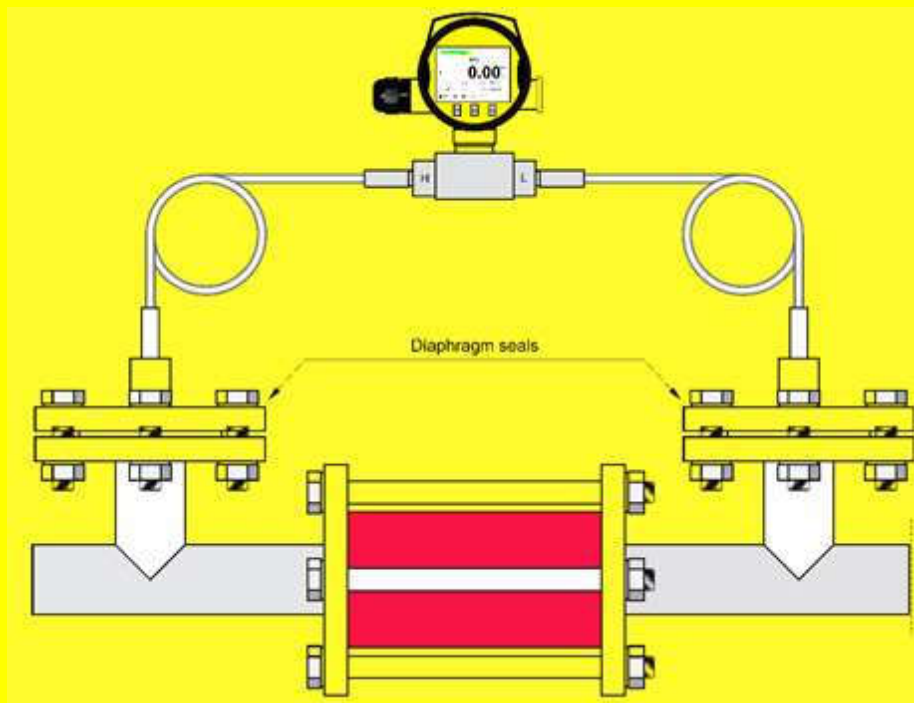


# Differential Pressure Transmitter MODEL: SB-DP

## SMART BIENE.



**Example of filter loss measurement**



## Modbus-RTU Register Map

### Format of the master message

Each message sent by the master obey the following format:

|                |               |                                 |         |         |
|----------------|---------------|---------------------------------|---------|---------|
| Device Address | Function code | n byte parameters<br>(optional) | CRC16_L | CRC16_H |
|----------------|---------------|---------------------------------|---------|---------|

Device Address: Address of the device.

Address 0 is reserved for broadcasting.

Addresses 1 to 247 can be used for this device

**Function code:** Function number

This function code use for read or write data.

**Parameters:** parameters different based on function

**CRC16:** 16-bit checksum to verify that data received correctly

### Format of the slave message

A message transmitted by the slave obey the following format:

|                |               |                                 |         |         |
|----------------|---------------|---------------------------------|---------|---------|
| Device Address | Function code | n byte parameters<br>(optional) | CRC16_L | CRC16_H |
|----------------|---------------|---------------------------------|---------|---------|

• Device Address: **Address of the device.**

• Function code: **The function number is same to the function number sent by the master.**

• Data: **Any data requested via the function follow here. If error ocued function code ORed with 0x80 and returned**

• CRC16

#### Exception errors

If message has been received correctly (no transmission error has occurred), but the transmitted function number and/or the parameters are invalid. **The slave responds an exception error**, unless the message has been received in broadcasting mode.

The message transmitted as a response by the slave has the following format:

|                |               |                |         |         |
|----------------|---------------|----------------|---------|---------|
| Device Address | Function code | Exception code | CRC16_L | CRC16_H |
|----------------|---------------|----------------|---------|---------|

#### Modbus RTU Frame Layout

|                          |               |                        |                |       |                          |
|--------------------------|---------------|------------------------|----------------|-------|--------------------------|
| > 3.5 char<br>Delay time | 8 bit address | 8 bit<br>Function code | n*(8 bit data) | CRC16 | > 3.5 char<br>Delay time |
|--------------------------|---------------|------------------------|----------------|-------|--------------------------|

The entire message frame must be transmitted continuously. If a interval of more than 1.5 character times occurs between two characters, the message frame is declared incomplete and discarded by the receiver.

### Description of MODBUS functions

**F3: Read registers on MODBUS address space**

**F6: Write single register on MODBUS address space**

**F8: MODBUS Echo function**

**F16: Write multiple registers on MODBUS address space**

#### Function 3: MODBUS Read Register



Read single or multiple registers in the MODBUS address space starting with Start Address. Note, that the data returned based on “MODBUS Register Map”.

**Request:**

|                |      |              |              |        |        |         |         |
|----------------|------|--------------|--------------|--------|--------|---------|---------|
| Device Address | 0x03 | Start addr H | Start addr L | #Reg H | #Reg L | CRC16_L | CRC16_H |
|----------------|------|--------------|--------------|--------|--------|---------|---------|

**Response:**

|                |      |         |        |        |     |         |         |
|----------------|------|---------|--------|--------|-----|---------|---------|
| Device Address | 0x03 | # Bytes | Data H | Data L | ... | CRC16_L | CRC16_H |
|----------------|------|---------|--------|--------|-----|---------|---------|

**Error:**

|                |      |       |         |         |
|----------------|------|-------|---------|---------|
| Device Address | 0x83 | Error | CRC16_L | CRC16_H |
|----------------|------|-------|---------|---------|

#### Function 6: MODBUS Write Single Register

This function is similar to F16, but writes only 1 register. Note, that the data will be written based on “MODBUS Register Map”.

**Request:**

|                |      |              |              |        |        |         |         |
|----------------|------|--------------|--------------|--------|--------|---------|---------|
| Device Address | 0x06 | Start addr H | Start addr L | Data H | Data L | CRC16_L | CRC16_H |
|----------------|------|--------------|--------------|--------|--------|---------|---------|

**Response:**

|                |      |              |              |        |        |         |         |
|----------------|------|--------------|--------------|--------|--------|---------|---------|
| Device Address | 0x06 | Start addr H | Start addr L | Data H | Data L | CRC16_L | CRC16_H |
|----------------|------|--------------|--------------|--------|--------|---------|---------|

**Error:**

|                |      |       |         |         |
|----------------|------|-------|---------|---------|
| Device Address | 0x86 | Error | CRC16_L | CRC16_H |
|----------------|------|-------|---------|---------|

#### Function 8: MODBUS Echo Test

This function used to perform a quick line check. It returns the data that received.

**Request:**

|                |      |   |   |        |        |         |         |
|----------------|------|---|---|--------|--------|---------|---------|
| Device Address | 0x08 | 0 | 0 | Data H | Data L | CRC16_L | CRC16_H |
|----------------|------|---|---|--------|--------|---------|---------|

**Response:**

|                |      |   |   |        |        |         |         |
|----------------|------|---|---|--------|--------|---------|---------|
| Device Address | 0x08 | 0 | 0 | Data H | Data L | CRC16_L | CRC16_H |
|----------------|------|---|---|--------|--------|---------|---------|

**Error:**

|                |      |       |         |         |
|----------------|------|-------|---------|---------|
| Device Address | 0x88 | Error | CRC16_L | CRC16_H |
|----------------|------|-------|---------|---------|

#### Function 16: MODBUS WRITE Register

Write multiple registers on the MODBUS address space starting with Start Address. Note, that the data will be written based on “MODBUS Register Map”.

**Request:**

|                |      |              |              |         |         |         |        |        |     |         |         |
|----------------|------|--------------|--------------|---------|---------|---------|--------|--------|-----|---------|---------|
| Device Address | 0x10 | Start addr H | Start addr L | # Reg H | # Reg L | # Bytes | Data H | Data L | ... | CRC16_L | CRC16_H |
|----------------|------|--------------|--------------|---------|---------|---------|--------|--------|-----|---------|---------|

**Response:**

|                |      |              |              |         |        |         |         |
|----------------|------|--------------|--------------|---------|--------|---------|---------|
| Device Address | 0x10 | Start addr H | Start addr L | # Reg H | #Reg L | CRC16_L | CRC16_H |
|----------------|------|--------------|--------------|---------|--------|---------|---------|

**Error:**

|                |      |       |         |         |
|----------------|------|-------|---------|---------|
| Device Address | 0x90 | Error | CRC16_L | CRC16_H |
|----------------|------|-------|---------|---------|

**RTU character framing**

|           |   |   |   |   |   |   |   |   |             |          |
|-----------|---|---|---|---|---|---|---|---|-------------|----------|
| Start bit | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Even parity | Stop bit |
|-----------|---|---|---|---|---|---|---|---|-------------|----------|

**Note that this device only support baud rate 9600.**

**Register Map-SB-DP****SB-DP (0101)**

| word               | name   | R/W |
|--------------------|--|-----|
| 0,1(Float IEEE754) | Min measuring range  | R   |
| 2,3(Float IEEE754) | Max measuring range  | R   |
| 4,5(Float IEEE754) | Pressure Value   | R   |
| 6,7(Float IEEE754) | High Pressure  | R   |
| 8,9(Float IEEE754) | Low Pressure   | R   |
| 10(bit)            | 0-E1<br>1-E2<br>2-E3<br>3-E4<br>5-AI1On<br>6-AI2On<br>7-AI3On<br>8-AI4On                                 | R   |
| 11-16(char)        | Model ID   | R   |
| 17-22(char)        | Serial Number  | R   |
| 23                 | Unit<br>0-mbar<br>1-bar<br>2-PSI<br>3-KPa<br>4-MPa<br>5-Kg/cm2<br>6-mmHg<br>7-mmH2O<br>8-inHg<br>9-inH2O | R   |
| 24-35(char)        | Tag ID   | R/W |

**WWW.SMARTBIENE.COM**

**Smart Measurement.**

---

All specifications are subject to change without notice.  
All sales subject to standard terms and conditions.  
© Smart Biene Inc. 2012/09/15

Smart Biene Inc., 250 East Main Street, Stuttgart,  
Germany.  
Email: [info@smartbiene.com](mailto:info@smartbiene.com)