Bosch PU (BUEP19E)

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5.9 Bosch PU BUEP19E

5.9.1 General Information

The operating terminals allow for a simple connection to the Bosch.
The operating terminal is connected to the respective PLC-module.
The data communication on the interface is handled by the PU protocol BUEP19E. Communication via the BUEP19E protocol is possible with the CPU types CL200 / CL350 / CL400 / CL500.

The software components of the system are fully adapted to the parameters and marginal conditions of the interface.

This offers the user the following advantages:

- Random write and read access to any data within the PLC. Data of existing PLC programs can be displayed and modified directly in the operating terminal. It is not necessary to adapt the PLC program to the operating terminal in any respect since it is not required that communications data be stored in a specified address area or data type area.

- The operating terminal automatically polls the freely definable data areas for cyclic data.

- No configuration required within the PLC.

- The PU protocol is handled entirely by the firmware of the PLC. A PLC program (function blocks, etc.) in the PLC is not required for the handling of the communication.

- The protocol provides error control. Transmission errors are detected and, if possible, eliminated by repeating the transmission. An electrically isolated, noise-immune interface hardware in accordance with the 20 mA current loop interface standard permits the application even in a harsh industrial environment.

- The parameters of the interface SER1 are assigned in the programming software in a protocol-specific manner and are stored in the application description. Modifying of the parameters is also possible in the setup mask or each other I/O mask of the terminal at any time.

- The programming system provides a maximum of support to the user in programming the operating terminal. The definitions (abbreviations) used here are identical with the definitions used within the PLC program.

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5.9.2 Technical Description

The interfacing of the operating terminal to the Bosch PLCs is effected by means of the BUEP19E protocol.

The protocol BUEP19E allows random read and write access to all PLC data. The size of the address area depends on the respective PLC.

5.9.3 Protocol Parameters BUEP19E

The operating terminal adapts to the default parameters of the interface. It is therefore **not** necessary to modify the interface parameters in the PLC.

Baud rate:	300, 600, 1200, 2400, 4800, 9600, **19200**, 38400, 375000, 500000 Baud
Parity:	none, **even**, odd
Data bits:	5, 6, 7, **8**
Stop bits:	**1**, 1.5, 2
Handshake:	**no handshake**, hardware handshake, software handshake

The default settings are printed in **bold**.

5.9.3.1 Parameter Coordination Flag

The protocol permits defining of a field coordination flag and a sequence coordination flag.
Permitted values are in the range of 0 to 255.
The default value is 0.

5.9.3.2 Parameter Target Module

As a target module you can choose between CL500, CL350, CL400 or CL200.

5.9.3.3 Parameter Block Check

As a default, the protocol BUEP19E implements the data block check method CRC16.
The programming device uses a data block check method in accordance with LRC8.
To avoid difficulties during the development phase during which the PU and the terminal are alternately connected to the PLC, the terminal allows selection of the block check method LRC8.

5.9.4 Data Type Structure

a) Alphanumerical Text
Is stored in the memory byte for byte in ascending address order.

b) Counter
The count value is interpreted in binary format. The maximum value is 8191.

c) Timer
Timer functions consist of a time value and a time base. The terminal operates with imaginary unsigned 4-byte variables, even though the data stored in the PLC comprise only 2 bytes.

When read-accessing the timer, the terminal converts the time value and time base into a terminal-internal unsigned 4-byte number, which represents the time value in reference to the time base of 0.01 second.
Example: A range of 10 (time base is 1.0 second) and a time value of 999, are represented or edited, respectively, in the terminal by the value 99900. Scaling of this value to other value ranges is possible by specifying a factor and divisor within the variable definition.

Before writing a timer variable to the PLC, the time value and the smallest possible time base are formed from the terminal-internal unsigned 4-byte value.

d) Floating Point Number
The data with a length of 4 bytes are interpreted in the IEEE floating point format.

e) Binary Variables with a Length of 1, 2 or 4 Bytes
Data with a length of 2 bytes are interpreted in the PLC-conformal byte order for words.
Data with a length of 4 bytes are interpreted in the PLC-conformal byte order for long words.

5.9.4.1 Data Types

Direct accessing of the following data types is possible:
The data types listed below can be accessed in bit, byte, word or double word-mode. The access modes are distinguished by the abbreviations B, BY, W and DW.

Type	Description	Values	Access
E	Input	(0 to 63) Byte Address	B, BY, W, DW
A	Output	(0 to 63) Byte Address	B, BY, W, DW
M	Flag	(0 to 255) Byte Address	B, BY, W, DW
T	Timer	(0 to 127) Timer Number	BY, W, DW
Z	Counter	(0 to 127) Counter Number	BY, W, DW
BZ	Status of PLC	RUN/STOP CL500/400	BY
BZ	Status of PLC	RUN/STOP CL200	W
DP	Data Buffer	(0 to 511) Byte Address	BY, W, DW
DF	Data Field	(0 to 24575) Byte Address	BY, W, DW
D	Data Block	(0 to 511) Byte Address	BY, W, DW

Table 5.9-1: Data types

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If the size of the data field is defined as a linear area the data field number must be set to 255.

5.9.5 Additional Functions

In addition to the random write and read access to PLC variables, a memory area comprising 12 bytes is specified in the application description as poll area.

Only marginal conditions regarding this memory area are that the PLC must be able to access in bit-mode and the terminal in word-mode and the memory area must be contiguous. The location of this memory area can be specified in the application description.

The data area comprises a maximum of 6 words or 12 bytes.

Word Address	Reference	High Byte	Low Byte
Word Address + 0	DW21	Write Coordination Byte	Reserved
Word Address + 1	DW22	Message Channel High Byte	Message Channel Low Byte
Word Address + 2	DW23	Function Keys LED 1 to 4	Function Keys LED 5 to 8
Word Address + 3	DW24	Function Keys LED 9 to 12	Function Keys LED 13 to 16
Word Address + 4	DW25	Function Keys LED 17 to 20	Function Keys LED 21 to 24
Word Address + 5	DW26	Function Keys LED 25 to 28	Function Keys LED 29 to 32

Example: The cyclic data area is set to DW21 in the programming system

Table 5.9-2: Word structured poll area

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5.9.6 Physical Interfacing

Pin	Designation	Function
1	Shield	Shielding
2	T+	Transmit Data, Positive Polarity
3	S1+	Power Source 1, Positive Polarity
4	R+	Receive Data, Positive Polarity
5	S2+	Power Source 2, Positive Polarity
6	T-	Transmit Data, Negative Polarity
7	S1-	Power Source 1, Negative Polarity
8	R-	Receive Data, Negative Polarity
9	S2-	Power Source 2, Negative Polarity

Table 5.9-3: Pin assignment X2 TTY / 20 mA

Pin	Designation	Function
10	T+	Transmit Data, Positive Polarity
12	S1+	Power Source 1, Positive Polarity
13	R+	Receive Data, Positive Polarity
14	R-	Receive Data, Negative Polarity
16	S2+	Power Source 2, Positive Polarity
19	T-	Transmit Data, Negative Polarity
21	S1-	Power Source 1, Negative Polarity
24	S2-	Power Source 2, Negative Polarity

Table 5.9-4: Pin assignment universal interface SER1 TTY / 20 mA

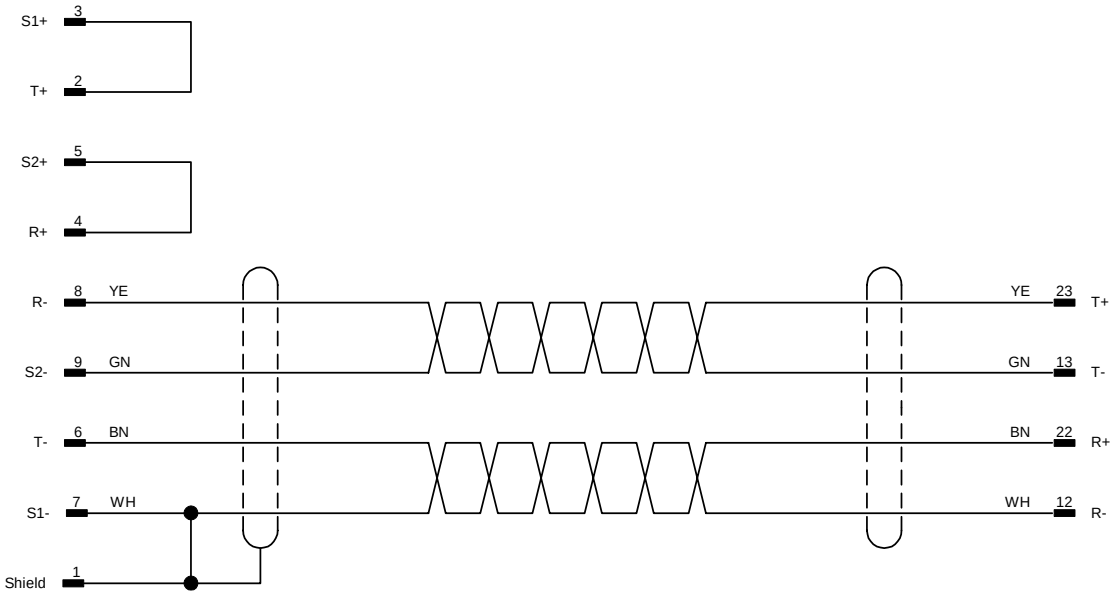
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5.7.6.1 Connecting Cable TTY / 20 mA - Bosch PU

The following wiring diagram does not apply to terminals with universal interface.

TesiMod	Bosch PLC
Operating Terminal	e.g. SK500
Transmitter active	Transmitter passive
Receiver active	Receiver passive



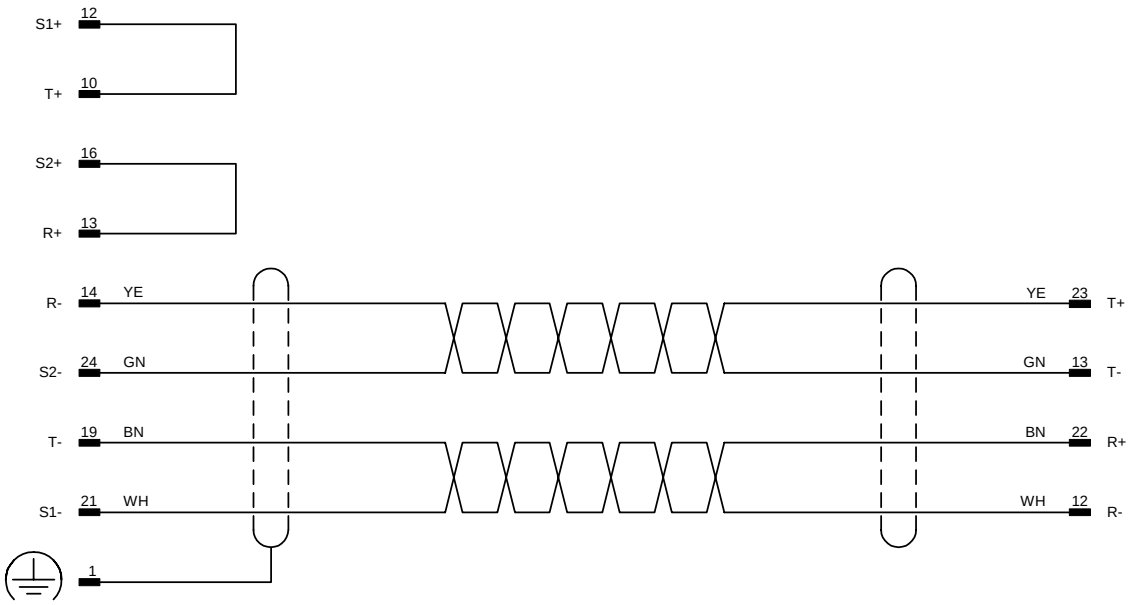
D-Subminiature	D-Subminiature
Male Connector	Male Connector
9-pin	25-pin

Each end of the shield is connected to the metallic enclosure.

5.7.6.2 Connecting Cable Universal Interface SER1 TTY / 20 mA - Bosch PU

The following wiring diagram applies to operating terminals with universal interface only.

TesiMod	Bosch PLC
Operating Terminal	e.g. SK500
Transmitter active	Transmitter passive
Receiver active	Receiver passive



D-Subminiature	D-Subminiature
Male Connector	Male Connector
25-pin	25-pin

Each end of the shield is connected to the metallic enclosure.

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5.9.7 Error Messages

Code 0

Subcode

0	NO_ERROR	Error-free processing

Code 1

Subcode

1	E_SLAVE_NOT_READY	Error originating in level 1 and level 2
2	E_PROTOKOL	Sequence of the packets
3	E_FRAME	Character frame error
4	E_TIMEOUT	Timeout error
5	E_CRC_BCC	CRC error
6	E_PARITY	Parity error
7	E_SEND_ABORT	Abort send process
8	E_REC_ABORT	Abort receive process
9	E_BUF_SIZE	Insufficient cyclic buffer
10	E_NO_DEFINE	No cyclic data defined
12	E_DEFINE	Cyclic data already defined
15	E_NO_PROTOCOL	Selected protocol is not supported
16	E_OVERRUN	Receive buffer overrun
40	E_SYS_ADDRESS	Illegal system variable

Bosch-specific error messages

Subcode

50	E_QUITTUNG_START	No communication setup
51	E_QUITTUNG_OPEN	Incorrect acknowledge signal during communication setup
52	E_QUITTUNG_DATA	Incorrect acknowledge signal to transmitted information block

Possible errors:

– Check the settings for block check. The PU always uses LRC8. The first peripheral user gives the following block check.

53	E_NO_RESPONSE_WRONG_CHAR	No response message
54	E_TIMEOUT_NO_RESPONSE	Timeout - no response message
55	E_TIMEOUT_BLOCKZEIT	Timeout - block time period has been exceeded

56 E_TIMEOUT_QUIT_RESPONSE ..... Timeout - no acknowledge signal
57 E_ABBRUCH_SPS ..... EOT -PLC abort

Code 2
Subcode
58 E_RECEIVE_COUNT ..... Number of received data is incorrect

Possible errors:
– Check if in the mask where the error occurs a variable with odd number of bytes will be read by a word or double-word address.

See module manual

Code 3
Subcode
1 The requested module is not available

16 Module is not accessible

35 The access to this address field is not allowed
36 The address field is secured by a user
37 Timer must not be written to
38 Module number to high
39 Module not available
40 Module is to small

147 Flag area overrun (CL200 only)
Possible errors:
- Flag area defined out of range of MB0 to MB191

Code 4
Subcode
32 The requested data type (Command Code) is not known by the PST
33 Protocol flag not known by the PST

35 The given coordination flag is not known by the PST

37 Parameter identifier in the telegram doesn't fit to the specified parameters
38 Length of block and topic number of data are different

40 Type of telegram unknown
41 Type of command unknown
58 Start address doesn't fit to the type of operand (Word at odd address)
Possible errors:
– Module R500 faulty

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59 Start address defined outside the address area
60 Invalid parameter for specified command
61 Invalid type of operand

64 The PST hasn't received an identification telegram, yet

99 The given length of data is greater than the requested data area

210 Coordination flag is locked