Profibus-DP
Documentation

# ENCODER SERIES Pxx
# WITH
# PROFIBUS-DP INTERFACE

**CONTENTS:**

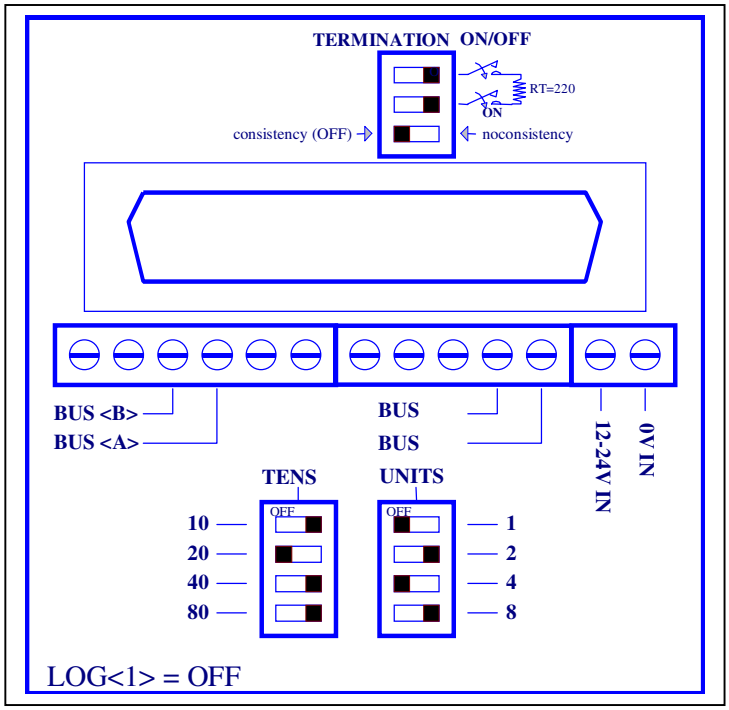
1. **Mechanical installation:**
   Refer to the "Instructions for the use" included in the supply

**2. Electric installation:**

**2.1 Connections**

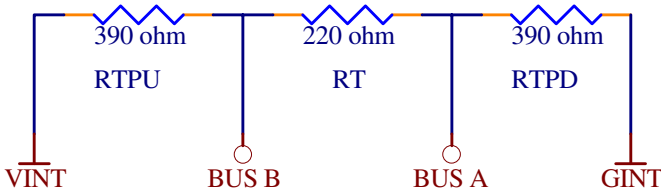
a) A standard connection is provided through a cap with three terminal screws: one for power supply (ranging between 12 and 24 VDC) and two for the serial line input and output respectively (BUS <A> and BUS <B>) where connection is allowed by a screw terminal board (see figure beside)

b) If high Baud Rates are used, cable will be shorter than 6 m.




**2.2 Terminal**

- The cap contains the selectors allowing to set terminal resistance, if the encoder is used as line terminator.
- Terminal and relevant values are shown in the figure beside




**2.3 Assigning slave address through selectors**

The Slave is to be given an address of between 1 and 99.
Two selector blocks (with four numbers each) in the cap allow to assign such value.
Enter the units using the four digits on the right and set tens with the four digits on the left, taking into account that digits weight increases from the bottom to the top (1-2-4-8 / 10-20-40-80) (refer to cap figure in paragraph 2.1).
It has to be noticed that the selection logic is negative, so it is necessary to give digits the logic value "0", instead of "1":

example: set 45 by taking selector 40 (tens) and selector 4 (units) to OFF.

**Warning:**

1) The value "0" and the values over "99" are not accepted by the Master which consequently reacts by disregarding the selection made and assigning the decimal value 126 to the Slave.
2) Remember that the Master queries the Slave about the address assigned (by selectors): this address must correspond to that assigned to the Slave during Hardware configuration. On the contrary a "Not Ready" error is signalled. The Slave reads the value of the selectors only when turned on (device power supply or "Power-ON") and this is the value given back to the Master. It is therefore necessary to select the address and then supply the Slave with power: a hot selection does not change the value of the address read when turned on.

### 2.4 Assigning the addresses through Profibus (without cap)

If the connection is a connector-type connection, Slave address must be assigned through the Profilibus system configuration. These procedures depend on the system type.

941612-way connector:

| pin n. | Function | Description |
|---|---|---|
| 1 | Shield | Shield/protection mass |
| 2 | M24 | Encoder voltage mass (24 V) |
| 3 | RxD/TxD-P | Data reception/transmission positive |
| 4 | RTS | Ready to Send: control signal for repeaters (optional) |
| 5 | DGND | Reference potential for data transmission signal and terminal resistance |
| 6 | VP | Supply voltage for P-terminal resistance (P5V) |
| 7 | P24 | Encoder power supply positive (24 VDC) |
| 8 | RxD/TxD-N | Data reception/transmission negative |
| 9 | NC | Not connected |
| 10 | NC | Not connected |
| 11 | NC | Not connected |
| 12 | NC | Not connected |

It is to be noticed that DGND/VP and M24/P24 power supplies are different and provided with galvanic insulation.

## 3. Hardware configuration:

a) Start the hardware organisation function from one's own system (example Step 7 SIEMENS)
b) Load the "Pxx.gsd" file included in the catalogue or data base supplied
c) From Master configuration, add the "Pxx-hohner-encoder" folder to the Profibus-DP network by dragging it from catalogue. This is found in the "Encoder" folder under the main folder called "Other field equipment"
d) Assign a "Slave address" (the same as that assigned through selectors)
e) Configure the 8 outputs and the 24 inputs by selecting either "8 Digital Out **no consistency**" and "24 Digital IN **no consistency**" respectively, if the consistency selector is set to OFF, or "8 Digital Out **consistency**" and "24 Digital IN **consistency**" if the consistency selector is set to ON (for further information about consistency refer to "Consistency" paragraph in this documentation).
f) Follow the procedures indicated by your system.

**4. Possible programming:**

a) The encoder allows to set the following:

- UP/Down increment direction (by default it increases if the shaft is rotated clockwise with UP setting)

b) The encoder allows to store the zero position (Offset)

**5. How to program:**

Through the 8 Outputs from your programming environment and using an "acyclic" writing method, two different procedures are possible according to the increment direction to be set.
If an encoder with an UP increment direction is wanted (shaft counter-clockwise increment), follows the procedure below:

| PROCEDURE 1 | BIN | HEX |
|---|---|---|
| 1) Prepares the encoder for programming | 0000 | 00 |
| 2) Sets the increment | 1001 | 90 |
| 3) Stores the increment direction | 0000 | 00 |
| 4) Resets | 1101 | D0 |
| 5) Stores the reset, ends programming and initialises the encoder | 0000 | 00 |

If an encoder with a DOWN increment direction (shaft clockwise decrement) is wanted, follow this procedure:

| PROCEDURE 2 | BIN | HEX |
|---|---|---|
| 1) Prepares the encoder for programming | 0000 | 00 |
| 2) Sets the increment | 1000 | 80 |
| 3) Stores the increment direction | 0000 | 00 |
| 4) Resets | 1100 | C0 |
| 5) Stores the reset, ends programming and initialises the encoder | 0000 | 00 |

WARNING: The procedure must be always completed, otherwise it has to be repeated from the beginning

## 6. Diagnostics:

The controller used in the Pxx encoder provides the Profibus-DP communications frame with an octet for the diagnostics.
The most significant bit of this byte (called PE7) is enabled whenever the encoder output data are not reliable. This condition may occur when:

1) the encoder is started until its inner configuration is completed.
2) steps are being programmed.

In these two cases the diagnostic bit is only temporarily enabled.
From the moment it gets disabled, the encoder is ready for a correct communication.

3) In the case of an error or failure of the encoder.

In this case the diagnostic bit can enable either temporarily (the encoder resets automatically the correct operation of its parts and disables the diagnostics) or permanently (the encoder can not restore all its functions by itself).
If the diagnostic bit always remains enabled, the encoder shall be fully reset (by turning it off and then on again). If the diagnostic bit remains in alarm condition even after encoder reset, the encoder is damaged.

Diagnostics checks the following encoder sections:

- **Controller of the single-turn section:**
  It checks that the single-turn section and the other steps dialogue correctly
- **Controller of the multi-turn section:**
  It checks that the multi-turn section and the other steps dialogue correctly
- **Controller of the internal Bus:**
  It is a Logic that checks the regular data exchange on the internal bus between the Profibus Controller and the encoder inner Controllers and also verifies that process is coherent.
- **Encoder time base**

NOTE: In cases 1 and 2 the diagnostic bit is a “ready” signal by the encoder
In case 3 the diagnostic bit is a real encoder error.

## 7. Consistency:

Consistency is a special mode used by the Profibus-DP protocol for data processing. It consists in keeping the information packed and sent in the same frame (case of data consistency: “Consistency”) or divided into different bytes sent in subsequent frames (case of data inconsistency: “no Consistency”).
The Profibus-DP protocol uses the inconsistent mode from 4 bytes on, the first 4 bytes being always consistent.
The encoder full version, that is the 24-bit version, needs 3 bytes to contain its data, so they are always processed by the Profibus-DP protocol as consistent data.
The use of the consistency requires the loading of some data blocks (for Siemens DB) as read data medium and functional blocks (for Siemens SFC) for processing the data contained in such blocks.
The advantage offered by the use of blocks relating to data consistency is that of creating a latch of such data. The disadvantage is the time wasted to manage such blocks.
The Consistency/No Consistency selector in the cap allows to physically operate from the outside, thus allowing to select the most suitable data reading mode.