PointMaster 200

6-channel Multipoint Recorder
Version with LC display
Version with LED display
Version with scales

Operating manual - Interface Description 42/41-25 EN Rev. 0.0

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1 Description

Provided for communication with the multi-point recorder is an RS 485 interface. The type of data protocol used is designed to suit DIN 19 245 Part 1 (Profibus protocol). Only a part of the directives were taken into account. Among others, the directives on the operation of a multimaster (Token-Passing-Procedures) were not taken into account, since the recorder is always a passive subscriber.

2 Technical data for bus connection RS 485

Bus structure
- Line without branchings
- Stub to subscriber < 0.3 m

Medium
- shielded, twisted 2-wire line
- surge resistance 100...130 Ω, for f > 100 kHz
- Cable capacity < 60 pF/m
- Cross section ≥ 0.22 mm^2

Line length
- ≤ 1200 m

Number of bus subscribers
- 32 (active and passive)

Transmission speed
- 600 / 1200 / 2400 / 4800 / 9600 / 19200 baud

Type of transmission
- symmetrical

Driver output
- idle state ±5 V, with load ±1.5 V
- load resistance 60 Ω

Receiver
- sensitivity 200 mV
- input resistance 12 kΩ

Grounding
- The shield should be grounded on both ends to arrest high frequency fault states

Potential balancing
- Potential variations between the data reference potentials (GND) of all bus subscribers may not exceed ±7 V

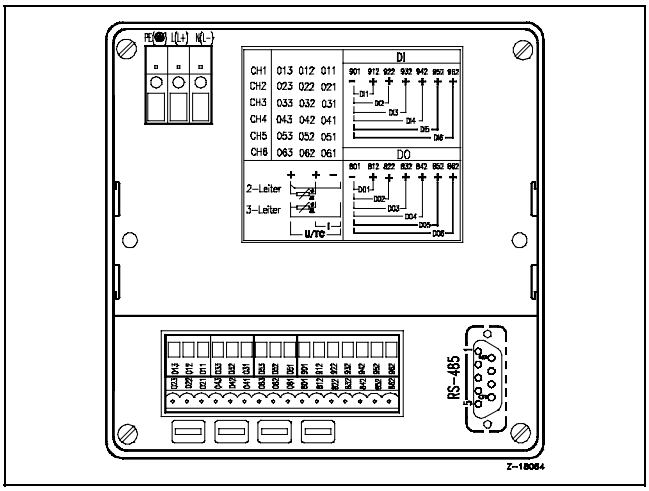

Fig. 1 Rear wall with RS 485 interface
Z-18064

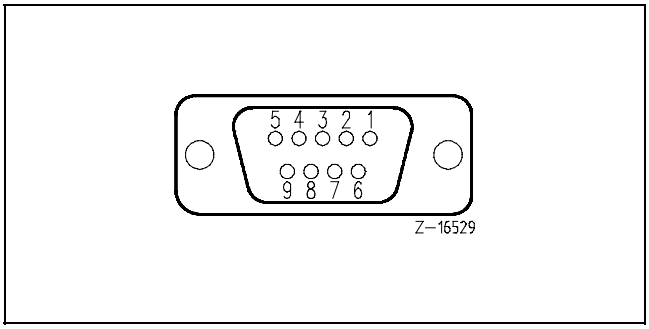

Fig. 2 Terminal layout of RS 485 interface
Z-16529 (9-pin connector SUB D)
- Pin 1 shielding
- Pin 3 RxD (+)
- Pin 4 I/O converter (+)
- Pin 5 GND (reference potential)
- Pin 6 +5 V
- Pin 8 RxD (−)
- Pin 9 I/O converter (−)

The voltage of +5 V on pin 6 is only required when the recorder is used as a bus end-unit.

The shielding is applied through a blade-type terminal on the recorder case.

The quiescent bus potential is fixed with the resistors R_d, R_t und R_u.

R_d = 390 Ω
R_t = 150 Ω
R_u = 390 Ω

Wiring should take place in accordance with Fig. 3. The resistors R_d, R_t and R_u should be installed in the 9-pin bus connector in such way that the recorder can be separated from the bus with the bus remaining closed.

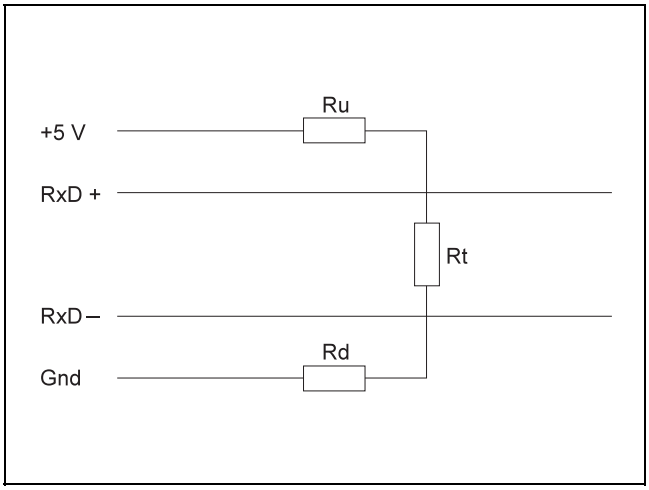

Fig. 3 Bus end wiring
Z-17340

Data formats

The data to be transmitted can be formatted in four different ways:

- Type BYTE Value range 0...255
- Type CHAR Value range −128...+127
- Type WORD Value range 0...65535
- Type FLOAT Value range ±1.175494E−38..±3.402823E+38

BYTE

The BYTE format is used for the selection of parameters from the tables in the “Parameter” section.

CHAR

The CHAR format is used when ASCII characters are transmitted. Hex-codes must be used.

WORD

The WORD format consists of 2 bytes and is used when integers are to be transmitted without preceding signs (integer values). During transmission, high bytes precede low bytes.

For example: The value 820 should be transmitted.

820 dec = 03 34 hex

FLOAT

The FLOAT format consists of 4 bytes and is used when floating decimal values are to be transmitted. The IEEE 754 format should be used. The numerical range accepted by the recorder lies within −9.990E9 and +9.990E9.

For example: transmit the value −12.5.

−12.5 dec = C1 48 00 00 hex

Determination of the hex figure

The general form of the floating decimal point is: (sign) $\times$ $2^{Exp-127}$ $\times$ (Rest).

The binary display of the figure −12.5 is

```
11000001 01001000 00000000 00000000
||       |                        |
||  Exp  |          Rest          |
||(8 bit)|        (23 bit)        |
|
negative sign
```

1. Calculate the sign:
   the bit is set in case of a negative sign.

2. Calculate the exponent:
   the highest exponent is calculated:

   EXP = INT [lg"$Figure_{dec}$"/lg2] + 127

   in the example:
   INT [lg12.5/lg2] + 127 = 130 dec = 82 hex = 10000010 binary

3. Calculate the rest:

   Rest = "$Figure_{dec}$"/2^{Exp}

   in the example:
   $12.5/2^{130 - 127}$ = 1.562

4. Transform into binary code:

   Rank : $2^0 + 2^{-1} + 2^{-2} + 2^{-3} + 2^{-4} + ... + 2^{-23}$
   In the example: 1 1 0 0 1

   The value of 2^0 is always 1 and is therefore not carried forward.

Data transmission

General

A combination of telegram characters is grouped together for the transmission of data. The telegrams accept the “Handshake function”, i.e. each telegram from the computer to the recorder must be first confirmed before being sent.

Notice
Prior to data transfer the interface address and the baud rate must be defined.

Telegram characters

(UART characters or Frame)

Every sign (frame) has 11 bits, a startbit (ST) with “logical 0” signal, 8 information bits with “logical 0” or “1” signal, an optional parity bit (P) with “logical 0” or “1” signal and a stopbit (SP) with logical “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

Permissible address

The recorder only answers queries which use the address set in the unit as target address. Permissible are values between 0 and 126 (= 7E H). These can be allocated in any manner desired. However, no double addresses may be allocated. The recorder does not reply to faulty messages (check sum, wrong address, other faulty reception). Also, faulty messages are not acknowledged.

Some data ranges are identified as “read only” fields. Attempts to write into such fields will be ignored by recorder.

Broadcast address

Messages to the broadcast address (133 dec) are processed by all recorders, no response is however given to a broadcast message.

Telegram formats, framework specifications

The recorder accepts the following types of telegram:

Telegram SD1

Telegram with fixed information field length without data field

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

is used for sending a query to the recorder and for sending acknowledgement by recorder.

Where:

SD1	= 10H Start byte (start delimiter), code: 10H
DA	Target address (Destination Address)
SA	Source address (Source Address)
FC	Function code (Frame Control)
FCS	Test byte (Frame Check Sequence) Sum of the hex value of the L frame without transformation for FFH
ED	End byte (End Delimiter), code: 16H
L	number of bytes in FCS = 3

In reply to a query with FC = 01H (ident-interrogation) the recorder will also respond in the SD1 format. If the unit has no self-test function, the response is in FC = 10H, otherwise it is FC = 11H.

The ident recognition of the recorder is conducted with the function code 4EH as follows:

In reply to a query with FC = 4EH the recorder replies with a message in SD2 format.

The “Data field” of the recognition message is assigned 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	= “xxx” Manufacturer’s code
CT	= “41422; xxx” Catalog number and apparatus
HR	= “CPU:A”” Index of the recorder CPU card
SR	= “00.00.16” Example for software release

Telegram SD2

Telegram with variable information field length

SD2/LE/LEr/SD2/DA/SA/FC/aa/oo/oo/cc/data field/FCS/ED
|<-- L -->|

is used for sending data to the recorder and for sending replies from the recorder.

Where:

SD2	= 68H Start byte
LE	Number of data bytes + 7
LEr	Repetition of LE
SD2	= 68H Repetition of start byte
DA	Target address (bus subscriber address)
SA	Source address
FC	Function code: 16H = send data to the recorder 15H = read data from recorder
aa	Basic address of the parameter field
oo oo	2 byte parameter address (= offset)
cc	Number of Datenbytes
data field	Data for transmission
FCS	Test byte (Frame Check Sequence) Sum of the hex value of the L frame without transformation for FFH
ED	= 16H End code
L	Number of Bytes in FCS

Upon receiving a data message in SD2 format, the recorder responds with a message in SD1 format.

The altered data is written into the non-volatile memory after receipt of the save command.

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

Telegram SD3

Telegram with fixed information length

SD3/DA/SA/FC/aa/oo/oo/cc/xx/xx/xx/xx/FCS/ED
|<-- L -->|

is used for sending a query to the recorder.

Where:

SD3	= A2H Start byte
DA	Target address (bus subscriber address)
SA	Source address
FC	= 15H Function code
aa	Basic address of the parameter field
oo oo	2 byte parameter address (offset)
cc	Number of data bytes
xx xx	
xx xx	4 random bytes
FCS	Test byte (Frame Check Sequence) Sum of the hex value of the L frame without transformation for FFH
ED	= 16H End byte (End Delimiter), code: 16H
L	Number of Bytes in FCS

Transmission rules

The idle state of the line corresponds to the logical “1” signal. Before data transmission starts − from the PC − a minimum time of 33 bits (syn-time) as idle state is required for synchronisation.

Pauses of the length ≥ 3 frames shall be interpreted as telegram end.

The recorder inserts a pause of ≤ 300 ms each between the reception of the last stop bit and the first start bit.

Pause between two telegrams:

Telegram	Break ≤ 300 ms	Answer telegram

Gaps between two frames:

Frame	≤ 0,2 ms	Frame

The receiver checks

- per frame Start ,stop and parity bit and
- per telegram Start, DA, SA, FCS and end byte.

If the check produces a negative result, the entire telegram should be rejected as incorrect.

In the reply, the recorder takes over the source address of the transmitted telegram as target address and inserts its own address as source address.

Parameters

Addressable parameters

The following parameters can be read or modified with telegrams SD2 and SD3 (see corresponding sections on pages 7 and 8). To be able to do this, a parameter field address (see table on the right), the parameter address (offset, page 10) and the code of the parameter value are required.

For example

The following information is required for the first chart speed:

Parameter field address	10H
Parameter address (offset)	0000H
Code for the chart speed 20 mm/h	04H

Parameter field address

Instrument function group	Parameter field address
System parameterisation	10H
Parameterisation, channel 1	11H
Parameterisation, channal 2	12H
Parameterisation, channel 3	13H
Parameterisation, channel 4	14H
Parameterisation, channel 5	15H
Parameterisation, channel 6	16H
Text lines	17H
Print intervals	18H
Print synchronisation times	19H
Print colours	1AH
DI assignment	1BH
Date and time	1CH
Calibration data	1DH
Measured values and equipment status	1EH
Sending measured values to the recorder	1FH
Reading accounting data (block transfer)	20H
Writing the equipment status	21H
Sending the print line	F1H
Sending the display line to the recorder	F2H
Communication error register	FFH

The above-named addresses are input into the appropriate fields of a message during communication. From the address, the recorder determines the data range to be transmitted. The data transmission takes place with messages in the SD2 and SD3 formats. To read a data field, FC = 15H must always be used, FC = 16H must be used to write a data field. If invalid parameter values are contained in a message, the negative acknowledgement (SD1, FC = 11H) is transmitted by the recorder in reply.

Parameter addresses

System parameters 10H

Parameter address (Offset)	Data type	Function	Value range and coding
0000H	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 = 40 mm/h 07H = 60 mm/h 08H = 120 mm/h 09H = 240 mm/h 0AH = 300 mm/h 0BH = 600 mm/h 0CH = 1200 mm/h
0001H	Byte	Speed 2	as speed 1
0003H	Byte	Mode	00H = Mode A 01H = Mode B 02H = Mode C 03H = Mode D 04H = Mode E
0004H	Word	Cycle time of measured value printout	0003H = 3 s ... 0168H = 360 s
0006H	Byte	Delay for exctrenal control	00H...1EH = 0...30 s
0008H	Byte	Number of event markers	00H = without 01H = 1 .. 0AH = 10
0009H	Byte	Date / time format	00H = European 01H = American
000AH	Byte	Type of simulation	00H = off 01H = Ramp 02H = Sinus 03H = Step (10%)
000BH	Word	Simulation period	0014..07D0H = 20...2000 s
000DH	Time	Time for external clock synchronisation	Hour (high byte) 00...23 = 00...17H Minute (low byte) 00...59 = 00...3BH
000FH	Byte	Baud rate	00H = 600 01H = 1200 02H = 2400 03H = 4800 04H = 9600 05H = 19200
0010H	Byte	Device address	0...126 = 00..7EH
0011H	Byte	Language selection	00H = Scale device 01H = German 02H = English 03H = French
0012H	Byte	Alarm acknowledgment	00H = off 01H = manual 02H = automatic

Parameter address (Offset)	Data type	Function	Value range and coding
0013H	Byte	Collective alarm output	00H = off 01H = DO 1 ... 14H = DO 20
0014H	Byte	Alarm output at end of paper	00H = off 01H = DO 1 ... 14H = DO 20
0015H	Byte	Background lighting LCD	00H = off 01H = on
0016H	Byte	Channel and scale display	00H = off 01H = channel display 02H = channel and scale display
0018H	Word	Spacing between the scale lines	0028...01F4H = 40...500 mm
001AH	Byte	Print speed selection	00H = no 01H = yes
001BH	Byte	Print channel number on curve	00H = no 01H = yes
001CH	Byte	Threshold text line with threshold	00H = no 01H = yes
001EH	Byte	IO converter installed	00H = no 01H = yes
001FH	Byte	Relay status	00H = quiescent current 01H = operating current
0022H	Word	Password	0000...270EH = 0...9998
0024H	Word	Increment for counter	0000H...03E8 = 0...1000
0026H	Byte	Counting direction	00H = adding 01H = subtracting
0027H	Byte	Assigned text line	00H = Counter off 01H = Text line 1 ... 0AH = Text line 10
0028H	Word	Set counter, upper 4 digits	0000H...270FH = 0...9999
002AH	Word	Set counter, lower 4 digits	0000H...270FH = 0...9999
002CH	Word	Formation of message block 1 The coding of lines combined into a message block is generated by totaling the individual codes. Message block 1 is coupled to DI 1.	00H = off 01H = Value channel 1 02H = Value channel 2 04H = Value channel 3 08H = Value channel 4 10H = Value channel 5 20H = Value channel 6 40H = Text 1 80H = Text 2 100H = Text 3 200H = Text 4 400H = Text 5 800H = Text 6 1000H = Text 7 2000H = Text 8 4000H = Text 9 8000H = Text 10
002EH	Word	Formation of message block 2 Message block 2 is coupled to DI 2.	as message block 1

Parameter address (Offset)	Data type	Function	Value range and coding
0030H	Word	Formation of message block 3 Message block 3 is coupled to DI 3.	as message block 1
0032H	Word	Formation of message block 4 Message block 4 is coupled to DI 4.	as message block 1
0034H	Byte	Standby mode	00H = not active 01H = on via DI, off via threshold 02H = on via DI, off via key *FT* 03H = on via Power on, off via threshold 04H = on via Power on, off via key *FT*
0035H	Byte	Standby delay time	00H...C8H = 0...200 min
0036H	Word	Standby threshold coding	0000H = inactive 0001H = channel 1, threshold 1 0002H = channel 1, threshold 2 0004H = channel 2, threshold 1 0008H = channel 2, threshold 2 0010H = channel 3, threshold 1 0020H = channel 3, threshold 2 0040H = channel 4, threshold 1 0080H = channel 4, threshold 2 0100H = channel 5, threshold 1 0200H = channel 5, threshold 2 0400H = channel 6, threshold 1 0800H = channel 6, threshold 2
003AH	Byte	Brightness of the 16-digit LED display	00H = off 01H = 1st stage 02H = 2nd stage 03H = 3rd stage 04H = 4th stage
003BH	Byte	Enabling the virtual channels 7...12	00H = off 01H = on
003CH	Byte	Enabling the bar chart display for 16-digit LCD	00H = off 01H = on

Measuring channel parameters 11H...16H

Parameter address (Offset)	Data type	Function	Value range and coding
0000H	Byte	Input type	0H = off 01H = 0...20 mA 02H = 4...20 mA 03H = ±2.5 mA 04H = ±5 mA 05H = ±20 mA 06H = 0...25 mV 07H = ±25 mV 08H = 0...100 mV 09H = ±100 mV 0AH = 0...500 mV 0BH = 0...2.5 V 0CH = ±2.5 V 0DH = 0...5 V 0EH = ±5 V 0FH = ±10 V 10H = ±20 V 11H = Pt100 I (−50..+150°C) 12H = Pt100 II (−50..+500°C) 13H = Pt100 III (−200..+850°C) 14H = TC B 15H = TC E 16H = TC J 17H = TC K 18H = TC L 19H = TC N 1AH = TC R 1BH = TC S 1CH = TC T 1DH = TC U 1EH = RS 485
0001H	Byte	Temperature unit	00H = °C 01H = °F
0002H	Byte	Physical unit of measurement	00H = free unit 01H = mA 02H = A 03H = mV 04H = V 05H = mbar 06H = bar 07H = Pa 08H = kPa 09H = °C 0AH = °F 0BH = K 0CH = l/s 0DH = l/min 0EH = % 0FH = ‰ 10H = kW 11H = MW 12H = 1/min 13H = m^3/h
0003H	Byte	Display format	00H = linear 01H = linear with 2 increments 02H = linear with 3 increments 03H = logarithmic
0004H	Byte	Enable channel display	00H = off 01H = on
0005H	Float	Measuring range start	-999...+9999
0009H	Float	Measuring range end	-999...+9999

Parameter address (Offset)	Data type	Function	Value range and coding
000DH	Float	Display range start	-999...+9999; 1,00E-9...9,99E+9 for logarithmic display range
0011H	Float	Display range end	-999...+9999; 1,00E-9...9,99E+9 for logarithmic display range
0015H	Float	1st tie point for non-linear display range measured range value	-999...+9999
0019H	Float	1st tie point for non-linear display range Display range value	-999...+9999
001DH	Float	2nd tie point for non-linear display range Measured range value	-999...+9999
0021H	Float	2nd tie point for non-linear display range Display range value	-999...+9999
0025H	Float	Results range lower range value	-999...+9999
0029H	Float	Results range upper range value	-999...+9999
002DH	Byte	Recording range start	0...90
002EH	Byte	Recording range end	10...100
002FH	Integer	Offset measured value correct.	-1000...+1000
0033H	Byte	Filter time	00...3CH = 0...60 s
0034H	Byte	Recording direction	00H = no 01H = yes
0035H	Byte	Square root extraction	00H = off 01H = on
0036	Byte	Reference junction temperature	00H = 0 °C 01H = 20 °C 02H = 50 °C 03H = 60 °C 04H = 70 °C 05H = internal 06H = Channel 6
0037H	Byte	Number of decimal places for measured value representation in the display	00H = Floating point 01H = 0 02H = 1 03H = 2 04H = 3
0038H	Byte	Pt100 connection	00H = 2-wire 01H = 3-wire
0039H	Float	Line resistance	0....40 Ω
003DH	Byte	Procedure in the event of a sensor break	00H = measuring signal = 0% 01H = measuring signal = 100%
003EH	Byte	Enable break monitoring	00H = off 01H = on
003FH	Byte	Fixed line resistance for Pt 100 2-wire circuit	00H = specify resistance 01H = measure resistance
0041H	Byte	Assignment of scale LED	00H = none 01H = LED 1 top 02H = LED 2 03H = LED 3 04H = LED 4 05H = LED 5 06H = LED 6 bottom

Parameter address (Offset)	Data type	Function	Value range and coding
0042H	Byte	Mathematical functions	00H = off 01H = Addition 02H = Subtraction
0043H	Byte	Logic channel 1	00H = Channel 1 02H = Channel 2 03H = Channel 3 04H = Channel 4 05H = Channel 5 06H = Channel 6
0044H	Byte	Logic channel 2	00H = Channel 1 02H = Channel 2 03H = Channel 3 04H = Channel 4 05H = Channel 5 06H = Channel 6
0046H	Float	Threshold 1	-999...9999; 1,00E-9...9,99E+9 for logarithmic display range
004AH	Float	Threshold 2	-999...9999; 1,00E-9...9,99E+9 for logarithmic display range
004EH	Byte	Effective direction threshold 1	00H = min 01H = max
004FH	Byte	Effective direction threshold 2	00H = min 01H = max
0050H	Byte	Relay output for threshold 1	00H = off 01H = DO 1 ... 14H = DO 20
0051H	Byte	Relay output for threshold 2	00H = off 01H = DO 1 ... 14H = DO 20
0052H	Byte	Text line for threshold 1	00H = none 01H = Text line 1 ... 0AH = Text line 10
0053H	Byte	Text line for threshold 1	as for threshold 1
0056H	Byte	Accounting: Mode	00H = off 01H = Mean 02H = Sum 03H = Sum and threshold
0057H	Byte	Accounting: External control	00H = off 01H = DI 1 ... 0EH = DI 14
0058H	Byte	Accounting interval	00H = 15 min 01H = 30 min 02H = 1 h 03H = 2 h 04H = 6 h 05H = 8 h 06H = 12 h 07H = 1 d 08H = 7 d 09H = 1 month
0059H	Word	Synchronisation time = start time interval	Hour (high byte) 00...17H = 0...23 Minute (low byte) 00...3BH = 0...59

Parameter address (Offset)	Data type	Function	Value range and coding
005BH	Byte	Synchronisation day	00H = ignore 01H = 1st day ... 1FH = 31st day
005CH	Byte	Message line	00H = none 01H = Text line 1 ... 0AH = Text line 10
005DH	Float	Value input for threshold	1....7,500E6 3F 80 00 00...4A E4 E1 C0H (float format)
0061H	Byte	Relay output for accounting threshold	00H = off 01H = DO 1 ... 14H = DO 20
0062H	Byte	Print format for accounting table	01H = Channel line 02H = Interval time 04H = Min. value 08H = Max. value 10H = Mean value 20H = Sum
0063H	Byte	Print sum if threshold exceeded	00H = no 01H = yes
0064H	Byte	Register the sum instead of measured value	00H = no 01H = yes
0067H	CHAR	Free unit of measurement (max. 7 characters)	00H = 1st character 01H = 2nd character ... 06H = 7th character
006EH	CHAR	Scale text line (max. 32 characters)	00H = 1st character 01H = 2nd character ... 1FH = 32nd character
00A4H	Byte	Format of the scale line	00H = no printout 01H = 2 graduations 02H = 3 graduations 03H = 5 graduations 04H = free input
00A5H	Byte	Enable user linearisation	00H = off 01H = on
00A6H	Word	Tie point x1	0000...03E8H = 0...1000
00A8H	Word	Tie point y1	0000...03E8H = 0...1000
00AAH	Word	Tie point x2	0000...03E8H = 0...1000
00ACH	Word	Tie point y2	0000...03E8H = 0...1000
...	...	...	...
00DEH	Word	Tie point x15	0000...03E8H = 0...1000
00E0H	Word	Tie point y15	0000...03E8H = 0...1000
00E2H	Word	Tie point x16	0000...03E8H = 0...1000
00E4H	Word	Tie point y16	0000...03E8H = 0...1000

Text lines 17H

Parameter address (Offset)	Data type	Function	Value range and coding
0000H	CHAR	Text line 1 max. 32 characters	**Value range** 01H...07H 20H...7FH DEH...F8H **Coding** 00H = 1st character 01H = 2nd character ... 1FH = 32nd character
0020H	CHAR	Text line 2	as text line 1
0040H	CHAR	Text line 3	as text line 1
0060H	CHAR	Text line 4	as text line 1
0080H	CHAR	Text line 5	as text line 1
00A0H	CHAR	Text line 6	as text line 1
00C0H	CHAR	Text line 7	as text line 1
00E0H	CHAR	Text line 8	as text line 1
0100H	CHAR	Text line 9	as text line 1
0120H	CHAR	Text line 10	as text line 1

Character 20 H is to be assigned to character positions which have not been assigned. Each character must lie within the range 01...07, 20H...7FH and DEH...F8H. If the recorder detects any invalid characters, these are replaced with 20H and a negative acknowledgment is sent as a reply.

Print intervals 18H

Parameter address (Offset)	Data type	Function	Value range and coding
0000H	Byte	Print interval for text line 1	00H = off 01H = 10 min 02H = 20 min 03H = 1 h 04H = 2 h 05H = 3 h 06H = 4 h 07H = 6 h 08H = 8 h 09H = 12 h 0AH = 24 h
0001H	Byte	Print interval for text line 2	as text line 1
0002H	Byte	Print interval for text line 3	as text line 1
0003H	Byte	Print interval for text line 4	as text line 1
0004H	Byte	Print interval for text line 5	as text line 1
0005H	Byte	Print interval for text line 6	as text line 1
0006H	Byte	Print interval for text line 7	as text line 1
0007H	Byte	Print interval for text line 8	as text line 1
0008H	Byte	Print interval for text line 9	as text line 1
0009H	Byte	Print interval for text line 10	as text line 1
000AH	Byte	Print interval for measured value table	as text line 1
000BH	Byte	Print interval for date and time	as text line 1
000CH	Byte	Print interval for time	as text line 1

Synchronisation times for text output 19H

Parameter address (Offset)	Data type	Function	Value range and coding
0000H	Word	Synchronisation time for cyclical printing of text line 1	Hour (high byte) 00...23 = 00...17H Minute (low byte) 00...59 = 00...3BH
0002H	Word	... of text line 2	as text line 1
0004H	Word	... of text line 3	as text line 1
0006H	Word	... of text line 4	as text line 1
0008H	Word	... of text line 5	as text line 1
000AH	Word	... of text line 6	as text line 1
000CH	Word	... of text line 7	as text line 1
000EH	Word	... of text line 8	as text line 1
0010H	Word	... of text line 9	as text line 1
0012H	Word	... of text line 10	as text line 1
0014H	Word	... of measured value table	as text line 1
0016H	Word	... of date and time	as text line 1
0018H	Word	... of time	as text line 1

The recorder also processes synchronisation times in the 24-hour format for US data format.

Print colours 1AH

Parameter address (Offset)	Data type	Function	Value range and coding
0000H	Byte	Print colour for measuring channnel 1	00H = none 01H = violet 02H = red 03H = black 04H = green 05H = blue 06H = brown
0001H	Byte	Print colour for measuring channnel 2	as measuring channel 1
0002H	Byte	Print colour for measuring channnel 3	as measuring channel 1
0003H	Byte	Print colour for measuring channnel 4	as measuring channel 1
0004H	Byte	Print colour for measuring channnel 5	as measuring channel 1
0005H	Byte	Print colour for measuring channnel 6	as measuring channel 1
0006H	Byte	Print colour for text line 1	as measuring channel 1
0007H	Byte	Print colour for text line 2	as measuring channel 1
0008H	Byte	Print colour for text line 3	as measuring channel 1
0009H	Byte	Print colour for text line 4	as measuring channel 1
000AH	Byte	Print colour for text line 5	as measuring channel 1
000BH	Byte	Print colour for text line 6	as measuring channel 1
000CH	Byte	Print colour for text line 7	as measuring channel 1
000DH	Byte	Print colour for text line 8	as measuring channel 1
000EH	Byte	Print colour for text line 9	as measuring channel 1
000FH	Byte	Print colour for text line 10	as measuring channel 1

Parameter address (Offset)	Data type	Function	Value range and coding
0010H	Byte	Print colour for measured value table	as measuring channel 1
0011H	Byte	Print colour for date and time	00H = none 01H = violet 02H = red 03H = black 04H = green 05H = blue 06H = brown 07H = daily alternately
0012H	Byte	Print colour for time	as for date and time

Di assignment 1BH

Parameter address (Offset)	Data type	Function	Value range and coding
0000H	Byte	Activate event marker 1	00H = off 01H = DI 1 .. 0EH = DI 14
0001H	Byte	Activate event marker 2	as event marker 1
0002H	Byte	activate event marker 3	as event marker 1
0003H	Byte	Aactivate event marker 4	as event marker 1
0004H	Byte	Trigger printout of text line 1	as event marker 1
0005H	Byte	Trigger printout of text line 2	as event marker 1
0006H	Byte	Trigger printout of text line 3	as event marker 1
0007H	Byte	Trigger printout of text line 4	as event marker 1
0008H	Byte	Trigger printout of text line 5	as event marker 1
0009H	Byte	Trigger printout of text line 6	as event marker 1
000AH	Byte	Trigger printout of text line 7	as event marker 1
000BH	Byte	Trigger printout of text line 8	as event marker 1
000CH	Byte	Trigger printout of text line 9	as event marker 1
000DH	Byte	Trigger printout of text line 10	as event marker 1
000EH	Byte	Trigger printout of measured value table	as event marker 1
000FH	Byte	Trigger printout of date and time	as event marker 1
0010H	Byte	Enable parameterisation	as event marker 1
0011H	Byte	External selection speed 1 to 2	as event marker 1
0012H	Byte	Control input for synchronisation of clock	as event marker 1
0013H	Byte	Delete printer queue	as event marker 1
0014H	Byte	Activate standby	as event marker 1

Date and time 1CH

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

Calibration data 1DH
[Data can only be read]

Parameter address (Offset)	Data type	Function	Value range and coding
0000H	Word	Lower range value, channel 1	0000...FFFF
0002H	Word	Upper range value, channel 1	0000...FFFF
0004H	Word	Lower range value, channel 2	0000...FFFF
0006H	Word	Upper range value, channel 2	0000...FFFF
0008H	Word	Lower range value, channel 3	0000...FFFF
000AH	Word	Upper range value, channel 3	0000...FFFF
000CH	Word	Lower range value, channel 4	0000...FFFF
000EH	Word	Upper range value, channel 4	0000...FFFF
0010H	Word	Lower range value, channel 5	0000...FFFF
0012H	Word	Upper range value, channel 5	0000...FFFF
0014H	Word	Lower range value, channel 6	0000...FFFF
0016H	Word	Upper range value, channel 6	0000...FFFF
0018H	Word	O-point offset print head	0...100
001AH	Word	Total number of increments	980...1000
001CH	Word	O-point offset scale	0...100

Channel measured values and instrument status 1EH
[Data can only be read]

Parameter address (Offset)	Data type	Function	Value range and coding
0000H	Float	Measured value, channel 1	
0004H	Float	Measured value, channel 2	
0008H	Float	Measured value, channel 3	
000CH	Float	Measured value, channel 4	
0010H	Float	Measured value, channel 5	
0014H	Float	Measured value, channel 6	
0018H	Byte	Status of DI binary inputs on the recorder	Bit 0 DI 1 1 DI 2 2 DI 3 3 DI 4 4 DI 5 5 DI 6 6 DI xx 7 DI xx

0019H	Byte	Status of DI binary inputs via IO converter	Bit 0 DI 7 1 DI 8 2 DI 9 3 DI 10 4 DI 11 5 DI 12 6 DI 13 7 DI 14
001AH	Byte	Status of DO binary outputs on the recorder	Bit 0 DO 1 1 DO 2 2 DO 3 3 DO 4 4 DO 5 5 DO 6 6 DO xx 7 DO xx
001BH	Word	Status of DO binary outputs via IO converter	Bit 0 DO 7 1 DO 8 2 DO 9 3 DO 10 4 DO 11 5 DO 12 6 DO 13 7 D0 14 8 DO 15 9 DO 16 A DO 17 B DO 18 C DO 19 D D0 20
001DH	D-Word	Device alarm status	Bit 00 01 CPU error 02 Internal RAM error 03 External RAM error on CPU card 04 Communication error between CPU and clock 05 A/D converter error 06 Check sum error, parameter data CPU card 07 Reading error with EEPROM on CPU card 08 Writing error with EEPROM CPU card 09 Check sum error, calibration data channel card 0A Reading error with EEPROM on channel card 0B Writing error with EEPROM channel card 0C Watchdog generates device reset 0D Printer queue full 0E Print head stuck 0F Voltage interruption to clock module 10 Speed too high for text output 11 Oscillator watchdog generates device reset 12 Communication error with IO converter 13 Check sum error F-RAM 14 Reading error with F-RAM 15 Writing error with F-RAM 16 Error, reference junction correction
0021H	D-Word	Device alarm: acknowledgment status	as for device alarm status

0025H	D-Word	Thresholds: alarm status	Bit 0 Threshold 1, channel 1 1 Threshold 1, channel 2 2 Threshold 1, channel 3 3 Threshold 1, channel 4 4 Threshold 1, channel 5 5 Threshold 1, channel 6 6 xx 7 xx 8 Threshold 2, channel 1 9 Threshold 2, channel 2 A Threshold 2, channel 3 B Threshold 2, channel 4 C Threshold 2, channel 5 D Threshold 2, channel 6
0029H	D-Word	Thresholds: acknowledgment status	as for thresholds alarm status
002DH	Byte	Device type	00H = scale version 01H = LC display 02H = LED display
002EH	Byte	Thresholds	00H = none 01H = installed
002FH	Byte	Remaining paper length	0000...0C80H = 0....3200 cm
0031H	Byte	Standby status	00H = Recording operation 01H = Standby
0032H	Byte	Status measuring channel 1	Bit 0 = Overflow 1 = Underflow 2 = Reserved 3 = Reserved 4 = Line break, display 0 5 = Line break, display 100
0033H	Byte	Status measuring channel 1	as status for measuring channel 1
0034H	Byte	Status measuring channel 1	as status for measuring channel 1
0035H	Byte	Status measuring channel 1	as status for measuring channel 1
0036H	Byte	Status measuring channel 1	as status for measuring channel 1
0037H	Byte	Status measuring channel 1	as status for measuring channel 1
0038H	D-Word	Counter for hours of operation	Operating time in minutes (hex coded)

Entering measured values into recorder 1FH

Measured values are entered into the recorder using an SD2 type message. The parameter field address 1FH is to be used as the basic address.

The measured values are transmitted in the form of standardised values. The permitted range of numbers is 0...1000. The recorder does not accept values that lie outside this range. If invalid measured values are received, the message is answered with a negative acknowledgment. The data contained in the message are only processed by the recorder if the corresponding channel is parameterised to the “SER” type of measurement. The data received are ignored in the case of other types of measurement.

The message format is:

SD2/LE/LEr/SD2/DA/SA/FC/aa/oo/oo/cc/datafield/FCS/ED
|<-- L -->|

Where:

SD2 = 68H
Start byte
LE Number of data bytes + 7
LEr Repetition of LE
SD2 = 68H
Repetition of start byte
DA Destination address (bus subscriber address)
SA Source address
FC Function code (16H = write)
aa Basic address of parameter field 1FH
bb High byte of the offset = 0
cc Low byte of the offsets
dd Number of data bytes
ee Data bytes
FCS Test byte (Frame Check Sequence)
Sum of the hex value of the L frame without transformation for FFH
ED = 16H
End byte (End Delimiter), code: 16H
L Number of bytes in FCS

Parameter address (Offset)	Data type	Function	Value range and coding
0000H	Word	Measured values channel 1	0000H...3E8H = 0...1000
0002H	Word	Measured values channel 2	0000H...3E8H = 0...1000
0004H	Word	Measured values channel 3	0000H...3E8H = 0...1000
0006H	Word	Measured values channel 4	0000H...3E8H = 0...1000
0008H	Word	Measured values channel 5	0000H...3E8H = 0...1000
000AH	Word	Measured values channel 6	0000H...3E8H = 0...1000

Reading accounting data 20H

The accounting data are interrogated by means of an SD3 interrogation to basic address 20H. The data of a measuring channel are transmitted in blocks with a message. It is not possible to access individual parameters of the accounting function. The offset which is sent in the interrogation determines the number of the measuring channel whose data are to be read. The byte number is to be entered into the interrogation in accordance with the data field size.

SD3/DA/SA/FC/aa/bb/bb/cc/xx/xx/xx/xx/FCS/ED
|<-- L -->|

Where:

SD3 = A2H
Start byte
DA Destination address (bus subscriber address)
SA Source address
FC = 15H
Function code
aa = 20H
Basic address of the parameter field
bb bb 2 bytes parameter address (offset)
cc = 27H
Number of data bytes
xx xx
xx xx 4 random bytes
FCS Test byte (Frame Check Sequence)
Sum of the hex value of the L frame without transformation for FFH
ED = 16H
End byte (End Delimiter), code: 16H
L Number of bytes in FCS

Parameter address (Offset)	Data type	Function	Value range and coding
0000H	Block	Accounting data to measuring channel 1	
0001H	Block	Accounting data to measuring channel 2	
0002H	Block	Accounting data to measuring channel 3	
0003H	Block	Accounting data to measuring channel 4	
0004H	Block	Accounting data to measuring channel 5	
0005H	Block	Accounting data to measuring channel 6	

The recorder sends an SD2 type reply telegram. In this telegram, the parameters have the following meanings:

Parameter address (Offset)	Data type	Function	Value range and coding
0000H	Byte	Accounting interval	
0001H	Float	Minimum	
0005H	Float	Maximum	
0009H	Float	Mean value	
000DH	Float	Accounting sum	
0011H	Byte	Starting day of the interval	

0012H	Byte	Starting month of the interval
0013H	Byte	Starting year of the interval
0014H	Byte	Starting hour of the interval
0015H	Byte	Starting minute of the interval
0016H bis 001AH	Byte	Time and date, minimum
001BH bis 001FH	Byte	Time and date, maximum
0020H bis 0025H	Byte	Current time and current date
0026H	Byte	Mode of accounting

Writing device status 21H

This parameter field address is used for entering the length of the new roll of paper after changing the chart paper.

It is possible to excite the channel-specific line pairs (scale line and text line) such that they are printed out immediately.

Parameter address (Offset)	Data type	Function	Value range and coding
0000H	Word	Paper length (entry in cm)	0000H = do not change 0001H...0C80H = 1...3200
0006H	Byte	Save parameterisation immediately	00H = no 01H = yes
0007H	Byte	Print line pair immediately	00H = none 01H = line 1 02H = line 2 03H = line 3 04H = line 4 05H = line 5 06H = line 6

Creating text blocks

If variable parameters are to be printed at the start and end of a batch process (precondition: the printer channel is installed in recorder), complete text lines can be sent to the recorder with the parameter field address F1H.

Send printout lines to recorder

(with parameter field address F1H)

It is with this message that a text line with 32 characters is sent to the recorder. The recorder enters the message in the printer queue. As soon as the queue is empty, text printout begins immediately, otherwise the text lines stored in the queue are printed first. The recorder acknowledges the message with the acknowledgment code 10H, if the message is received correctly and entered into the queue. If the queue has no more free space, the acknowledgement code 11H is sent in response.

The message format is:

SD2/LE/LEr/SD2/DA/SA/FC/aa/bb/cc/dd/ee/ff/[Text line]/FCS/ED
|<-- L -->|

Where:

SD2	= 68H Start byte
LE	Number of data bytes + 7
LEr	Repetition of LE
SD2	= 68H Repetition of start byte
DA	Target address (bus subscriber address)
SA	Source address
FC	= 16H Function code
aa	= F1H Basic address of the parameter field
bb	= 00H Fill byte
cc	= 00H Fill byte
dd	Length of the text line + 2
ee	Date control 00H = print text without date / without time 01H = print text with time 02H = print text with date 03H = print text with date / with time
ff	Print colour 00H = none 01H = violet 02H = red 03H = black 04H = green 05H = blue
[Text line]	Contents of the text line max. 32 ASCII characters
FCS	Test byte (Frame Check Sequence) Sum of the hex value of the L frame without transformation for FFH
ED	= 16H End byte (End Delimiter), code: 16H
L	Number of bytes in FCS

Scanning of the printout status

The number of lines in the printout queue is scanned by the recorder with:

SD3/DA/SA/FC/aa/oo/oo/cc/xx/xx/xx/xx/FCS/ED
|<-- L -->|

Where:

SD3 = A2H
Start byte
DA Target address (bus subscriber address)
SA Source address
FC = 15H
Function code
aa = F1H
Basic address of the parameter field
oooo = 00 00H
2 bytes of parameter address (Offset)
cc = 01H
Number of scanned data bytes
xx xx
xx xx 4 random bytes
FCS Test byte (Frame Check Sequence)
Sum of the hex value of the L frame without transformation for FFH
ED = 16H
End byte (End Delimiter), code: 16H
L Number of Bytes in FCS

The answer of the recorder is:

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

Where:

SD2 = 68H
Start byte
LE Number of data bytes + 3
LEr Repetition of LE
SD2 = 68H
Repetition of start byte
DA Target address (bus subscriber address)
SA Source address
FC = 15H
Function code
aa Number of information items in the queue
FCS Test byte (Frame Check Sequence)
Sum of the hex value of the L frame without transformation for FFH
ED = 16H
End byte (End Delimiter), code: 16H
L Number of bytes in FCS

Sending a display line to the recorder F2H

This message is used to send a text line with max. 16 characters to the recorder. The message appears on the display if the control byte is set to the value 01H.

The message format is:

SD2/LE/LEr/SD2/DA/SA/FC/aa/bb/cc/dd/ee/[Text line]/FCS/ED
|<-- L -->|

Where:

SD2 = 68H
Start byte
LE = 17H
Number of data bytes + 7
LEr Repetition of LE
SD2 = 68H
Repetition of start byte
DA Target address (bus subscriber address)
SA Source address
FC = 16H
Function code
aa = F2H
Basic address of the parameter field
bb = 00H
Fill byte
cc = 00H
Fill byte
dd Length of the text line + 1
ee Control for display
00H = do not display text
01H = display text
Text-
line Contents of the text line max. 16 ASCII characters
FCS Test byte (Frame Check Sequence)
Sum of the hex value of the L frame without transformation for FFH
ED = 16H
End byte (End Delimiter), code: 16H
L Number of bytes in FCS

Communication error register FFH

The communication error registers are used for making error diagnostics in case of communication problems which occur when invalid values are transmitted.

The error registers are scanned by the recorder with:

SD3/DA/SA/FC/aa/oo/oo/cc/xx/xx/xx/xx/FCS/ED
|<-- L -->|

Where:

SD3	= A2H Start byte
DA	Target address (bus subscriber address)
SA	Source address
FC	= 15H Function code
aa	= FFH Basic address of the parameter field
oooo	= 00 00H 2 bytes parameter address (offset)
cc	= 09H Number of scanned data bytes
xx xx xx xx	4 random bytes
FCS	Test byte (Frame Check Sequence) Sum of the hex value of the L frame without transformation for FFH
ED	= 16H End byte (End Delimiter), code: 16H
L	Number of Bytes in FCS

The answer of the recorder is:

SD2/LE/LEr/SD2/DA/SA/FC/aa/bb/cc/dd/ee/FCS/ED

Where:

SD2	= 68H Start byte
LE	= 17H Number of data bytes + 7
LEr	Repetition of LE
SD2	= 68H Repetition of start byte
DA	Target address (bus subscriber address B)
SA	Source address
FC	= 15H Function code
aa	requested data field length
bb	Type of error 00H = no error 01H = incorrect basic field address 02H = incorrect offset 03H = incorrect value 04H = incorrect length 05H = Header error 06H = incorrect function code
cc	Field address of where error occured
dd	Offset at which error occured
ee	4 bytes copy of the incorrect value
FCS	Test byte (Frame Check Sequence) Sum of the hex value of the L frame without transformation for FFH
ED	= 16H End byte (End Delimiter), code: 16H
L	Number of bytes in FCS

Connection of the recorder to WIZCON

The function codes and parameter addresses below are for establishing a connection between the recorder and WIZCON.

The function codes used by the driver software “VPIDC.COM” are supported here.

Interrogation of 8 values

(with telegram SD3 and function code 04H)

is used to send a query to the recorder.

The query sent to the recorder has the following format:

SD3/DA/SA/FC/a1/a2/a3/a4/a5/a6/a7/a8/FCS/ED
|<-- L -->|

Where:

SD3 = A2H
Start byte
DA Destination address (bus subscriber address)
SA Source address
FC = 04H
Function code
a1..
..a8 Parameter addresses from Section “Parameter addresses”
FCS Test byte (Frame Check Sequence)
Sum of the hex value of the L frame without transformation for FFH
ED = 16H
End byte (End Delimiter), code: 16H
L Number of bytes in FCS

The addresses permitted for a1...a8 are listed in section “Parameter addresses”. If the same value is entered for two successive address fields, the data of the repeated address and all following data are omitted.

The recorder answer is:

SD2 LE LEr SD2 DA SA 04H value1 value2 ... value8 FCS ED

The max. 8 values correspond to the addresses entered in the query. Each value is represented by 16 bits. The values are transmitted in the order High Byte / Low Byte.

Modification of 2 values

(with telegram SD3 and function code 07H)

The computer query is:

SD3/DA/SA/FC/c1/a1/val1/c2/a2/val2/FCS/ED
|<-- L -->|

Where:

SD3 = A2H
Start byte
DA Destination address (bus subscriber address)
SA Source address
FC = 07H
Function code
c1 = 01H
Triggers modification in device
a1 Parameter address from section „Parameter addresses“
val1 Parameter value
c2 = 01H
triggers modification in the device
a2 Parameter address from section „Parameter addresses“
val2 Parameter value
FCS Test byte (Frame Check Sequence)
Sum of the hex value of the L frame without transformation for FFH
ED = 16H
End byte (End Delimiter), code: 16H
L Number of bytes in FCS

c1 or c2 is the code which decides whether the value is to be actually modified. The new value is taken over by the recorder if the code is 01H or 02H. No other value for c1 or c2 triggers an action. Parameters a1/a2 are the corresponding parameter addresses. The new values (16 bit) have been entered into the message for val1/val2, with the order High Byte / Low Byte.

The recorder answer is:

SD1 DA SA qq FCS ED.

Here qq is the acknowledge code of the recorder.

If qq = 10H, the message has been processed without error. The acknowledge code 11H is sent in the event of an error. Repeat the entries for val 1 as val 2 if only one value is to be changed in the recorder (WIZCON only permits modification of one value).

Numerical formats

Analog values are transmitted in a standardized format, with scale start = 0 ‰ and scale end = 1000 ‰ being used as reference values. Hence all values possible are within the range 0 to 1000. Negative values cannot occur. The hexadecimal value assigned to a decimal per mille value is calculated as follows:

Hex value = per mille value * 16 + 32768

Example

The measured value of a channel is 87 °C (= val) in a measuring range between −50 °C (= low) and +150 °C (= high).

Hex value = (val-low) / (high-low) * 1000 * 16 + 32768 = AAD0H

Example

Speed 1 = 240 mm/h → index = 08H (from section “System parameters”).

transmitted value = index * 16 + 32768 = 8080H

Parameter addresses for function codes 04H and 07H

Parameter address	Contents
00H	Measured value, channel 1
01H	(standardised)
02H	
03H	
04H	
05H	..., channel 6 (standardised)
06H	Speed index 1
07H	Speed index 2
08H	Day of recorder-internal clock
09H	Month
0AH	Year
0BH	Hour
0BH	Minute
	Thresholds for channel 1
10H	Threshold 1 (standardised)
11H	Threshold 2 (standardised)
12H	Function threshold 1 (0 = min., 1 = max.)
13H	Function threshold 1 (0 = min., 1 = max.)
14H	Relay output for threshold 1 (0...20)
15H	Relay output for threshold 1 (0...20)
	Thresholds for channel 2
18H	Threshold 1 (standardised)
19H	Threshold 2 (standardised)
1AH	Function threshold 1 (0 = min., 1 = max.)
1BH	Function threshold 1 (0 = min., 1 = max.)
1CH	Relay output for threshold 1 (0...20)
1DH	Relay output for threshold 1 (0...20)

Parameteradresse	Inhalt
	Thresholds for channel 3
20H	Threshold 1 (standardised)
21H	Threshold 2 (standardised)
22H	Function threshold 1 (0 = min., 1 = max.)
23H	Function threshold 1 (0 = min., 1 = max.)
24H	Relay output for threshold 1 (0...20)
25H	Relay output for threshold 1 (0...20)
	Thresholds for channel 4
28H...2DH	as channel 3
	Thresholds for channel 5
30H...35H	as channel 3
	Thresholds for channel 6
38H...3DH	as channel 3

Interrogation of binary information

(with telegram SD3 and function code 05H)

Is used to send a query to the recorder. The values transmitted with function code 05 are not converted acc. to the numerical format for analog values, since the information involved here is exclusively binary information. The recorder uses one byte in the answer message for each parameter address queried. Bits not in use are set to 0 by the recorder.

The computer's query to the recorder is:

SD3/DA/SA/FC/aa/cc/xx/xx/xx/xx/xx/xx/FCS/ED
|<-- L -->|

The following applies:

SD3 = A2H
Start byte
DA Destination address (bus subscriber address)
SA Source address
FC = 05H
Function code
aa Start address = Parameter address from section „Parameter addresses“
cc Number of data bytes
xx...
...xx 6 arbitrary bytes
FCS Test byte (Frame Check Sequence)
Sum of the hex value of the L frame without transformation for FFH
ED = 16H
End byte (End Delimiter), code: 16H
L Number of bytes in FCS

The recorder's answer is:

SD2 LE LEr SD2 DA SA 05H Byte 1 Byte 2 ... Byte n FCS ED

Parameter addresses for function code 05H

Parameter address	Contents
00H	Threshold status, channel 1 to 4
01H	Threshold status, channel 5 and 6
02H	Status DI
03H	Status DO
04H	Equipment self-test status, bits 0...7
05H	Equipment self-test status, bits 8...15
06H	Equipment self-test status, bits 16...23
07H	Equipment self-test status, bits 24...31
08H	Parameterisation status (01 = recorder is in parameterisation mode, it is not possible to modify the parameterisation via the interface)

The threshold status of channels 1 to 4 is stored in one byte:

Bit
7 Threshold 1 channel 1
6 Threshold 2 channel 1
5 Threshold 1 channel 2
4 Threshold 2 channel 2
3 Threshold 1 channel 3
2 Threshold 2 channel 3
1 Threshold 1 channel 4
0 Threshold 2 channel 4

The threshold status of channels 5 and 6 is stored in an additional byte:

Bit
..
3 Threshold 1 channel 5
2 Threshold 2 channel 5
1 Threshold 1 channel 6
0 Threshold 2 channel 6

The status of the binary inputs is stored in the lower 6 bits of a byte:

Bit
..
5 DI 1 active
4 DI 2 active
3 DI 3 active
2 DI 4 active
1 DI 5 active
0 DI 6 active

The status of the binary outputs is stored in the lower 6 bits of a byte:

Bit
..
5 DO 1 active
4 DO 2 active
3 DO 3 active
2 DO 4 active
1 DO 5 active
0 DO 6 active

Character set table

Character	Code [dec]	[Hexdec]
²	01	01
³	02	02
‰	03	03
↑	04	04
↓	05	05
▲	06	06
¹⁰	07	07
	32	20
!	33	21
"	34	22
#	35	23
$	36	24
%	37	25
&	38	26
’	39	27
(	40	28
)	41	29
*	42	2A
+	43	2B
,	44	2C
-	45	2D
.	46	2E
/	47	2F
0	48	30
1	49	31
2	50	32
3	51	33
4	52	34
5	53	35
6	54	36
7	55	37
8	56	38
9	57	39
:	58	3A
;	59	3B
<	60	3C
=	61	3D
>	62	3E
?	63	3F
@	64	40

Character	Code [dec]	[Hexdec]
A	65	41
B	66	42
C	67	43
D	68	44
E	69	45
F	70	46
G	71	47
H	72	48
I	73	49
J	74	4A
K	75	4B
L	76	4C
M	77	4D
N	78	4E
O	79	4F
P	80	50
Q	81	51
R	82	52
S	83	53
T	84	54
U	85	55
V	86	56
W	87	57
X	88	58
Y	89	59
Z	90	5A
[	91	5B
\	92	5C
]	93	5D
^	94	5E
_	95	5F
‘	96	60
a	97	61
b	98	62
c	99	63
d	100	64
e	101	65
f	102	66
g	103	67
h	104	68
i	105	69

Character	Code [dec]	[Hexdec]
j	106	6A
k	107	6B
l	108	6C
m	109	6D
n	110	6E
o	111	6F
p	112	70
q	113	71
r	114	72
s	115	73
t	116	74
u	117	75
v	118	76
w	119	77
x	120	78
y	121	79
z	122	7A
{	123	7B
|	124	7C
}	125	7D
→	126	7E
←	127	7F
~	222	DE
°	223	DF
α	224	E0

Character	Code [dec]	[Hexdec]
ä	225	E1
β	226	E2
ε	227	E3
μ	228	E4
σ	229	E5
ς	230	E6
g with Unterl.	231	E7
√	232	E8
⁻¹	233	E9
j	234	EA
▮	235	EB
ϕ	236	EC
£	237	ED
ñ	238	EE
ö	239	EF
p	240	F0
q	241	F1
Θ	242	F2
∞	243	F3
Ω	244	F4
ü	245	F5
Σ	246	F6
π	247	F7
$\overline{X}$	248	F8

Subject to technical changes.

ABB Automation Products GmbH
Höseler Platz 2
D-45279 Heiligenhaus
Phone +49 (0)20 56) 92 - 51 81
Fax +49 (0)20 56) 92 - 50 81
http://www.abb.com

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