PBI200

ProfiBus Gateway PBI200

Manual Version 2.4k and 3.0k

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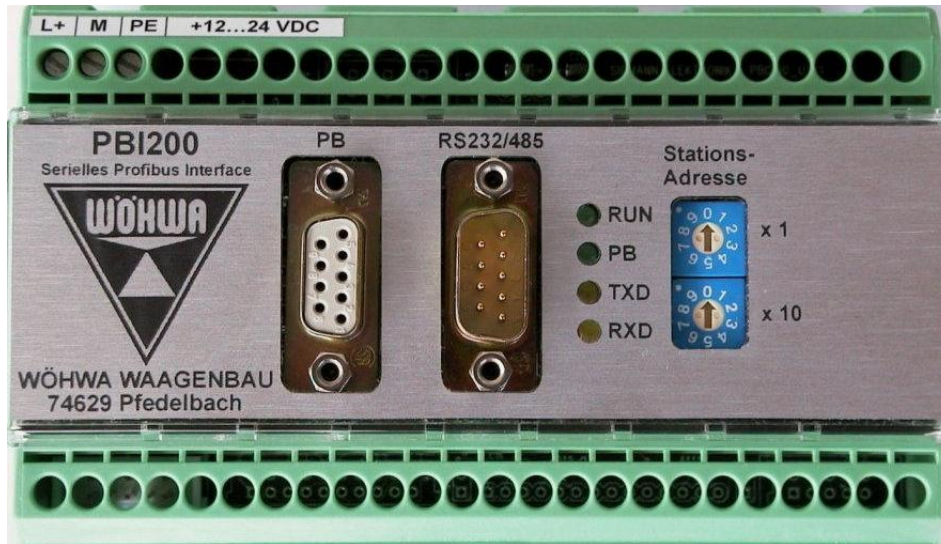Fax +49 (7941) 9131-19

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Subject to modification

Contents

1 Operation basics

1.1 Operation voltage

Power supply is connected to the 3-pin terminal X1.

Pin 1 Voltage input L+ (12-24 DC)
Pin 2 Voltage input M (GND ground)
Pin 3 PE

The PE input (Pin 3) is connected to ground (Pin 2) for potential equalisation through a resistance of 1 MΩ, parallel to a capacitor of 15 nF.

Power consumption at 24 V is approx. 70 mA.

1.2 PB adress (Ger: Stationsadresse)

The Profibus station address is set at two decimal switches (S1 for ones and S2 for tens), i.e. addresses between „0" and „99" may be set. Address „0" is forbidden to use because the Gateway responds to it with an error message (5 blinking signals at LEDs „RUN" and „PB", see below).

The address is polled at programme start only; later address changes will be ignored.
In case of address change, remove the operating voltage.

For using protocol 0, the internal selector switch must be set on 0.

1.3 Status LED's

The Gateway PBI200 has the following four status LEDs:

RUN: This LED blinks if the Gateway processor works properly. If there are any errors, the LEDs „RUN" and „PB" will blink (see below).

PB: This LED blinks if there is contact between the Gateway and the PLC, i.e. if there is an active Profibus connection.

TXD: This LED blinks if data is transmitted from the Gateway to the weigher (Tx data).

RXD: This LED blinks if data is received by the Gateway from the weigher (Rx data).

1.4 System malfunction

System errors are indicated by the blinking LEDs „RUN" and „PB". Both LEDs are blinking simultaneously.

System error 0:   Unknown error (does not usually occur); LEDs are blinking with 50:50 duty cycle.

System error 1:   Memory allocation error at SPC3 chip (programme error); LEDs are blinking cyclically once.

System error 2:   Data access error at SPC3 chip (programme error). LEDs are blinking cyclically twice.

System error 3:   Internal programme error (case error). LEDs are blinking cyclically three times.

System error 4:   Invalid protocol selected. LEDs are blinking cyclically four times.

System error 5:   Invalid station address at selector switch S1/S2; LEDs are blinking cyclically 5 times.

2 Transmission protocol between PLC and Gateway

A 20-byte output range and a 40-byte input range (as viewed from the PLC) are defined for the data exchange with the PLC via the Profibus. Both ranges are defined in double words (32-bit signed long integer), referred to in the programme as DW 1 ... DW5 or DW1 ... DW10.

The ranges are structured as follow:

2.1 Output range:

The PLC can send a control word to the Gateway (DW1 in PLC output range, 32-bit long integer, see below) whereby certain bits can trigger certain actions. Some of these actions evaluate a numerical value that is also transmitted by the PLC from DW2 (32-bit long integer). In general, these actions cause the transmission of special data records to the weigher.

The Gateway can only recognise changes in data if data values are changed in the control word as compared with previously transmitted values. Therefore, actions will only be triggered if data is changed in the control word DW1. With every 800ms cycle, only 1 bit of the control word DW1 is evaluated beginning with the least significant bit, Bit 0, and continuing towards the most significant bit.

As soon as a bit has been found to be set, the action linked to it will be started. The bit is then stored internally. Further actions will only be performed, if new data from the PLC have caused different bits to be set.

A bit that has been set by the PLC can cause further actions only after it was erased and transmitted to the gateway and successfully received there (observe time conditions).

2.1.1 Example of sequentially sent data from the PLC:

Transmitted control word DW1	Actions
0x00000001	Bit 0 starts action
0x00000002	Bit 1 starts action
0x00000003	Bit 0 starts action
0x00000007	Bit 2 starts action
0x0000000F	Bit 3 starts action
0x00000003	No action
0x00000001	No action
0x00000002	Bit 1 starts action

DW1 Control Word:
Bit 0: zero adjustment of belt weighing unit
Bit 1: clear measurement buffer of belt weighing unit
Bit 2: clear measurement memory 1 of belt weighing unit.
Bit 3: request „correction value" from weigher.
Bit 4: transmit correction value from DW2 by PLC to the weigher.
Bit 5: Start „legal-for-trade" print log.

DW2 Correction Factor   (0 ... 99999; larger values are limited to 99999, negative values are set to 0)

DW3
DW4 (not used)
DW5 (not used)

The bits in the control word can be set by the PLC to trigger the described actions (data transmission to weigher). Make sure to set one bit only at a time. With every 800ms cycle, only 1 bit is evaluated beginning with the least significant bit. If a bit has been set and an action was triggered, this bit is stored. It can only trigger another action after it was transmitted by the PLC as a „0".

Attention: We use double-words! Please notice the Siemens manual about double-word, data byte and data word. (Bit 0 double-word 10 is Bit 0 data byte 13)

Actions of control bits:

Bit 0:   Transmit request for zeroing to the weigher.
          No return message from the weigher.

Bit 1:   Transmit request for „erase measured weight value" to weigher.
          No return message from the weigher.

Bit 2:   Transmit request for „erase memory" to the weigher.
          No return message from the weigher.

Bit 3:   Request „correction factor" from weigher.
          The weigher returns data that contain a correction factor.
          The value from the weigher may contain a leading minus sign. It will be
          processed in any case as a positive absolute value, i.e. a minus sign will
          be ignored. Before the value received from the weigher is made available
          to the input range of the PLC, the correction factor stored there is erased
          (i.e. set to 0). It will only be set to the received value after valid reception
          from the weigher. A time-out will not be evaluated. If there is no response
          from the weigher, the PLC will recognise this from a correction factor value
          of „0" and it repeats its request for transmission of data.

Bit 4:   Transmit correction factor of PLC to weigher.
          The value will be transmitted to the weigher as correction factor only after
          a value was received by the PLC in data word DW2 that is larger than
          zero. Otherwise there will be no action.
          No return message from the weigher.

Bit 5:   Start „legal-for-trade" print log (certifiable for trade use only)

2.2 Input range

DW1   mass (in „kg"; value is >= 0)
DW2   Flow rate (in „t/h"; value may be negative, zero or positive)
DW3   Belt speed (in „cm/s"; absolute value of value from weigher)
DW4   A/D pulse (absolute value of value from weigher)
DW5   Memory (absolute value of value from weigher)
DW6   Zeroing (value is >= 0)
DW7   Correction value
           (Value is set only after request was transmitted to weigher to read
           correction factor via Bit 3 in control word and after a valid response was
           received from the weigher. If there is no response from the weigher, the
           correction factor is set to 0 so that the PLC recognises an error status).

DW8   Gateway status   Bit 0: „0" normal status/normal operation
                                         „1" polling time-out
                                 Bit 1: „0" zeroing value of weigher is <= 0
                                         „1" zeroing value of weigher is > 0
                                 Bit 2: „0" zeroing value of weigher is >= 0
                                         „1" zeroing value of weigher is < 0

DW9   legal-for-trade ID number
DW10   weight relating to legal-for-trade ID number

The time-out bit (Bit 0 in DW8) will be set, if there is no valid response from the weigher
during four subsequent polling cycles. As soon as a valid response is received, this bit
will be reset.

3 Connect PBI200 to a Siemens Simatic S7 plc

For protocol 0 the delivered GSD-File „WO07A5_0.GSD" is required.
First add the GSD-File manually to the hardware catalogue of simatic.
Connect PBI200 with the PB-DP project.
Each PBI200 use 10 input double-words und 5 output double-words.

<u>**Attention:**</u> **We use double-words! Please notice the Siemens manual about double-word, data byte and data word. (Bit 0 double-word 10 is Bit 0 data byte 13)**
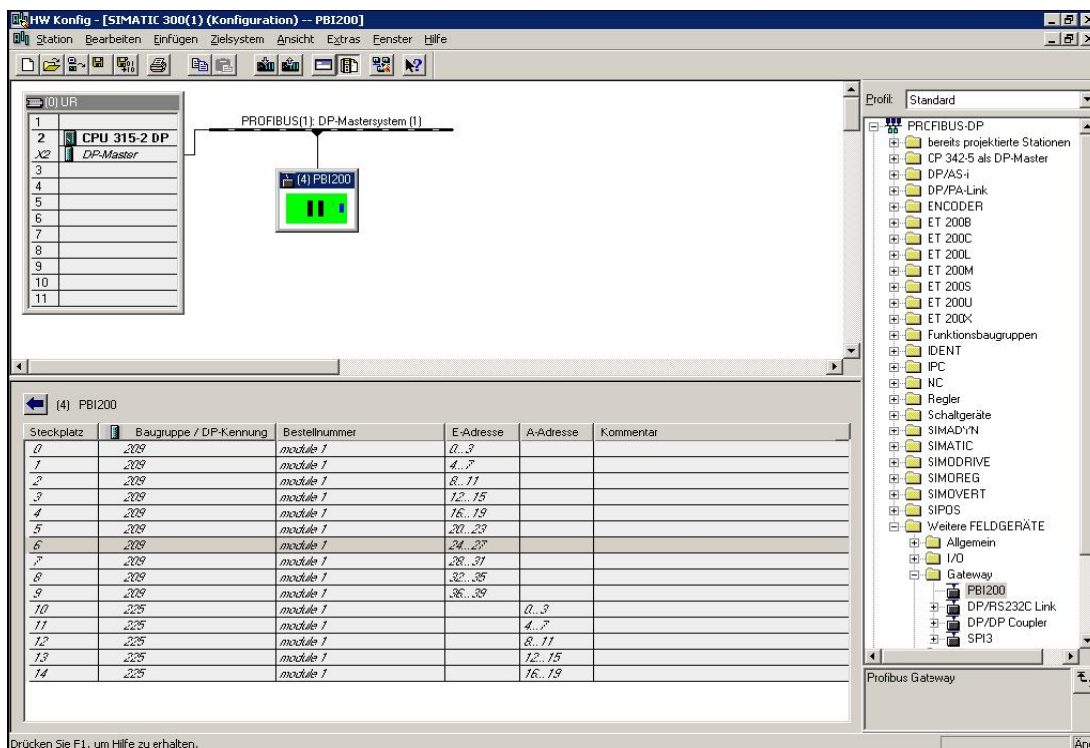
Steckplatz 0 INPUT DW 1 mass in kg
Steckplatz 1 INPUT DW 2 flow-rate in t/h
Steckplatz 2 INPUT DW 3 belt speed in cm/s
Steckplatz 3 INPUT DW 4 A/D pulse
Steckplatz 4 INPUT DW 5 value of mass memory 1
Steckplatz 5 INPUT DW 6 Zeroing
Steckplatz 6 INPUT DW 7 correction value
Steckplatz 7 INPUT DW 8 Gateway-Status

Steckplatz 10 OUTPUT DW 1 controll word
Steckplatz 11 OUTPUT DW 2 correction value
Steckplatz 12 OUTPUT DW 3 not used
Steckplatz 13 OUTPUT DW 4 not used
Steckplatz 14 OUTPUT DW 5 not used