



## PHM33 User's Manual

# Industry Degree Differential Pressure Transmitter

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## Product description

Transmitter for differential pressure measurement. Membrane technology sensor.

The main application area for the PHM33 is going to be clean-rooms, but also other applications such as control of pressure drop, energy management systems or HVAC can be considered as target markets. The PHM33 is best economic option to the market.

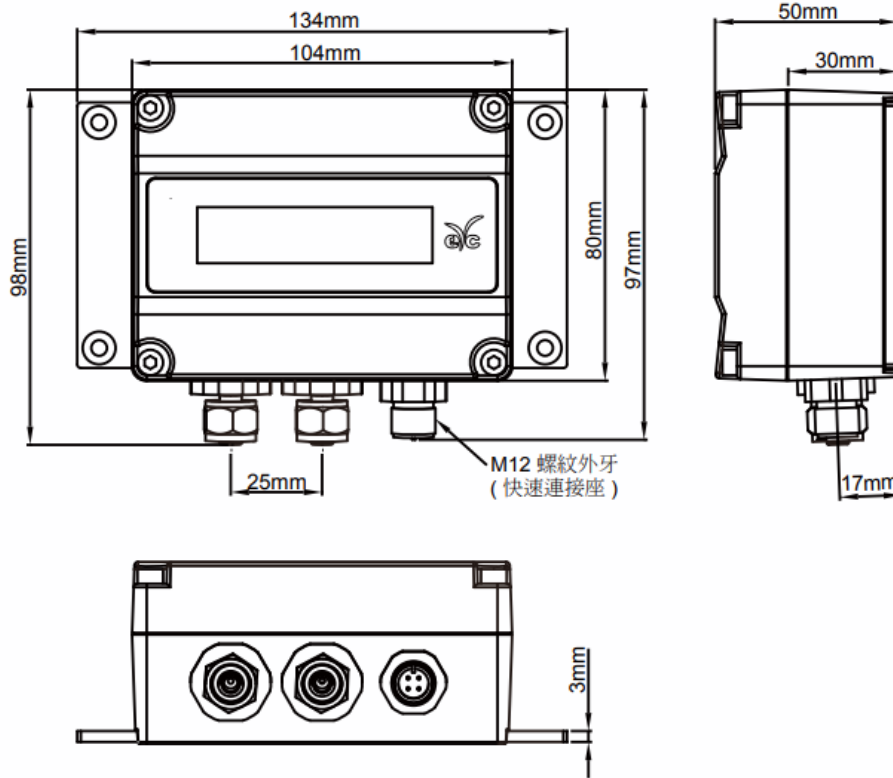
## Product Characteristics

- Range from  $\pm 50\text{Pa}$  to  $\pm 500\text{Pa}$
- RS-485 Communication Interface, Modbus RTU protocol.
- 4-20mA or 0-10V output
- IP65, with or without LCD display
- Square root function for air velocity measurement
- Computer fixing for linearity.
- High stability & repeatability.

## Technical Data

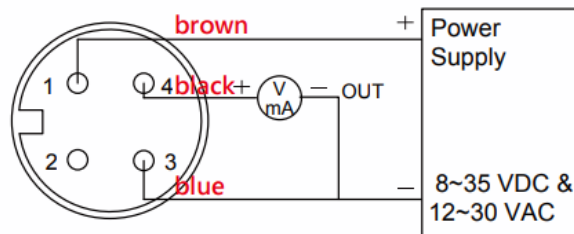
Parameters	Differential pressure
Sensor technology	Piezoelectric Differential Pressure Module
Measuring Units	mbar, Pa, hPa, kPa, mmH <sub>2</sub> O, mmWS, inH <sub>2</sub> O, mmHg
Measuring Range	0- $\pm 500$ Pa
Output Signal 3-wire	0-20mA / 4-20mA / 0-1V / 0-5V / 1-5V / 0-10V / 2-10V
Accuracy at 25°C	$\pm 0.5$ % of F.S.
Load Impedance (Current output)	< 500 $\Omega$
Load Impedance (Voltage output)	$\geq 10\text{K}\Omega$
Filter	0, 5, 10, 20, 25 seconds
Auto zero	Manual with push button
Display	LCD 16*2 digits
Power Supply	8~35VDC or 12~30VAC
Electronic Protection	Overvoltage/ Reverse Protection
Certification:	CE
IP-Protection	IP 65
Connect	M12 Metal Connector
Working Temperature	0 ~ 50°C (With Display) -20~+80°C (Without Display)
Storage Temperature	-40 ~ +80 °C
Environment Humidity	< 97 % RH (Non-Dewing Condition)

## Dimension (mm)



## Connection Diagram

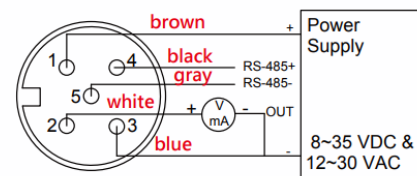
### Analogue Diagram



M12 connector

M type (4P)

### Analogue + RS-485 Diagram



M type (M12, 5P) connector

## DIP Switch

For PHM33, the setting status of DIP switch will be read by software while power on, and this reading action will not happen later on. Thus in order to read the DIP switch status again by firmware, the user must to reboot again if re-setting the DIP switch.

### Function List

- Switch\_1                      DIP switch Active / Deactivate
- Switch\_2                      0-10V / 4-20mA
- Switch\_3,4                    Maximum measuring value
- Switch\_5,6,7                Units
- Switch\_8                      Central range
- Switch\_9                      Square Root Extracted
- Switch\_10                    Filter 1 second
- Switch\_11,12                Station ID 1-4

### DIP Switch Active / Deactivate

The function of DIP Switch\_2 ~ 12 only be effective while setting the DIP switch\_1 as “On” .  
The transmitter setting is factory default or by software if DIP switch\_1 as “Off” .

O: On, X: Off

DIP switch	Switch_1
Deactivate	X
Active	O

### Analog Output setting

4-20mA or 0-10V for output setting

O: On, X: Off

Output	Switch_2
4-20mA	X
0-10V	O

## Maximum Measuring value setting

Three fixed values could be selected by DIP switch. Example, the number 0.5 on the table (mbar, Switch\_3 and Switch\_4 both Off) is represented +100% of measuring value.

One flexible measuring range support by factory default or user software setting as Switch\_3 and Switch\_4 both On. In this setting, the Central range setting for Switch\_8 will be ignored and the measuring range is setting as factory default or user software.

O: On, X: Off

Switch	3		4		3		4		3		4		3		4	
	X	X	X	X	O	O	O	O	X	X	X	X	O	O	O	O
Unit\Range	10	20	30	40	10	20	30	40	10	20	30	40	10	20	30	40
Pa	50	300	1000	2500	100	500	1600	5000	250	1000	2500	7500	default or software setting			
mbar	0.5	3	10	25	1	5	16	50	2.5	10	25	75	default or software setting			
hPa	0.5	3	10	25	1	5	16	50	2.5	10	25	75	default or software setting			
kPa	0.05	0.3	1	2.5	0.1	0.5	1.6	5	0.25	1	2.5	7.5	default or software setting			
mmH2O	5	30	100	250	10	50	160	500	25	100	250	750	default or software setting			
mmWS	5	30	100	250	10	50	160	500	25	100	250	750	default or software setting			
inH2O	0.2	1.2	4	10	0.4	2	6.4	20	1	4	10	30	default or software setting			
mmHg	0.375	2.25	7.5	18.75	0.75	3.75	12	37.5	1.875	7.5	18.75	93.75	default or software setting			

## Unit setting

Eight units is supported by transmitter: mbar, Pa, hPa, kPa, mmH2O, mmWS, inH2O and mmHg.

O: On, X: Off

Unit	Switch_5	Switch_6	Switch_7
mbar	X	X	X
Pa	O	X	X
hPa	X	O	X
kPa	O	O	X
mmH2O	X	X	O
mmWS	O	X	O
inH2O	X	O	O
mmHg	O	O	O

## Central range setting

According maximum measuring value setting of Switch\_3, 4 and unit setting of Switch\_5, 6, 7, the central range sets the Bidirectional or unidirectional of measuring.

Example: the maximum measuring value is 0.5 and the unit setting is mbar

Switch\_8 Off : -0.5 / +0.5 mbar

Switch\_8 On : 0 / +0.5 mbar

O: On, X: Off

Range	Switch_8
Range: -100 ~ +100%	X
Range: 0 ~ +100%	O

Note: If Switch\_3, 4 both On, then Central range setting will be ignored

## Square Root Extracted setting

Root extraction is benefit for air velocity application. Measure the air velocity in the application with a reference instrument and work out the average velocity. LCD shown the √ mark on left-low side and red led of LDEP flash slowly while the square root extracted function has active.

The following formula can be used for converting a linear 4-20mA current loop signal to a square root extraction type:

$$\text{Output}_{\text{SqRt}} = 4\text{mA} + (4 \times \sqrt{\text{Output}_{\text{Linear}} - 4\text{mA}})$$

The formula for 0-10V to a square root extraction type:

$$\text{Output}_{\text{SqRt}} = \sqrt{10 \times \sqrt{\text{Output}_{\text{Linear}}}}$$

O: On, X: Off

Status\No.	Switch_9
Linear	X
Square Root Extracted	O

## Filter

Analog output filter setting for 1 second or disable.

O: On, X: Off

Status\No.	Switch_10
Filter off	X
1 second	O

## Station ID setting for Modbus

Station ID for Modbus RTU slave device setting.

O: On, X:Off

Station ID	Switch_11	Switch_12
1	X	X
2	O	X
3	X	O
4	O	O

Note:

While setting the DIP switch\_1 as "On", some of the "Setting" & "Output" features will be disabled on user software. In other word, these features are controlled by DIP switch. Otherwise, the features on UI can be configured if set the DIP switch\_1 as "Off" .



## Button

### AUTOZERO

This button allows user to set the current pressure to “AUTOZERO”, it is required to press the button for 1~2 seconds, and the pressure adjusted to “AUTOZERO” after release this button. The user will observe the red led of LEDP turn on for the noticing zero function has active.

### Factory default

This button allows user to restore factory default setting, it is required to press the button for 10 seconds, red led of LEDP turn to flash, the pressure offset and multiple factor will reset to 0 and 1 after release this button.



## RS-485 and Modbus

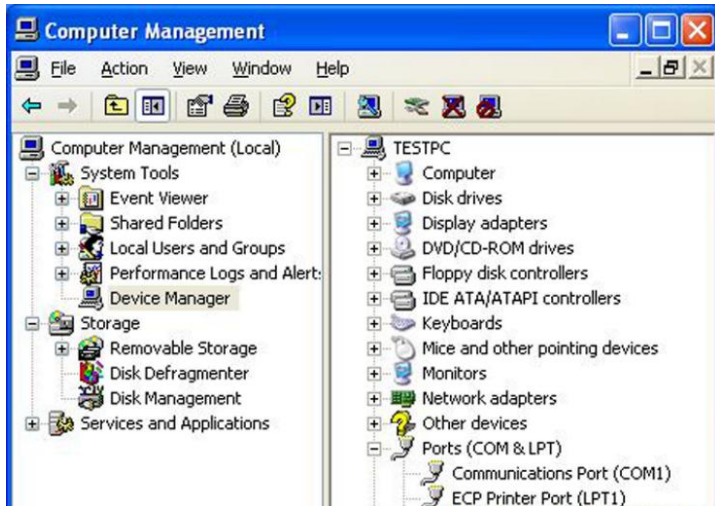
PHM33 integrate a RS-485 interface for digital communication as a option feature. Based on Modbus protocol makes the general convenience on PLC, HMI and PC connection. For Modbus protocol information please attached the file from website to download. Besides the PLC, HMI application, the user software provide the device setting and data logging function, it also can free download from website.

### Technical Data:

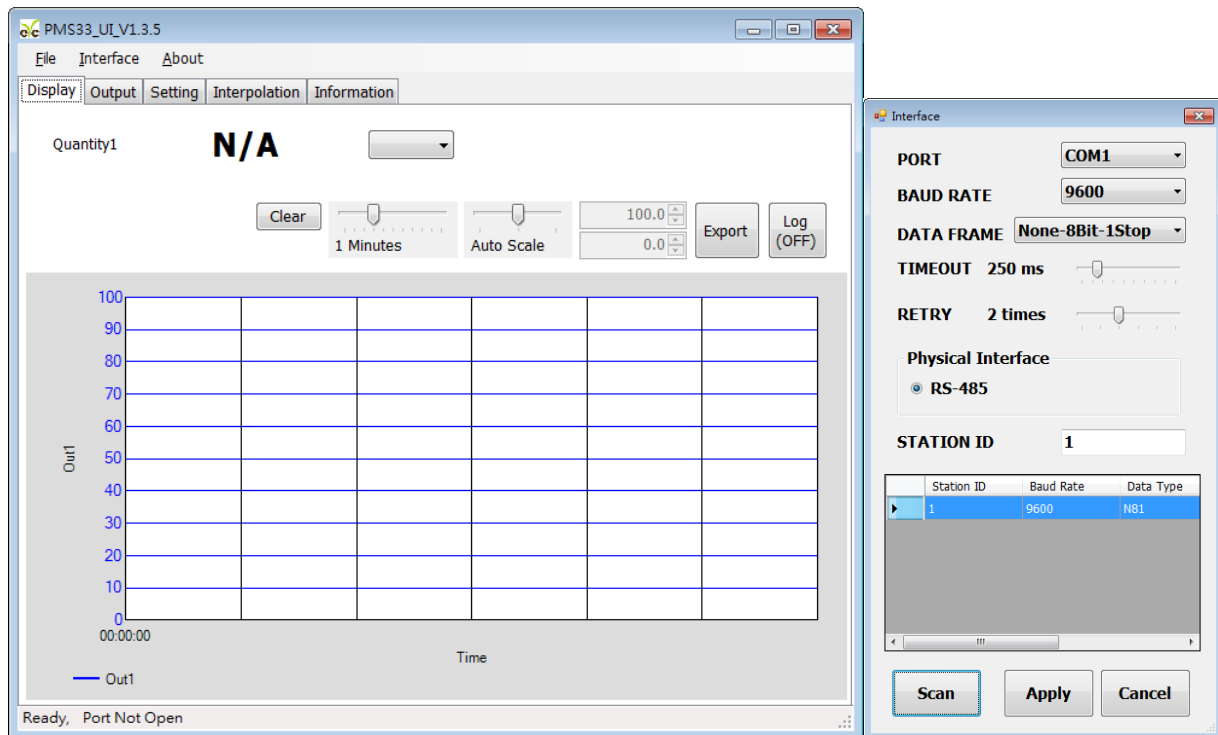
- Max. network size: 32 transmitters
- Communication: with COM-Port (serial interface) of PC
- Max. network expansion: 1200m (3937ft) total length at 9600 baud
- Transmission rate: 9600, 19200, 38400, 57600, 115200 Baud
- Parity: None, Even, Odd
- Data length: 8 bit
- Stop bit: 1 or 2 bit
- Factory default Station address = 1, Data format= 9600, N81

## User Software

1. Hardware connection: Connect the PHMK33 to PC by USB to RS-485 converter.
2. Check the COM port number from Computer Management



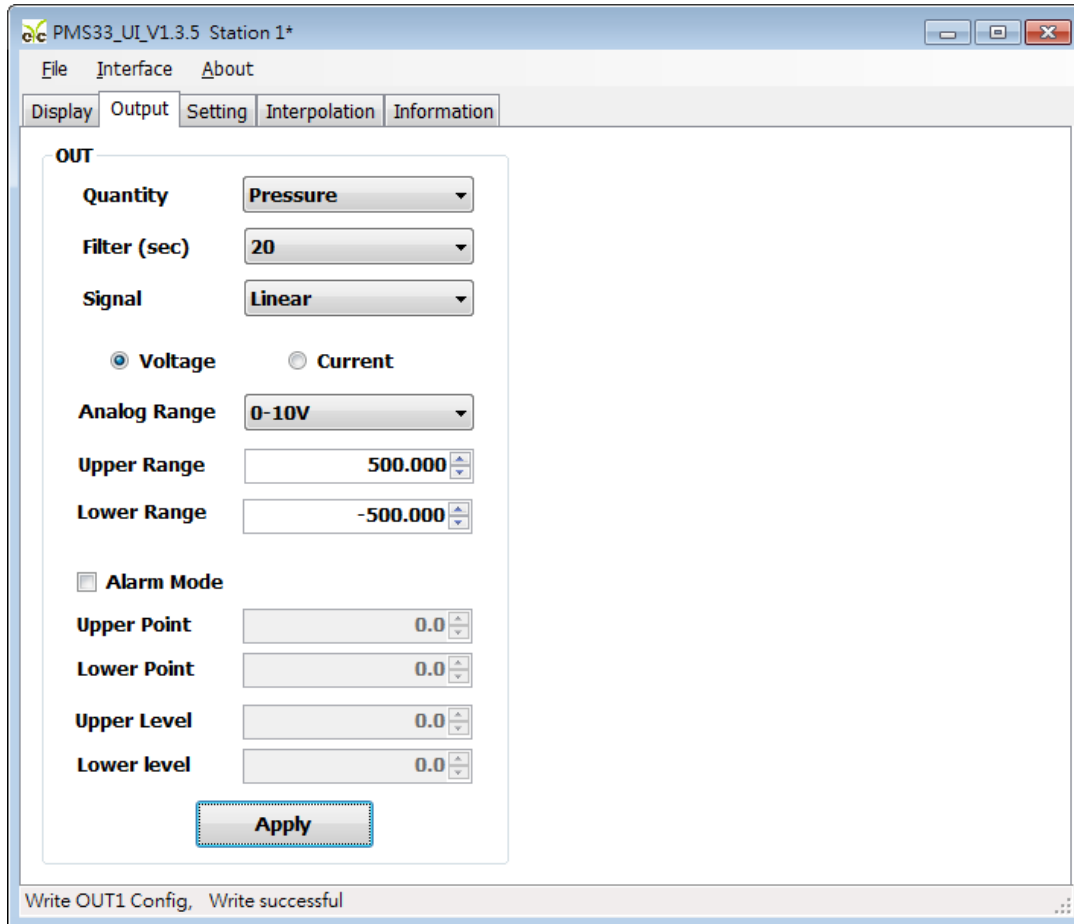
3. Open the PMS33\_UI, go to function "Interface", click item "Config" and then setting COM port, BAUD rate and data format, pressed "Scan" bottom for scan devices and "Apply" for connection.



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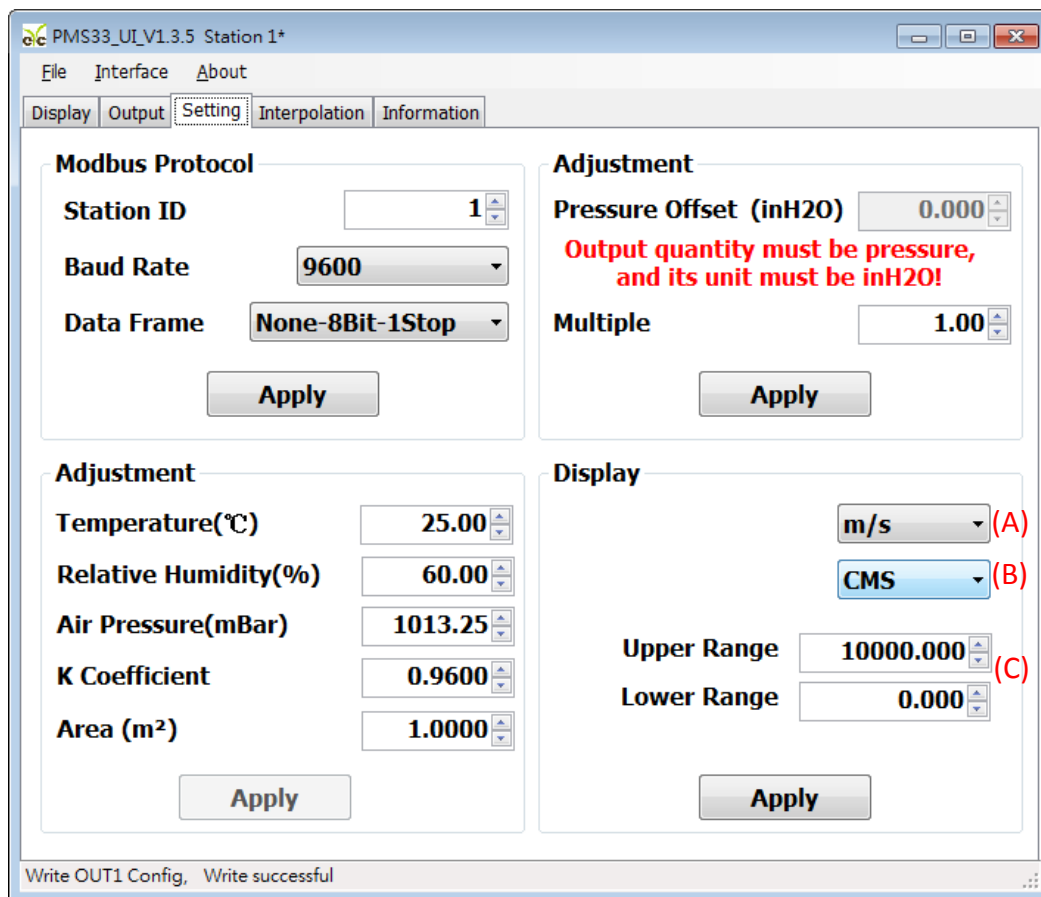
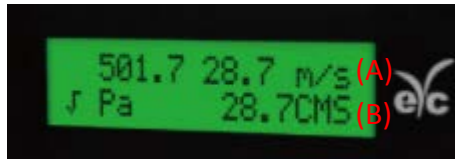
### 4. Setting on Analog Output

- i. Quantity: Pressure
- ii. Filter: 0, 5, 10, 20 seconds
- iii. Signal: Linear / Square root extraction
  - LCD shown the  $\sqrt{\quad}$  mark on left-low side and red led of LDEP flash slowly while the square root extracted function has active.
- iv. Analog type: 0-20mA / 4-20mA / 0-1V / 0-5V / 1-5V / 0-10V / 2-10V
- v. Range for Upper and Lower



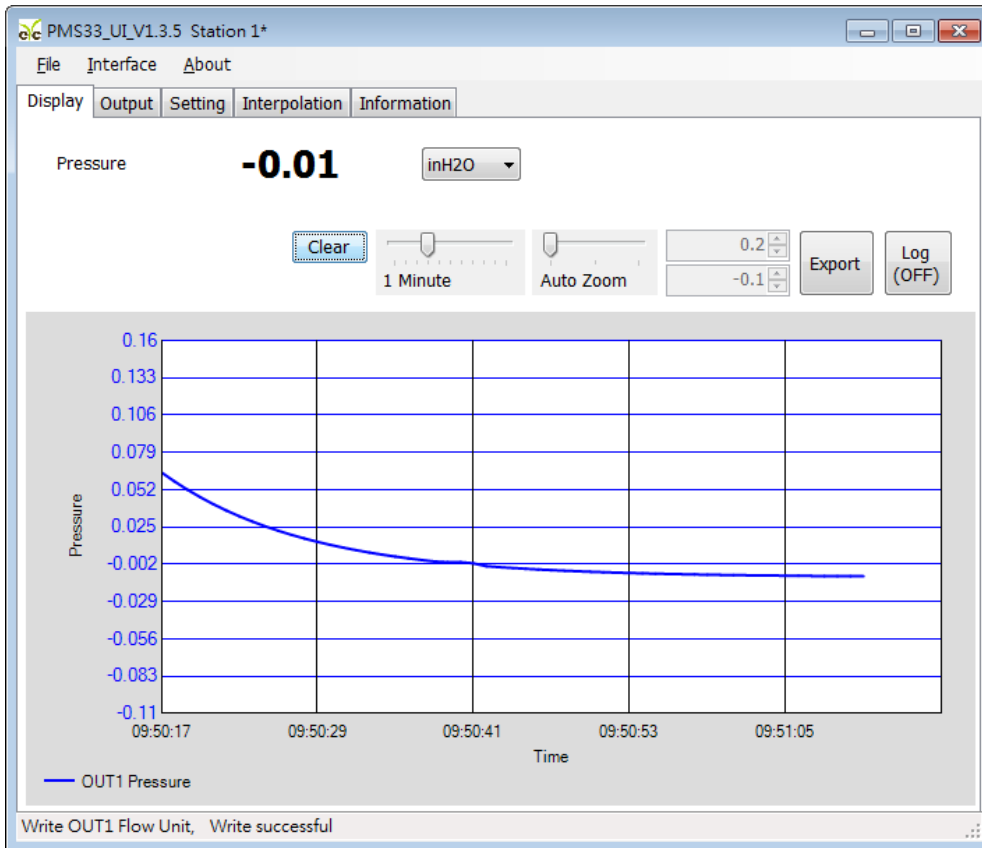
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5. Setting on RS-485, offset adjustment and display
  - i. Station ID: 1~247
  - ii. Baud Rate: 9600 / 19200 / 38400 / 57600 / 115200
  - iii. Data Frame: None-8Bit-1Stop / None-8Bit-2Stop / Even-8Bit-1Stop / Even-8Bit-2Stop / Odd-8Bit-1Stop / Odd-8Bit-2Stop /
  - iv. Pressure Offset adjustment, unit available in inH2O only
  - v. Multiple on measuring value, from 0.01 to 100
  - vi. Display unit of flow velocity (A)
  - vii. Display unit of flow volumetric (B) and span programming (C)



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6. Unit setting, data display and data logging
  - i. Pressure unit: mbar, Pa, hPa, kPa, mmH2O, mmWS, inH2O, mmHg
  - ii. Export file: \*.CSV



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## 7. Transmitter information

The screenshot shows a software window titled "PMS33\_UI\_V1.3.5 Station 1\*" with a menu bar (File, Interface, About) and a tabbed interface (Display, Output, Setting, Interpolation, Information). The "Information" tab is active, displaying the following data:

<u>Product Identification</u>		<u>Offset Adjustment</u>	
Model Name	PMH33	Pressure Offset (inH2O)	0.000
Firmware Version	1.5.8		
Serial Number	RD1710200001	<u>Multiple Adjustment</u>	
Firmware Checksum	E73E	Multiple	1.00
Calibration Date	2017-12-27		
<u>Calib Data</u>		<u>Lower Point</u>	<u>Upper Point</u>
Pressure (inH2O)	0.00	0.00	1.00

At the bottom of the window, a status bar displays the message: "Write OUT1 Flow Unit, Read successful".