operation (token-passing procedures) have not been considered as the continuous-line recorder always is a passive participant.

2 Technical data

2.1 Bus connection RS-485

Bus structure	Line, no branches, tie lines to devices < 0.3 m
Medium	Shielded, twisted two-wire line, characteristic impedance 100...130 Ω, at f >100 kHz Cable capacity < 60 pF/m Cross section at least 0.22 mm^2
Line length	Maximum 1200 m
Number of devices on the bus	32 (active and passive)
Transmission speed	600, 1.200, 2.400, 4.800, 9.600 and 19.200 bauds
Type of transmission	Symmetrical
Driver output	No-load voltage ± 5 V, with load ≥ 1.5 V Load resistance ± 60 Ω
Receiver	Sensitivity 200 mV Input impedance 12 kΩ
Grounding	Ground the shield at both ends to ground high-frequency interferences.
Potential equalization	The potential difference between the data reference potentials (GND) of all devices on the bus must not exceed ± 7 V.

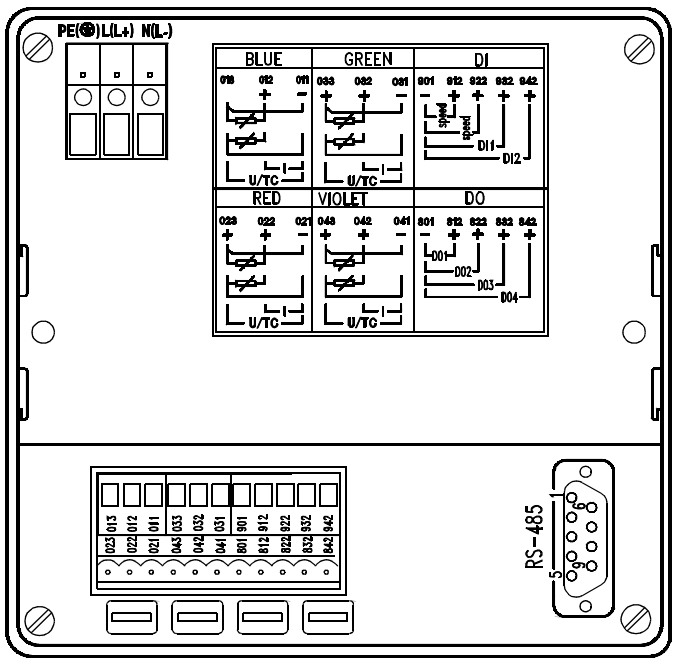


Figure 1 Rear panel of the LINAX 4000M

9-pin Sub-D socket
Pin 1: Shield
Pin 3: RXD (+)
Pin 5: GND (reference potential)
Pin 6: +5 V
Pin 8: RXD (–)

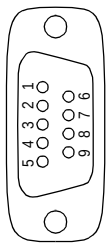


Figure 2 Pin assignment of the RS-485 interface

The voltage + 5 V on pin 6 is only required when the LINAX 4000M is used as bus terminal device.

The shield is attached to a plug connector on the recorder case.

The quiescent potential of the bus is defined with the aid of the resistors R_u, R_t and R_d.

R_u = 390 Ω,
R_t = 150 Ω
R_d = 390 Ω

Wire up as shown in figure 3.

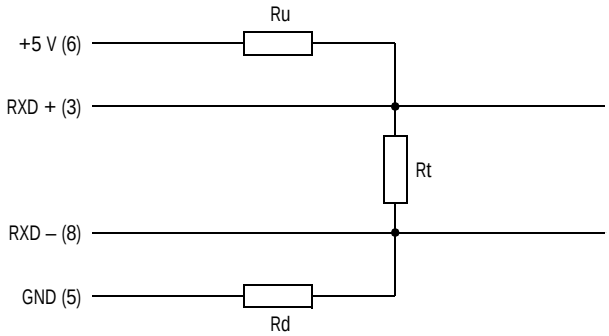


Figure 3 Bus termination wiring

The resistors Ru, Rt and Rd must be built into the 9-pin bus connector so that the recorder can be disconnected from the bus but the bus remains terminated.

3 Data formats

The data to be transmitted is formatted in four different types.
1. Type Byte Value range 0 ... 255
2. Type Char Value range –128 ... + 127
3. Type Word Value range 0 ... 65535
4. Type Float Value range ± 1.175494E–38 ... ± 3.402823E+38

Type Byte

The format type Byte is used to choose the parameters from the tables (see section 5.3).

Type Char

The format type Char is ued for the transmission of ASCII characters. The character font accepted by the recorder is listed in section 8. The Hex Code is to be used.

Type Word

The format Word consists of 2 bytes and is used for the transmission of integers without sign (integer values). When transmitting, the high byte is transmitted before the low byte.

Example: The value 820 is to be transmitted
820D = 0334H

Type Float

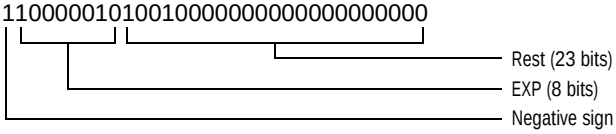
The format type Float consists of 4 bytes and is used for the transmission of values with floating decimal point. The value range accepted by the recorder is between –1000 ... +9999 (IEEE-754 format).

Example: The value –12.5 is to be transmitted
–12.5D = C1480000H

Determination of the hex number:
The general form of the number with foating decimal point is (sign) * $2^{EXP-127}$ * (rest)

Binary presentation of the number –12.5

11000001010010000000000000000000



1. Determine sign
   The bit is set with negative sign.
2. Determine exponent
   The highest exponent is determined
   EXP = INT [|g |number| / |g 2] + 127
   In the example:
   INT [|g 12.5 / |g 2] + 127 = 130D = 82H = 10000010
3. Determine the rest
   Rest = |number| / $2^{EXP-127}$
   In the example: 12.5 / 2^3 = 1.5625

Conversion to binary code:

Valency	$2^0+2^{-1}+2^{-2}+2^{-3}+2^{-4}+ \ldots 2^{-23}$
In the example:	(1) 1 0 0 1

The value of 2^0 is always 1 and is thus not transmitted.

4 Data transmission

4.1 General

A combination of telegram characters is used for transmission of the data. The telegrams perform the "handshake function" that is, each telegram from the computer to the recorder must be confirmed before the next telegram can be sent.

Note

The interface address and the transmission rate must be parameterized on the recorder before the transmitting data.

4.2 Telegram characters (UART character or frame)

Each frame (character) has 11 bits:
– One start bit (ST) with logic "0" signal
– 8 information bits with logic "0" or "1" signal
– One parity bit (P) (as option) with logic "0" or "1" signal
– One stop bit (SP) with logic "1" signal.

0	b1	b2	b3	b4	b5	b6	b7	b8	(P)	1
ST	2^0	2^1	2^2	2^3	2^4	2^5	2^6	2^7	(P)	SP

Figure 4 Bits of a frame

4.3 Permissible addresses

With the RS-485 interface, the LINAX 4000M only answers requests that use the address set in the unit as destination address. Values between 0 ... 126 (= 7EH) are permissible. Any address can be assigned. But no address must be assigned twice. The LINAX 4000M will not answer erroneous messages (checksum, incorrect address, other receiving errors). An erroneous message will not be acknowledged. Some data sections are marked as Read Only.
The recorder ignores attempts to write to these data fields.

4.3.1 Broadcast address

Messages sent to the broadcast address (132D) are processed by all LINAX 4000M recorders but no answer is sent to a broadcast message.

4.4 Telegram formats, frame specifications

The LINAX 4000M accepts the following telegram types:

4.4.1 Telegram SD1

Telegram with fixed length of the information field without data field:

SD1/ DA/SA/FC /FCS/ED
I<--- L--->I

This is used to send a request to the recorder, and used by the recorder as acknowledgement.

Where:

SD1 = 10H	Start byte (start delimiter), code: 10H
DA	Destination address
SA	Source address
FC	Function code (frame control)
FCS	Check byte (frame check sequence) Sum of the Hex values of the "L" frame without carry-over at FFH
ED	End byte (end delimiter), code: 16H
L	Number of bytes in FCS = 3

The recorder sends the answers to a request with FC = 01_H (ident request) also in SD1 format. If there is no self-test error in the device, the answer is FC = 10H. Otherwise FC is 11H.

With the function code 4EH, the ident recognition of the recorder is performed according to an internal standard.

The recorder answers a request with FC = $4E_H$ with a message of the SD2 type (see section 4.4.2).
The data field of the recognition message is occupied as follows:

LE_VN/LE_CT/LE_HR/LE_SR/VN/CT/HR/SR
LE_VN = 03H
LE_CT = 11H
LE_HR = 05H
LE_SR = 05H

VN =	„Gossen Metrawatt“	Manufacturer identification
CT =	„43011“	Product serial number and
	„L4000M“	device designation
HR =	„CPU:A“	Index of the recorder CPU card
SR =	„01.04“	Example of software release

4.4.2 Telegram SD2

Telegram with variable length of the information field:

SD2/LE/LEr/SD2/DA/SA/FC/aa/oo/oo/cc/data field/FCS/ED
L

This telegram is used to send data to the recorder and used for data answers by the recorder.

Where:

SD2 = 68H	Start byte
LE	Number of data bytes + 7
LEr	LE repeat
SD2 = 68H	Start byte repeat
DA	Destination address (address of the device on the bus)
SA	Source address
FC	Function code (16H = read; 15H = write)
aa	Basic address of the parameter field
oo oo	2 bytes parameter address (=offset)
cc	Number of data bytes
Datenfeld	Data to be transmitted
FCS	Checksum (sum of the Hex values of the L frames without carry-over at FFH)
ED = 16H	End marking
L	Number of bytes in FCS

The recorder answers the receipt of a type SD2 data message with a message in SD1 format, where FC = 10H when all data is accepted by the recorder, otherwise FC = 11H.

The changed data is automatically copied to the non-volatile memory 1 minute after receipt of the last data message.

Function code 16H is used to send data to the recorder. For reply telegrams in SD2 format the recorder uses the function code 15H.

4.4.3 Telegram SD3

Telegram with fixed length of the information field:

SD3/DA/SA/FC/aa/oo/oo/cc/xx/xx/xx/xx/FCS/ED
L

This telegram is used to send a request to the recorder.

Where:

SD3 = A2H	Start byte
DA	Destination address (address of the device on the bus)
SA	Source address
FC = 15H	Function code
aa	Basic address of the parameter field
oo oo	2 bytes parameter address (offset)
cc	Number of data bytes
xx xx xx xx	Any 4 bytes
FCS	Checksum (sum of the Hex values of the L frames)
ED = 16H	End marking
L	Number of bytes in FCS

4.5 Transmission rules

The quiescent state of the line corresponds to a logic "1" signal. Prior to the transmission of data – starting from the computer – a minimum time of 33 bits (sync time) is required as quiescent state.

Intervals of a length ≥ 3 frames are interpreted as end of telegram. The LINAX 4000M uses an interval of ≤ 300 ms at a time between receipt of the last stop bit and sending of the first start bits.

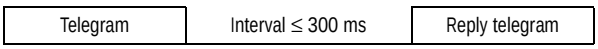


Figure 5 Interval between two telegrams

The gap between individual frames is 0.2 ms at a maximum.

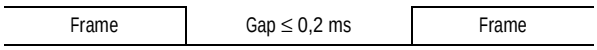


Figure 6 Gap between two frames

The receiver checks:
– Per frame Start, stop and parity bit
– Per telegram Start, DA, SA, FCS and end byte
If the check yields a negative result, the entire telegram is to be rejected as incorrect.

In its reply, the LINAX 4000M uses the source address of the sent telegram as destination address and uses its own address as source address.

5 Parameters

5.1 Addressable parameters

Using the telegrams according to sections 4.4.2 and 4.4.3, the following parameters can be read and/or changed. This requires that the address of a parameter field, the address of a parameter (offset) and the coding of the parameter value are given. The parameter field addresses are listed in section 5.2. The parameter addresses are listed in section 5.3.
For the first speed, the following must, therefore, be specified:

Parameter field address: 10H
Parameter address (offset): 0002H
Coding of the speed 20 mm/h: 0EH

5.2 Correlation between equipment function group and parameter field addresses

Equipment function group	Parameter field address
System parameterization	10_H
Channel parameterization BL	11_H
Channel parameterization RT	12_H
Channel parameterization GN	13_H
Channel parameterization VI	14_H
Text lines	17_H
Print intervals	18_H
Print sync times	19_H
Assignment DI	$1B_H$
Date and time	$1C_H$
Calibration data	$1D_H$
Measured values and status	$1E_H$
Send print line	$F1_H$

When transmitting, the addresses listed above are entered into the corresponding fields. The recorder determines the data range to be transmitted from the address. The data is transmitted with messages of the SD2 and SD3 types. To read a data field, it is always required to use FC 15H. FC 16H is used to write a data field. If invalid parameter values in a message are received while writing, the recorder sends a negative acknowledge (SD1, FC = 11H) as answer.

5.3 Parameter addresses

5.3.1 System parameter 10H

Parameter address (offset)	Data type	Function and coding	
0000H	Word	Password	0000 ... 270EH
0002H	Byte	Speed 1	00H = off 01H = 2.5 mm/h 02H = 5 mm/h 03H = 10 mm/h 04H = 20 mm/h 05H = 30 mm/h 06H = 60 mm/h 07H = 120 mm/h 08H = 240 mm/h 09H = 300 mm/h 0AH = 600 mm/h 0BH = 1200 mm/h
0003H	Byte	Speed 2	Same as speed 1
0004H	Byte	Slow speed	00H = off 01H = on
0005H	Byte	Date/time format	00H = European format 01H = U.S. format

System parameter 10H cont'd

Parameter address (offset)	Data type	Function and coding	
0006H	Byte	Simulation type	00H = off 01H = Ramp 02H = Sinusoidal 03H = Step (10 %)
0007H	Word	Simulation period	0014 ... 07D0H
0009H	Word	Software revision marking	
000BH	Byte	Scaling	00H = no 01H = yes
000CH	Word	Scaling distance	003C ... 01F4H (60 ... 500 mm)
000EH	Byte	Text printout with speed change	00H = no 01H = yes
000FH	Byte	Equipment address	0 ... 126 = 00 ... 7EH
0010H	Byte	Baud rate	00H = 600 01H = 1200 02H = 2400 03H = 4800 04H = 9600 05H = 19200
0011H	Byte	End of paper signal	00H = off 01H = DO 1 02H = DO 2 03H = DO 3 04H = DO 4

5.3.2 Channel parameters 11 ... 14H

Parameter address (offset)	Data type	Function and coding	
0000H	Byte	Type of input	00H = off 01H = 0...20 mA 02H = 4...20 mA 03H = ± 20 mA
		Standard card	04H = ± 10 V
		Universal card	04H = ± 75 mV 05H = ± 20 V 06H = Pt 100 (-50...+150) 07H = Pt 100 (-50...+500) 08H = TC B 09H = TC E 0AH = TC J 0BH = TC K 0CH = TC N 0DH = TC L 0EH = TC R 0FH = TC S 10H = TC T 11H = TC U
0001H	Byte	Temperature unit	00H = °C 01H = °F
0002H	Float	Lower range limit	
0006H	Float	Upper range limit	
000AH	Float	Scaling range, lower limit	
000EH	Float	Scaling range, upper limit	
0012H	Byte	Filter time	0 ... 60 s (00 ... 3CH)
0013H	Byte	Direction	00H = 0 –> 100 01H = 100 <– 0
0014H	Byte	Root extraction	00H = off 01H = on
0015H	Byte	Cold junction TC	00H = 0 °C 01H = 20 °C 02H = 50 °C 03H = 60 °C 04H = Internal
0016H	Float	Limit # 1	
001AH	Float	Limit # 2	

Channel param. 11 ... 14H cont'd

Parameter address (offset)	Data type	Function and coding
001EH	Byte	Function limit 1 00H = low 01H = high
001FH	Byte	Function limit # 2 00H = low 01H = high
0020H	Char[ ]	Free physical unit (5 charact.) 00H = 1st character 01H = 2nd character : : 04H = 5th character 05H = 0
0026H	Char[ ]	Channel text line (max. 32 characters) 00H = 1st character 01H = 2nd character : : 1FH = 32th character 20H = 0
0047H	Byte	Pt 100, type of connection 00H = 2-wire connection 01H = 3-wire connection
0048H	Byte	Relay contact limit 1 00H = off 01H = DO1 02H = DO2 03H = DO3 04H = DO4
0049H	Byte	Relay contact limit 2 (same as GW 1)
004AH	Byte	Correlation between text line and limit # 1 00H = off 01H = Text line 1 02H = Text line 2 : : 08H = Text line 8
004BH	Byte	Correlation between text line and limit # 2 same as limit # 1
004CH	Byte	Sensor failure monitor Pointer to 00H = Beginning of scale 01H = End of scale
004DH	Byte	Lead resistance with Pt 100 2-wire connection 00H = no correction 01H = 10 Ω 02H = 20 Ω 03H = 40 Ω
004EH	Byte	Unit of scaling 00H = Input at offset 0020H 01H = mA 02H = A 03H = mV 04H = V 05H = bar 06H = mbar 07H = Pa 08H = kPa 09H = °C 0AH = °F 0BH = K 0CH = m3/h 0DH = l/sec 0EH = % 0FH = ‰ 10H = MW 11H = 1/min

5.3.3 Text lines 17H

Parameter address (offset)	Data type	Function and coding
00 ... 0FH	Char [ ]	Text line #1 (1st character at offset 00)
10 ... 1FH	Char [ ]	Text line #2 (1st character at offset 10)
20 ... 2FH	Char [ ]	Text line #3
30 ... 3FH	Char [ ]	Text line #4
40 ... 4FH	Char [ ]	Text line #5
50 ... 5FH	Char [ ]	Text line #6
60 ... 6FH	Char [ ]	Text line #7
70 ... 7FH	Char [ ]	Text line #8

Character positions not used must be occupied by the 20H character. Each character must be within the range from 12 to 129. If the recorder finds invalid characters, they are replaced by 20H and a negative acknowledge is sent as reply.

5.3.4 Print intervals 18H

Parameter address (offset)	Data type	Function and coding
0000H	Byte	Print intervals for text #1 00H = off 01H = 15 min 02h = 30 min 03H = 1 h 04H = 2 h 05H = 3 h 06H = 6 h 07H = 12 h 08H = 24 h
0001H	Byte	Print intervals for text #2 same as text 1
0002H	Byte	Print intervals for text #3 same as text 1
0003H	Byte	Print intervals for text #4 same as text 1
0004H	Byte	Print intervals for text #5 same as text 1
0005H	Byte	Print intervals for text #6 same as text 1
0006H	Byte	Print intervals for text #7 same as text 1
0007H	Byte	Print intervals for text #8 same as text 1
0008H	Byte	Print intervals for meassured values same as text 1
0009H	Byte	Print intervals for date and time same as text 1

5.3.5 Synchronous times for text print 19H

Parameter address (offset)	Data type	Function and coding
0000H	Word	Sync time for text 1 High-Byte = hour (0 ... 23) = 00 ... 17H Low-Byte = minute (0 ... 59) = 00 ... 3BH
0002H	Word	Sync time for text 2
0004H	Word	Sync time for text 3
0006H	Word	Sync time for text 4
0008H	Word	Sync time for text 5
000AH	Word	Sync time for text 6
000CH	Word	Sync time for text 7
000EH	Word	Sync time for text 8
0010H	Word	Sync time for measured values
0009H	Byte	Print intervals for date and time same as text 1

Also for the U.S. date format the recorder handles the sync times in the 24-hour format.

5.3.6 Assignment of binary inputs 1BH

Parameter address (offset)	Data type	Function and coding	
0000H	Byte	Event marker #1	00H = off 01H = DI1 02H = DI2
0001H	Byte	Event marker #2	(Same as event marker #1)
0002H	Byte	Initiate printout text line #1	(Same as event marker #1)
0003H	Byte	Initiate printout text line #2	
0004H	Byte	Initiate printout text line #3	
0005H	Byte	Initiate printout text line #4	
0006H	Byte	Initiate printout text line #5	
0007H	Byte	Initiate printout text line #6	
0008H	Byte	Initiate printout text line #7	
0009H	Byte	Initiate printout text line #8	
000AH	Byte	Initiate printout measured values	
000BH	Byte	Initiate printout date and time	
000CH	Byte	Enable parameterizing	

5.3.7 Date and time 1CH

Parameter address (offset)	Data type	Function and coding	
0000H	Byte	Day	1 ... 31 = 01 ... 1FH
0001H	Byte	Month	1 ... 12 = 01 ... 0CH
0002H	Byte	Year	00 ... 99 = 00 ... 63H
0003H	Byte	Hour	00 ... 23 = 00 ... 17H
0004H	Byte	Minute	00 ... 59 = 00 ... 3BH

5.3.8 Calibration data 1DH
[Data can only be read]

Parameter address (offset)	Data type	Function and coding
0000H ... 0007H	Word	Channel blue, red, green, violet Zero line on chart 0000 ... FFFF
0008H ... 000FH	Word	Channel blue, red, green, violet 100 % line on chart 0000 ... FFFF
0010H ... 0017H	Word	Channel blue, red, green, violet Input calibration, lower limit
0018H ... 001FH	Word	Channel blue, red, green, violet Input calibration, upper limit

5.3.9 Channel data and equipment status 1EH
[Data can only be read]

Parameter address (offset)	Data type	Function and coding
0000H	Float	Measured value blue channel
0004H	Float	Measured value red channel
0008H	Float	Measured value green channel
000CH	Float	Measured value violet channel
0010H	Byte	Status DI 7 6 5 4 3 2 1 0 DI1 = on DI2 = on
0011H	Byte	Status DO 7 6 5 4 3 2 1 0 DO1 = on DO2 = on DO3 = on DO4 = on
0012H	Byte	Status external speed change 0 = Input open, speed 1 is active 1 = Input closed, speed 2 is active

Channel data and equipment status 1EH cont'd

Parameter address (offset)	Data type	Function and coding
0013	Byte	Slow speed 0 = Input open, speed 1 or 2 active 1 = Input closed, slow speed On
0014H	D -Word	Equipment alarm status Bit (Low-Word) 0 Error CPU 1 Error RAM 2 Error external RAM on CPU circuit board 3 Error communication between CPU and clock 4 Timing error measured value acquisition 5 Reading error of EEPROM on CPU card 6 Reading error of EEPROM on channel card 7 Checksum error calibration data channel card 8 Checksum error parameter data CPU card 9 Writing error EEPROM channel card A Writing error EEPROM CPU card B Watchdog causes equipment reset C Printer queue full D Printhead frozen E Voltage interruption to clock component F Speed too high for text print Bit (High-Word) 0 Channel card no handling input type 1 Oscillator watchdog causes equipment reset 2 3
0018H	D -Word	Length of remaining chart supply
001CH	Word	Limit status F E D C B A 9 8 7 6 5 4 3 2 1 0 Blue Limit 1 Blue Limit 2 Red Limit 1 Red Limit 2 Green Limit 1 Green Limit 2 Violet Limit 1 Violet Limit 2
001DH	Byte	Recording systems 7 6 5 4 3 2 1 0 System green System red System blue System violet
001EH	Byte	Type of channel cards 0 = Standard 1 = Universal 255 = Unknown type
001FH	Byte	Installation DI and DO 0 = No 1 = Installed
0020H	Byte	Print head 0 = Not installed 1 = Installed
0021H	Word	Length of remaining chart supply

6 Formation of text blocks

If variable parameters are to be printed at the beginning and end of a charge process (provided a printer channel is installed in the recorder), a complete text line can be sent to the recorder by means of the parameter field address F1H.

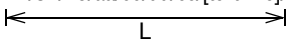
6.1 Send print lines to recorder

(With parameter field address F1H)

With this message, a text line of 16 characters is sent to the recorder. The recorder enters the message into the printer queue. If the queue is empty, printing of the text is immediately started, if not, the text lines stored in the queue are printed first. The recorder acknowledges the message with the acknowledge code 10H after having received the message correctly and entered into the queue. If there is no free space available in the queue, the acknowledge code 11H is sent as reply.

The message format is:

SD2/LE/LEr/SD2/DA/SA/FC/aa/oo/dd/cc/[text line]/FCS/ED



Where:

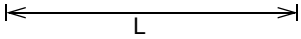
SD2 = 68H	Start byte
LE = 17H	Number of data bytes + 7
LEr = 17H	LE repeat
SD2 = 68H	Start byte repeat
DA	Destination address (address of device on the bus)
SA	Source address
FC = 16H	Function code
aa = F1H	Basic address of the parameter field
oo = 00H	Filler byte
dd	Date control 00H = Print text without date, without time 01H = Print text with time 02H = Print text with date 03H = Print text with date and time
cc = 10H	Number of data bytes
Text line	16 ASCII characters, characters not used must be set to 20H (space
FCS	Checksum
ED = 16H	End marking
L	Number of bytes in FCS

6.2 Request printer status

Using the following telegram, the number of lines in the printer queue can be requested.

The request to the recorder is as follows:

SD3/DA/SA/FC/aa/oo/oo/cc/xx/xx/xx/xx/FCS/ED

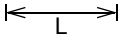


Where:

SD3 = A2H	Start byte
DA	Destination address (address of device on the bus)
SA	Source address
FC = 15H	Function code
aa	Basic address of the parameter field (F1H)
oo oo	2 bytes parameter address (offset) (0000H)
cc	Number of requested data bytes (19H)
xx xx xx xx	Any 4 bytes
FCS	Checksum (sum of the Hex values of the L frames
ED = 16H	End marking
L	Number of bytes in FCS

The recorder answers as follows:

SD2/LE/LEr/SD2/DA/SA/FC/aa/FCS/ED



Where:

SD2 = 68H	Start byte
LE = 17H	Number of data bytes + 7
LEr = 17H	LE repeat
SD2 = 68H	Start byte repeat
DA	Destination address (address of device on the bus)
SA	Source address
FC = 16H	Function code
aa	Number of messages in queue
FCS	Checksum
ED = 16H	End marking
L	Number of bytes in FCS

7 Table of character font

Character	Code		Character	Code	
	Decimal	Hex		Decimal	Hex
µ	12	C	G	71	47
π	13	D	H	72	48
σ	14	E	I	73	49
Σ	15	F	J	74	4A
τ	16	10	K	75	4B
Φ	17	11	L	76	4C
Ω	18	12	M	77	4D
Å	19	13	N	78	4E
å	20	14	O	79	4F
Ä	21	15	P	80	50
ä	22	16	Q	81	51
Ö	23	17	R	82	52
ö	24	18	S	83	53
Ü	25	19	T	84	54
ü	26	1A	U	85	55
←	27	1B	V	86	56
√	28	1C	W	87	57
²	29	1D	X	88	58
£	30	1E	Y	89	59
¥	31	1F	Z	90	5A
	32	20	[	91	5B
!	33	21	\	92	5C
"	34	22	]	93	5D
#	35	23	^	94	5E
$	36	24	_	95	5F
%	37	25	`	96	60
&	38	26	a	97	61
'	39	27	b	98	62
(	40	28	c	99	63
)	41	29	d	100	64
*	42	2A	e	101	65
+	43	2B	f	102	66
,	44	2C	g	103	67
-	45	2D	h	104	68
.	46	2E	i	105	69
/	47	2F	j	106	6A
0	48	30	k	107	6B
1	49	31	l	108	6C
2	50	32	m	109	6D
3	51	33	n	110	6E
4	52	34	o	111	6F
5	53	35	p	112	70
6	54	36	q	113	71
7	55	37	r	114	72
8	56	38	s	115	73
9	57	39	t	116	74
:	58	3A	u	117	75
;	59	3B	v	118	76
<	60	3C	w	119	77
=	61	3D	x	120	78
>	62	3E	y	121	79
?	63	3F	z	122	7A
@	64	40	{	123	7B
A	65	41	|	124	7C
B	66	42	}	125	7D
C	67	43	~	126	7E
D	68	44	³	127	7F
E	69	45	‰	128	80
F	70	46	°	129	81

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