

Contents

	Page
Description	3
Technical data bus connection RS-485	3
Data formats	4
Data transmission	
General information	5
Telegram characters	5
Permissible addresses	5
Broadcast address	5
Telegram formats, general specifications	
SD1 telegram	6
SD2 telegram	6
SD3 telegram	7
Transmission rules	7
Parameters	
Addressable parameters	8
Parameter field addresses	8
Parameter addresses	
System parameters 10H	9
Channel parameters 11H...14H	10
Text lines 17H	11
Print intervals 18H	12
Synchronization times for text print 19H	12
Assignment of binary inputs 1BH	13
Date and time 1CH	13
Calibration data 1DH	13
Channel-measured values and device status 1EH ...	14
Formation of text blocks	16
Send print lines to the recorder	16
Interrogation of print status	17
Connection of the recorder to WIZCON ...	18
Interrogation of 8 values	18
Modification of 2 values	19
Numerical formats	20
Parameter addresses for function code 04H and 07H ...	20
Interrogation of binary information	21
Parameter addresses for function code 05H	21
Table of character sets	22

Description

The RS-485 interface has been provided to enable communication with the recorder.

Parameter definition of the recorder can be effected on the operator panel or using a PC and a parameter definition software via the interface.

The serial communication of the recorder according to interface RS-485 is based on DIN 19245 Part 1. Only a subset of the stipulations have been taken into consideration. Inter alia, stipulations regarding multimaster operation (token-passing procedures) have not been taken into account since the recorder is always a passive subscriber.

Technical data bus connection RS-485

Bus structure

- Line, no branches
- Stub-end feeder to the subscriber <0.3 m

Medium

- shielded, twisted 2-wire leads
- Surge impedance 100...130 Ω , at $f > 100$ kHz
- Cable capacitance <60 pF/m
- Cross-section min. 0.22 mm²

Cable length

- max. 1200 m

Number of bus subscribers

- 32 (active and passive)

Transmission rate

- 600, 1200, 2400, 4800, 9600 and 19200 Baud

Type of transmission

- symmetrical

Driver output

- No-load operation ± 5 V, with load $\geq \pm 1,5$ V
- Load resistance $\geq 60 \Omega$

Receiver

- Sensitivity 200 mV
- Input resistance 12 k Ω

Earthing

- earth the shield at both ends to divert high-frequency interference

Potential equalization

- the difference in potential between the data ground potentials (Gnd) of all bus subscribers may not exceed ± 7 V

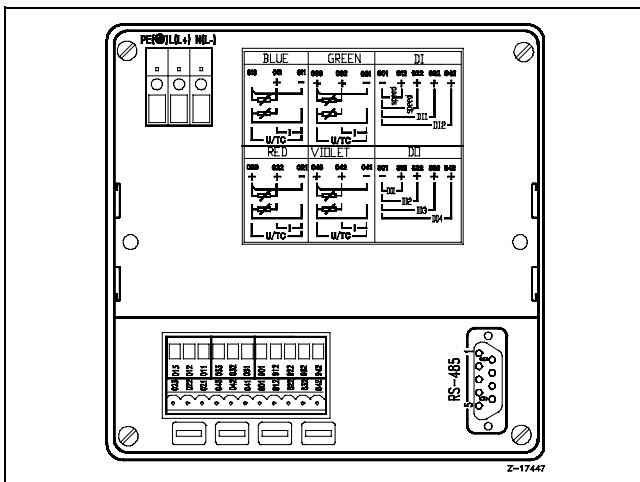


Bild 1 Rear panel of the recorder
Z-17447

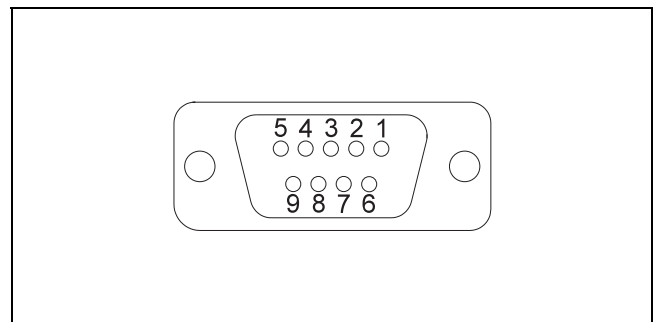


Bild 2 Pin assignment of RS-485 interface
Z-17447
Pin 1: Shield
Pin 3: RxD (+)
Pin 5: Gnd (Reference potential)
Pin 6: +5 V
Pin 8: RxD (-)

The +5 V voltage at pin 6 is only needed if the recorder is being operated as a bus terminal unit.

The shield should be laid on a blade-type terminal located on the recorder case.

The bus open-circuit potential is determined with resistors R_u , R_t and R_d :

$$R_u = 390 \Omega, R_t = 150 \Omega, R_d = 390 \Omega$$

Wiring according to figure 3.

Fit resistors R_u , R_t and R_d in the 9-pin bus connector such that the recorder can be separated from the bus, with the bus, however, remaining properly terminated.

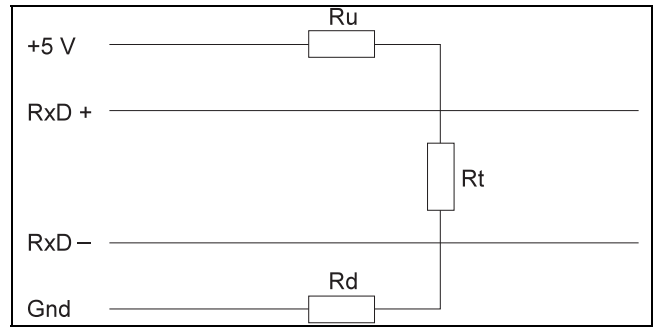


Bild 3 Bus terminal wiring
Z-17340

Data formats

Byte type

Value range: 0...255

The Byte-type format is used to select the parameters from the tables (see section "Parameter addresses").

Char type

Value range: -128...+127

The Char-type format is used to transmit ASCII characters. The character set accepted by the recorder is listed in section "Table of character sets". The Hex codes must be used.

Word type

Value range: 0...65535

The Word-type format consists of 2 bytes and is used to transmit integers without signs (whole-figure values). The High byte is transmitted before the Low byte.

Example: the value 820 is to be transmitted:

$$820 = 03\ 34H$$

Float type

Value range: $\pm 1.175494E-38$... $\pm 3.402823E+38$

The float-type format consists of 4 bytes and is used to transmit floating point numbers. The numerical range accepted by the recorder is between -1000 ... +9999 (IEEE-754 format).

Example: the value -12.5 is to be transmitted:

$$-12,5 = C1\ 48\ 00\ 00H$$

Calculation of the Hex number:

The general form of the floating point number is:

$$(\text{Sign}) * 2^{\text{EXP}-127} * (\text{Remainder})$$

The binary representation of the number -12.5 is:

11000001 01001000 00000000 00000000
 |-----|
 | EXP (8 Bit) Remainder (23 Bit)
 |----- negative sign

1. Calculate sign. The bit is set for a negative sign.

2. Calculate exponent. The highest exponent is calculated:
 $\text{EXP} = \text{INT} [\lg |\text{Number}_{\text{dec}}| / \lg 2] + 127$

in the example:

$$\text{INT} [\lg 12,5 / \lg 2] + 127 = 130 = 82H = 10000010 \text{ binary}$$

3. Calculate remainder.

$$\text{Remainder} = |\text{Number}_{\text{dec}}| / 2^{\text{EXP}}$$

in the example: $12,5 / 2^3 = 1,562$

4. Conversion to binary code:

$$\text{Rank} \quad 2^0 + 2^{-1} + 2^{-2} + 2^{-3} + 2^{-4} + \dots + 2^{-23}$$

in the example: 1 1 0 0 1

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

Data transmission

General information

A combination of telegram characters is used for data transmission. The telegrams use the "Handshake function", i.e. each telegram from the computer to the recorder must first be acknowledged before the next telegram can be sent.

Note

Before data transmission, parameters must be set for interface address and transmission rate.

Telegram characters

(UART character or frame)

Each 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 and one stop bit (SP) with logic "1" signal.

Bits of a character:

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 addresses

With the RS-485 interface set, the recorder only answers queries which use as destination address the address set in the device. Values between 0...126 (= 7EH) are allowed, with values being specified arbitrarily. However, no address may be specified twice. The recorder sends no answer to incorrect messages (checksum, wrong address, any other type of reception errors). Neither are incorrect messages acknowledged. Some data areas are marked as Read Only areas. Attempts to write data to these data fields are ignored by the recorder.

Broadcast address

Messages to the broadcast address (132) are always processed. However, no answer is sent for a broadcast message.

Telegram formats, frame specifications

SD1 telegram

Telegram with fixed information field length without data field

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

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

The following applies:

SD1 = 10H
Start byte (Start Delimiter)
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" frames without carry for FFH
ED End byte (End Delimiter)
L Number of bytes in FCS = 3

If a query with FC = 01H (ident query) is sent, the response from the recorder will also be sent in the SD1 format. If no self-test error has occurred in the device, FC = 10H is contained in the answer. Otherwise FC = 11H.

The recorder ident code is implemented with the function code 4EH acc. to the internal Hartmann & Braun standard.

The recorder responds to a query with FC = 4EH with a message of the SD2 type (see Section 4.4.2).

Data field of the identification 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 = „xxx; xxx“: Prod. Root No. and dev. designation
HR = „CPU:A“: Index of the recorder CPU card
SR = „00.00.16“: Example of software release

SD2 telegram

Telegram with variable information field length

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

used for sending data to the recorder and for data answers from the recorder.

The following applies:

SD2 = 68H
Start byte
LE Number of data bytes + 7
LEr Repeat of LE
SD2 = 68H
Repeat of start byte
DA Destination address (bus subscriber address)
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
Data-field Data to be sent
FCS Check byte (Frame Check Sequence)
Sum of the Hex values of the "L" frames without carry for FFH
ED = 16H
End code
L Number of bytes in FCS

On receiving data message of the SD2 type, the recorder responds with a message in the SD1 format. FC = 10H if all data have been taken over by the recorder, otherwise FC = 11H.

1 minute after reception of the last data message from the recorder, the modified data are copied automatically into the non-volatile memory (EEPROM).

Function code 16H is used when transmitting data to the recorder. The recorder uses function code 15H for its answer telegrams in SD2 format.

SD3 telegram

Telegram with fixed information field length:

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

used to send a query to the recorder.

The following applies:

SD3 = A2H
Start byte
DA Destination address (bus subscriber address)
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 4 arbitrary bytes
FCS Check byte (Frame Check Sequence)
Sum of the Hex values of the "L" frames without carry for FFH
ED = 16H
End code
L Number of bytes in FCS

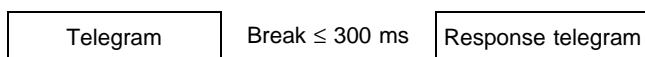
Transmission rules

The release state of the line corresponds to the logic "1" signal. Before beginning data transmission from the computer, a minimum time of 33 bits (synchronization time) is needed as release state for the synchronization.

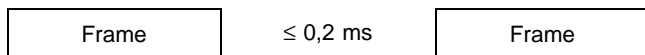
Breaks of the length ≥ 3 frames are interpreted as telegram end.

The recorder takes a break of ≤ 300 ms for the interval between reception of the last stop bit and transmission of the first start bit.

Break between two telegrams:



Gap between two frames:



The receiver checks:

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

If the check returns a negative result, the entire telegram must be rejected as false.

In the answer, the recorder uses the source address of the transmitted telegram as destination address and enters its own address as source address.

Parameters

Addressable parameters

The following parameters can be read or modified with the telegrams according to the procedures in the sections on pages 6 and 7. To this end, a parameter field address, a parameter address (offset) as well as the coding of the parameter value must be specified. Please consult the table on the right for the parameter field addresses. Please consult section "Parameter addresses" (beginning next page) for the parameter addresses.

Example

The following specifications are therefore needed for the first chart speed:

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

Parameter field addresses

Device function group	Parameter field address
System parameter definition	10H
Channel parameter definition blue	11H
Channel parameter definition red	12H
Channel parameter definition green	13H
Channel parameter definition violet	14H
Text lines	17H
Print intervals	18H
Print synchronization times	19H
DI assignment	1BH
Date and time	1CH
Calibration data	1DH
Measured values and status	1EH
Transmit print line	E1H

During communication, the above addresses are entered into the corresponding fields of a message. From the address, the recorder calculates the data area to be transmitted. Data are transmitted with messages of the SD2 and SD3 types. FC = 15H must always be used to read a data field. Data are written into a data field with FC = 16H. If invalid parameter values have arrived while writing data into a message, the negative acknowledgement (SD1, FC = 11H) is sent by the recorder as an answer.

Parameter addresses

System parameters 10H

Parameter address (Offset)	Data type	Function	Value range and coding
0000H	Word	Password	0...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	as speed 1
0004H	Byte	Slow speed	00H = off 01H = on
0005H	Byte	Date/time format	00H = European 01H = American
0006H	Byte	Simulation type	00H = off 01H = ramp 02H = sinus 03H = level 10 %
0007H	Word	Simulation period	0014...07D0H
0009H	Word	Software revision code	
000BH	Byte	Scale	00H = no 01H = yes
000CH	Word	Scale spacing	003C...01F4H (60...500 mm)
000EH	Byte	Text printout in case of speed change	00H = no 01H = yes
000FH	Byte	Device address	00..7EH (0...126)
0010H	Byte	Transmission rate	00H = 600 01H = 1200 02H = 2400 03H = 4800 04H = 9600 05H = 19200
0011H	Byte	Signal "Out of paper"	00H = off 01H = DO1 02H = DO2 03H = DO3 04H = DO4

Channel parameters 11H...14H

Parameter address (Offset)	Data type	Function	Value range and coding
0000H	Byte	Input type Standard card Universal card	00H = off 01H = 0...20 mA 02H = 4...20 mA 03H = ± 20 mA 04H = ± 10 V 04H = ± 75 mV 05H = ± 20 V 06H = Pt100 (-50...+150) 07H = Pt100 (-50...+500) 08H = Thermocouple Type B 09H = Thermocouple Type E 0AH = Thermocouple Type J 0BH = Thermocouple Type K 0CH = Thermocouple Type N 0DH = Thermocouple Type L 0EH = Thermocouple Type R 0FH = Thermocouple Type S 10H = Thermocouple Type T 11H = Thermocouple Type U
0001H	Byte	Physical unit	00H = °C 01H = °F
0002H	Float	Measuring range start	
0006H	Float	Measuring range end	
000AH	Float	Start of scale range	
000EH	Float	End of scale range	
0012H	Byte	Filter time	00..3CH (0..60 s)
0013H	Byte	Direction	00H = 0 → 100 01H = 100 → 0
0014H	Byte	Root extraction	00H = off 01H = on
0015H	Byte	Reference junction thermocouple	00H = 0 °C 01H = 20 °C 02H = 50 °C 03H = 60 °C 04H = internal
0016H	Float	Alarm value 1	
001AH	Float	Alarm value 2	
001EH	Byte	Function alarm value 1	00H = min 01H = max
001FH	Byte	Function alarm value 2	00H = min 01H = max
0020H	Char []	Free unit (5 characters)	00H = 1st character 01H = 2nd character ... 04H = 5th character 05H = 0
0026H	Char []	Channel textlines (max. 32 characters)	00H = 1st character 01H = 2nd character ... 1FH = 32nd character 20H = 0
0047H	Byte	Pt100 type of circuit	00H = 2-wire circuit 01H = 3-wire circuit

Parameter address (Offset)	Data type	Function	Value range and coding
0048H	Byte	Relay contact alarm value 1	00H = off 01H = DO1 02H = DO2 03H = DO3 04H = DO4
0049H	Byte	Relay contact alarm value 2	as alarm value 1
004AH	Byte	Assignment of textlines to alarm value 1	00H = off 01H = text line 1 02H = text line 2 ... 08H = text line 8
004BH	Byte	Assignment of textlines to alarm value 2	as alarm value 1
004CH	Byte	Sensor break monitoring	Pointer to 00H = Scale start 01H = Scale end
004DH	Byte	Line resistance with Pt 100 2-wire circuit	00H = no correction 01H = 10 Ω 02H = 20 Ω 03H = 40 Ω
004EH	Byte	Unit of measurement for scale	00H = Input for 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 = m ³ /h 0DH = l/sec 0EH = % 0FH = ‰ 10H = MW 11H = 1/min

Text lines 17H

Parameter address (Offset)	Data type	Function	Value range and coding
00..0FH	Char []	Text line 1	(1st character for offset 00)
10..1FH	Char []	Text line 2	(1st character for 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	

Unoccupied character positions must be occupied with the character 20H. Each character must be within the range 12 to 129. If the recorder detects invalid characters, they will be replaced by 20H and a negative acknowledgement will be sent as an answer.

Print intervals 18H

Parameter address (Offset)	Data type	Function	Value range 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	as text 1
0002H	Byte	Print intervals for text 3	as text 1
0003H	Byte	Print intervals for text 4	as text 1
0004H	Byte	Print intervals for text 5	as text 1
0005H	Byte	Print intervals for text 6	as text 1
0006H	Byte	Print intervals for text 7	as text 1
0007H	Byte	Print intervals for text 8	as text 1
0008H	Byte	Print intervals for measured values	as text 1
0009H	Byte	Print intervals for date and time	as text 1

Synchronization times for text print 19H

Parameter address (Offset)	Data type	Function	Value range and coding
0000H	Word	Synchronization time for text 1	High-Byte = hour (0..23) = 00..17H Low-Byte = minute (0..59) = 00..3BH
0002H	Word	Synchronization time for text 2	
0004H	Word	Synchronization time for text 3	
0006H	Word	Synchronization time for text 4	
0008H	Word	Synchronization time for text 5	
000AH	Word	Synchronization time for text 6	
000CH	Word	Synchronization time for text 7	
000EH	Word	Synchronization time for text 8	
0010H	Word	Synchronization time for measured values	
0012H	Word	Synchronization time for date and time	

The synchronization times are also processed by the recorder in the 24-hour format even if the US date format is given.

Assignment of binary inputs 1BH

Parameter address (Offset)	Data type	Function	Value range and coding
0000H	Byte	Event marker 1	00H = off 01H = DI1 02H = DI2
0001H	Byte	Event marker 2	as event marker 1
0002H	Byte	trigger printout of text line 1	as event marker 1
0003H	Byte	trigger printout of text line 2	
0004H	Byte	trigger printout of text line 3	
0005H	Byte	trigger printout of text line 4	
0006H	Byte	trigger printout of text line 5	
0007H	Byte	trigger printout of text line 6	
0008H	Byte	trigger printout of text line 7	
0009H	Byte	trigger printout of text line 8	
000AH	Byte	trigger printout of measured values	
000BH	Byte	trigger printout of date and time	
000CH	Byte	Parameter definition enable	

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..0CH (1...12)
0002H	Byte	Year	00..63H (00...99)
0003H	Byte	Hour	00..17H (00...23)
0004H	Byte	Minute	00..3BH (00...59)

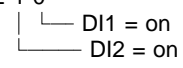
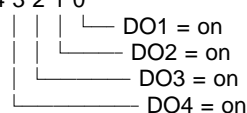
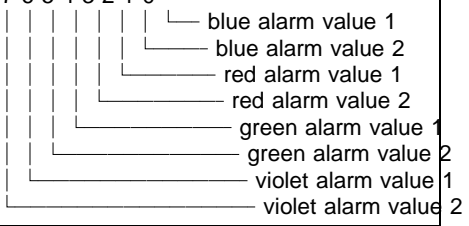
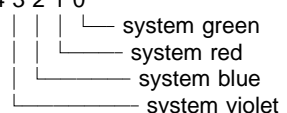
Calibration data 1DH

(data can only be read)

Parameter address (Offset)	Data type	Function	Value range and coding
0000H...0007H	Word	Blue, red, green, violet channel	Chart zero line 0000...FFFF
0008H...000FH	Word	Blue, red, green, violet channel	Chart 100 % line 0000...FFFF
0010H...0017H	Word	Blue, red, green, violet channel	Input calibration start value
0018H...001FH	Word	Blue, red, green, violet channel	Input calibration final value

Channel-measured values and device status 1EH

(data can only be read)

Parameter address (Offset)	Data type	Function	Value range 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	DI status	7 6 5 4 3 2 1 0 
0011H	Byte	DO status	7 6 5 4 3 2 1 0 
0012H	Byte	External speed changeover status	0 = Input open, speed 1 is active 1 = Input closed, speed 2 is active
0013H	Byte	Slow speed	0 = Input open, speed 1 or 2 active 1 = Input closed, slow speed is on
0014H	D-Word	Device alarm status	Bit (Low-Word) 0 Error CPU 1 Error RAM 2 Error external RAM on CPU motherboard 3 Error comm. between CPU and clock 4 Time error measured value acquisition 5 Read error by EEPROM on CPU card 6 Read error by EEPROM on channel card 7 Checksum error calibration data chan. card 8 Checksum error parameter data CPU card 9 Write error EEPROM channel card A Write error EEPROM CPU card B Watchdog generates unit reset C Printer queue full D Printer head is stuck E Voltage interruption to clock module F Speed too high for print Bit (High-Word) 0 Channel card no processing input type 1 Oscillator watchdog generates unit reset 2 3
0018H	D-Word	Unit alarm acknowledge status	same messages as for unit alarm status
001CH	Word	Alarm value status	... 8 7 6 5 4 3 2 1 0 
001DH	Byte	Recording systems	7 6 5 4 3 2 1 0 
001EH	Byte	Channel card type	0 = standard 1 = universal 255 = unknown type

Parameter address (Offset)	Data type	Function	Value range and coding
001FH	Byte	Installation DI and DO	0 = not installed 1 = installed
0020H	Byte	Print head	0 = not installed 1 = installed
0021H	Word	Remaining paper length	

Formation of text blocks

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

Send print lines to recorder

(with parameter field address F1H)

With this message a text line with 16 characters is sent to the recorder. The recorder enters the message into the printer queue. Once the queue is empty, printing of the text is immediately commenced, otherwise the text lines stored in the queue are printed first. The recorder acknowledges the message with the acknowledge code 10H if the message has been received without error and has been entered into the queue. The acknowledge code 11H is transmitted as an answer if the queue has no more free space.

The message format is:

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

The following applies:

SD2	= 68H	Start byte
LE	= 17H	Number of data bytes + 7
LEr	= 17H	Repeat of LE
SD2	= 68H	Repeat of start byte
DA		Destination address (bus subscriber address)
SA		Source address
FC	= 16H	Function code
aa	= F1H	Basic address of the parameter field
oo	= 00H	Fill byte
bb		Date control
		00H = print text without date and 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 in use must be set to 20H (space).
FCS		Check byte (Frame Check Sequence)
		Sum of the Hex values of the "L" frames without carry for FFH
ED	= 16H	End code
L		Number of bytes in FCS

Interrogation of print status

The number of lines in the printer queue can be requested with the following telegram.

The request to the recorder should read:

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

The following applies:

SD3	= A2H	Start byte
DA	Destination address (bus subscriber address)	
SA	Source address	
FC	= 15H	Function code
aa	Basic address of the parameter field (F1H)	
oo oo	2 bytes parameter address (offset) (00 00H)	
cc	Number of data bytes required (19H)	
xx xx	4 arbitrary bytes	
FCS	Check byte (Frame Check Sequence)	Sum of the Hex values of the "L" frames without carry for FFH
ED	= 16H	End code
L	Number of bytes in FCS	

The recorder answer is:

```
SD2/LE/LEr/SD2/DA/SA/FC/aa/FCS/ED
|<--  L  -->|
```

The following applies:

SD2	= 68H	Start byte
LE	= 17H	Number of data bytes + 7
LEr	= 17H	Repeat of LE
SD2	= 68H	Repeat of start byte
DA	Destination address (bus subscriber address)	
SA	Source address	
FC	= 16H	Function code
aa	Number of messages in the queue	
FCS	Check byte (Frame Check Sequence)	Sum of the Hex values of the "L" frames without carry for FFH
ED	= 16H	End code
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 computer query sent to the recorder has the following format:

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

The following applies:

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 Check byte (Frame Check Sequence)
Sum of the Hex values of the "L" frames without carry for FFH
ED = 16H
End code
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          -->|
```

The following applies:

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 Check byte (Frame Check Sequence)
Sum of the Hex values of the “L” frames without carry for FFH
ED = 16H
End code
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 code 04H and 07H

Parameter address	Contents
00H	Measured value blue channel (standardized)
01H	Measured value red channel (standardized)
02H	Measured value green channel (standardized)
03H	Measured value violet channel (standardized)
04H *	Chart speed index 1
05H *	Chart speed index 2
06H *	Slow speed
07H *	Day of the internal recorder clock
08H *	Month
09H *	Year
0AH *	Hour
0BH *	Minute
Alarm values for blue measuring system	
10H *	Alarm value 1 (standardized)
11H *	Alarm value 2 (standardized)
12H *	Alarm value 1 function (0 = min, 1 = max)
13H *	Alarm value 2 function (0 = min, 1 = max)
14H *	Relay output for alarm value 1 (0...4)
15H *	Relay output for alarm value 2 (0...4)
Alarm values for red measuring system	
18H *	Alarm value 1 (standardized)
19H *	Alarm value 2 (standardized)
1AH *	Alarm value 1 function (0 = min, 1 = max)
1BH *	Alarm value 2 function (0 = min, 1 = max)
1CH *	Relay output for alarm value 1 (0...4)
1DH *	Relay output for alarm value 2 (0...4)

Parameter addresses	Content
Alarm values for green measuring system	
20H *	Alarm value 1 (standardized)
21H *	Alarm value 2 (standardized)
22H *	Alarm value 1 function (0 = min, 1 = max)
23H *	Alarm value 2 function (0 = min, 1 = max)
24H *	Relay output for alarm value 1 (0...4)
25H *	Relay output for alarm value 2 (0...4)
Alarm values for violet measuring system	
28H *	Alarm value 1 (standardized)
29H *	Alarm value 2 (standardized)
2AH *	Alarm value 1 function (0 = min, 1 = max)
2BH *	Alarm value 2 function (0 = min, 1 = max)
2CH *	Relay output for alarm value 1 (0...4)
2DH *	Relay output for alarm value 2 (0...4)

Values marked with "*" can be modified with function code 07H. Here one must note that also these values are transmitted acc. to the standardized numerical format.

Table of character sets

Character	Coding [dec] [hexdec]
μ	12 C
π	13 D
σ	14 E
Σ	15 F
τ	16 10
Φ	17 11
Ω	18 12
À	19 13
á	20 14
Ä	21 15
ä	22 16
Ö	23 17
ö	24 18
Û	25 19
ü	26 1A
←	27 1B
√	28 1C
²	29 1D
£	30 1E
¥	31 1F
	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

Character	Coding [dec] [hexdec]
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
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

Character	Coding [dec] [hexdec]
^	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
j	106 6A
k	107 6B
l	108 6C
m	109 6D
n	110 6E
o	111 6F

Character	Coding [dec] [hexdec]
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
³	127 7F
‰	128 80
°	129 81

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