MINI DIGITAL DIFFERENTIAL PRESSURE GAUGE/CONTROLLER/TRANSMITTER

SERIES MD

Power type   Battery type
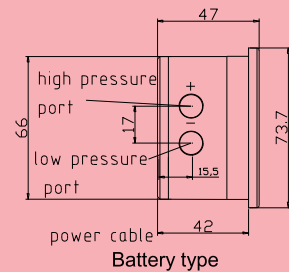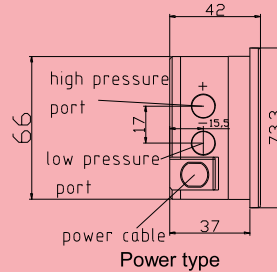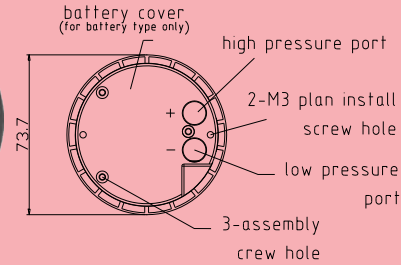
The Series MD Digital Differential Pressure Gauge is available with various options like Battery powered version, Digital Display Gauge with control relay switch with buzzer or as a single Digital Differential Pressure Controller having 3 in 1 instrument processing a Digital Display Gauge, control relay switches, and a transmitter with 4-20mA/0-10 VDC output all packed in a compact housing.

FEATURES:
● The Compact size make it ideal for use in small equipment application.
● Unit Selection provides reading in easily recognizable units.

APPLICATIONS
● It can measure system pressure of fan, filters, blower and can apply to various biological safety cabinet, clean bench, medical or pharmaceutical machine, etc.

MODEL CHART FOR DIGITAL DIFFERENTIAL GAUGE

Series	MDPG MBDPG		Mini Digital DP Gauge (Power Type) Mini Digital DP Gauge (Battery Type)
Range		x	Range Selection, Only 1,10,20,40 are available

MODEL CHART FOR DIGITAL DIFFERENTIAL PRESSURE GAUGE/SWITCH

Series	MDPC			Mini Digital DP Switch/Gauge
Output		x		
Range			1 2	2xSPST 1xBuzzer

MODEL CHART FOR DIGITAL DIFFERENTIAL PRESSURE CONTROLLER

Series	MDPT				Mini Differential Pressure Gauge/Controller
Range		x			
Relay			- 1 2		No Relay/Alarm 2xSPST 1xBuzzer
				0 1	0-10 V & 4-20 mA RS485/Modbus

SPECIFICATIONS:

Service: Air and non-combustible gas
Accuracy: ± 1 % FS
Long term stability: ±0.5%FS /Year
Thermal effect: <0.05%FS/°C(zero), <0.08%FS/°C(FS)
Storage Temperature: MBDPG: -10~50°C
MDPG: 20~70°C
Operating Temperature: 0 ~ 60°C
Working Pressure: overload 10xFS, burst 15xFS
Display: 5 bits LCD, with engineering unit, with backlight (except MBDPG)
Output: 0-10V / 4-20mA (3 wires)
Output load: ≤500Ω (current), ≥2KΩ (voltage)
Digital Output: RS485/Modbus (9600-n-8-1)
Relay Output: 2×SPST, 3A/30VDC, 3A/250VAC or 1xBuzzer
Process Connection: 5mm ID tubing
Battery type (MBDPG):
Power: AA battery x 4, recommend LR6 alkaline
Display update time: selectable for 0.5/1/5/10s (default 1s)
Automatic sleep time: selectable for normal open (NO), or 1/5/10min (default 1min)
Battery service life: when display update time=1s and automatic sleep time=NO, ≥2 year. When display time>1s or automatic sleep time≥1min, will be longer. It also depends on the quality of the batteries.
Power type (MDPG/MDPC/MDPT): 16~28VDC/AC
Process Connection: 5mm ID tubing, two pairs (left/back)
**Enclosure Rating:** IP54
Material: ABS
Approval: CE

Code	Unit & Range & Display Resolution					
	Pa	Pa	kPa	in w.c.	mm w.c.	mbar
0	0-25	25.00	0.025	0.100	2.500	0.250
Q	0-60	60.00	0.060	0.250	6.000	0.600
H	0-125	125.0	0.125	0.500	12.50	1.250
1	0-250	250.0	0.250	1.000	25.00	2.500
2	0-500	500.0	0.500	2.000	50.00	5.000
4	0-1000	1000	1.000	4.000	100.00	10.00
10	0-2500	2500	2.500	10.00	250.00	25.00
20	0-5000	5000	5.000	20.00	500.00	50.00
40	0-10000	10000	10.000	40.00	1000	100.0

1. 5 engineering units can be set by keys and related LCD will be on.
2. For MDPG and MBDPG, only ranges 1, 10, 20, 40 are available.
3. For zero center models, add "Z" at the end of the model.
   MDPTQZ, means- 30-0-30 Pa, only Q-10 have this selection

MD Mini Digital Differential Pressure Gauge/Controller/Transmitter

Connection

Different models have different electrical connections. Refer to the table as below (x means for any models) Power type MDPG/MDPC/MDPT series gauges need external power 24VAC/DC, red line connect positive and black line connect negative power, shown as figure (1); transmitter output and relay output connections are shown as figure (2) follow tables. Battery type MBDPG series gauges need to installed 4 pcs of AA batteries, LR6 alkaline is suggested, shown as figure (3). Battery compartment cover should be installed tightly to ensure IP65 protection rate.

Figure (1)   Figure (2)   Figure (3)
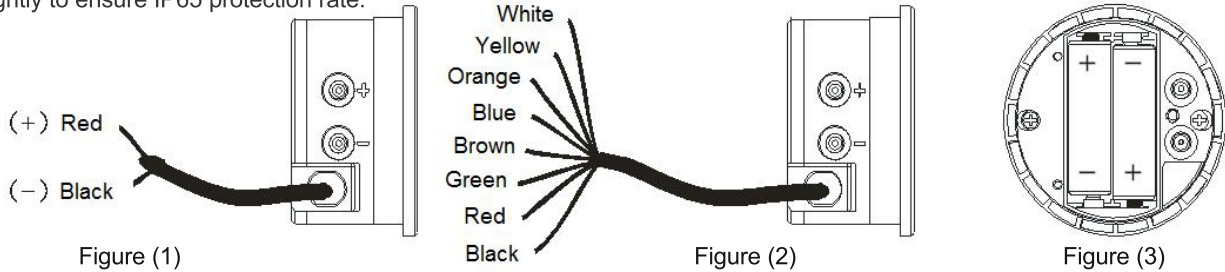
MDPG/MDPC/MDPT series 24VDC/AC power relay output and transmitter output connections

Table Model	2 wires cable		
	Line color	Red	Black
MDPG	Signal	+24V	
MDPCx2	Signal	+24V	GND

Model	4 wires cable				
	Line color	Red	Black	Yellow	White
MDPTx20	Signal	+24V	GND	0-10V	4-20mA
MDPTx21	Signal	+24V	GND	A+	B-

Model	6 wires cable							
	Line color	Red	Black			Green	Brown	Blue	Orange
MDPCx1	Signal	+24V	GND			No2	COM2	No1	COM1

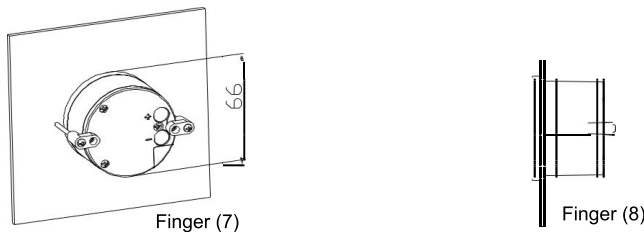| Model	8 wires cable								
	Line color	Red	Black	Yellow	White	Green	Brown	Blue	Orange
MDPTx10	Signal	+24V	GND	0-10V	4-20mA	No2	COM2	No1	COM1
MDPTx11	Signal	+24V	GND	A+	B-	No2	COM2	No1	COM1

Remark:x means for different range code.

Installation and Accessories

It can be installed by surface, panel or flush mount with accessories. Gauges should be installed vertically and connected high/low pressures.
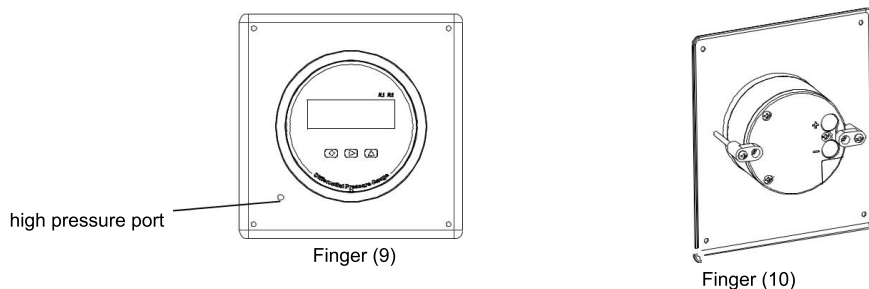
1 .Surface mount
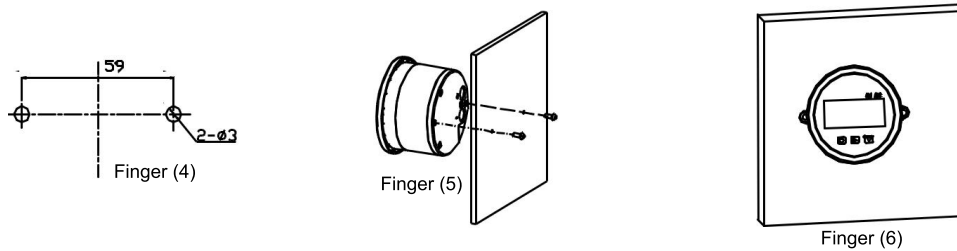
Finger (4)   Finger (5)   Finger (6)

2.Panel mount

Finger (7)   Finger (8)

3. Flush mount

high pressure port   Finger (9)   Finger (10)

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Flush mount needs extra accessories, shown as figure (9) and (10), depending on the desired ways of installation.
The main difference from panel mounting is: flush mount can only be opened and operated at the front side of the installation position, but the back side is completely sealed. The total depth of the gauge is only 42mm (battery type) and 37mm (power type), so if customers use the side pressure ports fortubing, the flush space can be as small as only 42mm or 37mm. Pressure connections are the same as above surface or panel mounting method.

Zero reset:
Due to different environment and sensor's own characteristics, gauges may have some zero drift after long period of using, which may affect the accuracy. Therefore, the gauges need to be reset at zero point before using. Otherwise it can not perform the normal accuracy. The gauges can get better accuracy if they can be reset at zero point after 7 days continuously using. In addition, users should repeat the zero reset operation in every 6 or 12 months, or when the deviation of the gauges exceeds permitted value. Zero reset operation: keep the high/low pressure ports unconnected in stable air, or directly connect the two, press the button 3 seconds (at this time, the gauges should display 0) to reset the actual "zero point". It means "remove the zero drift of the gauge in order to improve the accuracy". It is recommended that this operation could be done periodically. Initial drift and zero reset: when initial using, power on and fully warm the gauge (more than 30 minutes), then operate the zero reset. Long period drift and reset: after long periods using, the gauge may produce long-term drift, customers can operate the zero reset when needed.

User calibration:
This product allows the user to re calibrate the following 2 sets of parameters: 4-20mA analog output (zero and range), 0-10V analog output (zero and range). However, it is recommended to carefully deal with. Factory has completed the calibration, field calibration under the inadequate conditions will affect the accuracy of the product, and even damage to the product.

Attention
It should be power OFF during installing and wiring, and ensure the external power connection or battery polarities are completely correct. Otherwise it will bring unpredictable circumstances, or even damage to the product.

Warranty
It has limited warranty for twelve (12) months after the production date.
MDPG Mini Digital Differential Pressure Gauge/Controller/Transmitter
Operation Instruction
Button definition:

◇   ▷   △
Set/Save   Bit Select/decrease   Adjust/increase

Zero reset:
keep the high/low pressure ports unconnected in stable air, or directly connect the two, press the button 3 seconds (at this time, the gauges should display 0) to reset the actual "zero point". It means "remove the zero drift of the gauge in order to improve the accuracy". It is recommended that this operation could be done periodically.

Operation instruction:
The user can set the parameters of the device in accordance with the following operation. Pls press ◇ entering programming and shows "P000" , then press ▷ to select bit, and press △ to cycle 0~9 settings, choose a different function code that shows as below, then press ◇ to setup the function parameters.
When parameter set in for 30 seconds without any operation, the program will exit to the normal working condition.
For the different product types, the corresponding function is slightly different. Users can be set according to the model parameters

Model	Function													
	P810	P075	P076	P081	P083	P301	P302	P401	P402	P483	P484	P485	P271	P281
MBDPG	√	√	√	√	√	X	X	X	X	X	X	X	X	X
MDPG	√	√	X	√	√	X	X	X	X	X	X	X	X	X
MDPCx1	√	√	X	√	√	X	X	√	√	X	X	X	X	X
MDPCx2	√	√	X	√	√	√	√	X	X	X	X	X	X	X
MDPTx00	√	√	X	√	√	X	X	X	X	X	X	X	√	√
MDPTx01	√	√	X	√	√	X	X	X	X	√	√	√	X	X
MDPTx10	√	√	X	√	√	X	X	√	√	X	X	X	√	√
MDPTx11	√	√	X	√	√	X	X	√	√	√	√	√	X	X
MDPTx20	√	√	X	√	√	√	√	X	X	X	X	X	√	√
MDPTx21	√	√	X	√	√	√	√	X	X	√	√	√	X	X

1. "P810": Reset factory default set
◇ □ ▷/△ □ P810 □ "rESt" □ ◇ finish. Users can use this function to restore factory default settings.

2. "P075": Set display update time (Default set: 1 second, available range: 0.5, 1, 5, 10 seconds)
◇ □ ▷/△ □ P075 □ ◇ □ ▷/△ □ XXX □ ◇ finish. (XXX means set time)

3. "P076": Set automatic sleep time (Default set: 1 minute, available range:0, 1, 5, 10 minute, 0 = continuously display, 1~10:
auto shut-off(sleep) time when no operation), This function is only available for MBDPG models. ◇ □ △/ □ P076 □ △/ □ ◇ □ XXX □ ◇ finish (XXX means set time) Note：In power-on status, press △ key 3s to shutdown; In power-off status, press any key to boot.

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4. "P081": Set Engineering Unit (Default set: 1, for engineering unit Pa, available ranges: 1-5)
◇ □ /△ □ P081 □ ◇ □ X □ ◇ finish (XXX means the code of engineering unit), then the relevant unit LED on.
(Index of Unit: 1: Pa; 2: KPa; 3: mbar; 4: mm W.C.; 5: in W.C.)
5. "P083": Check LCD display function, It is use for checking the display screen.
◇ □ /△ □ P083□ ◇ Light all display for check the display □ ◇ finish
6. "P301": Sound-light alarm Set (default set: 0, no any preset, does NOT work), for buzzer option gauge
◇□ /△□P301□◇□ /△□XXX□◇□ /△□XXX□◇□ /△□XXX□◇□ /△□XXX□◇□ /△□XXX□◇finish
XXX means 5 settable parameters, stands for alarm mode, parameter #1, #2, #3 and #4 respectively.
Schematic diagram of sound-light alarm function

Mode	Description	Para. #1	Para. #2	Para. #3	Para. #4	Schematic diagram
0	Cancel alarm function	N/A	N/A	N/A	N/A	Alarm OFF
1	Alarm actuate when input is lower than setpoint	Set point	Dead band	Actuate delay	Restore delay	Alarm ON ↑Deadband ↓Alarm OFF ▲Setpoint
2	Alarm actuate when input is higher than setpoint	Set point	Dead band	Actuate delay	Restore delay	Alarm OFF↓Deadband↑Alarm ON ▲Setpoint
3	Alarm actuate between high and low limits	Low limit	High limit	Actuate delay	Restore delay	Alarm OFF Alarm ON Alarm OFF Low limit ▲ ▲ High limit
4	Alarm actuate outside high and low limits	Low limit	High limit	Actuate delay	Restore delay	Alarm ON Alarm OFF Alarm ON Low limit ▲ ▲ High limit

Note:
(1) when the alarm working mode is 0, the parameter 1~4 can not be set.
(2) when the alarm working mode is 1~4, the parameter 1~4 must be set reasonably, otherwise, the relays will not work properly. A. when the alarm working mode is 1 or 2, the set point should be inside the range, not allowed to zero or full scale.
B. when the alarm working mode is 3 or 4, the low limit should be less than the high limit, and both of them can not be zero or full scale.
C. start delay and reset delay should be based on the actual application with reasonable set, which are between 0~99 seconds.
Available actuate or restore delay: 0~9999 seconds.
7. "P302": Alarm sound mode (Default: 1, 0: Alarm mute, 1: Alarm with voice) ◇→ P000→ / △→P301→◇→X→◇ finish. X means alarm sound mode. 0 means alarm mute,
1 means alarm with voice. Sound-light alarm mute: when sound-light alarm, press any key, current sound-light alarm into silent state. After the silent
operation, if the following happens, sound-light alarm will resume:
(1) automatic recovery: after the pressure returns to normal state once again when the alert conditions are met, sound- light alarm automatic recovery.
(2) manual recovery: reset alarm mode, or parameters, enter "P301" or enter "P302" reopen the sound-light alarm.
8. "P401": Relay 1 Set (default set: 0, 50, 5, 0, 1), for relays option gauge ◇□ /△□P401□◇□ /△□XXX□◇□ /△□XXX□◇□ /△□XXX□◇□ /△□XXX□◇□ /△□XXX□◇finish
XXX means 5 settable parameters, stands for relay output mode, parameter #1, #2, #3 and #4 respectively.
Schematic diagram of Relay1 and Relay2 function

Mode	Description	Para. #1	Para. #2	Para. #3	Para. #4	Schematic diagram
0	Cancel relay function	N/A	N/A	N/A	N/A	Relay OFF
1	Relay actuate when input is lower than set point	Set point	Dead band	Actuate delay	Restore delay	Relay ON ↑Deadband ↓Relay OFF ▲Setpoint
2	Relay actuate when input is higher than set point	Set point	Dead band	Actuate delay	Restore delay	Relay OFF↓Deadband↑Relay ON ▲Setpoint
3	Relay actuate between high and low limits	Low limit	High limit	Actuate delay	Restore delay	Relay OFF Relay ON Relay OFF Low limit ▲ ▲ High limit
4	Relay actuate outside high and low limits	Low limit	High limit	Actuate delay	Restore delay	Relay ON Relay OFF Relay ON Low limit▲ ▲ High limit

Note: Light AL1, AL2 respectively indicating relay1 and relay2 working mode. Light on means close and light off means open.

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(1) when the relay working mode is 0, the parameter 1~4 can not be set.

(2) when the relay working mode is 1~4, the parameter 1~4 must be set reasonably, otherwise, the relays will not work properly. A.
when the relay working mode is 1 or 2, the set point should be inside the range, not allowed to zero or full scale.

B. when the relay working mode is 3 or 4, the low limit should be less than the high limit, and both of them can not be zero or full scale.

C. start delay and reset delay should be based on the actual application with reasonable set, which are between 0~99 seconds.

9. "P402": Relay 2 Set (default set: 0, 50, 5, 0, 1), for relays option gauge

◇□ /△□P402□◇□ /△□XXX□◇□ /△□XXX□◇□ /△□XXX□◇□ /△□XXX□◇□ /△□XXX□◇finish

XXX means 5 settable parameters, stands for relay output mode, parameter #1, #2, #3 and #4 respectively.

For other operation, the same as above "P401".

10. "P483": Set RS485 baud rate (Default set: 9600, available 4800, 9600), for Modbus option gauge

◇→ P000→ /△→P483→◇→XXx→ /△→XXx→◇ finish. XXX means baud rate.

Baud rate can be set: 9600/4800bps

11. "P484": Set RS485 parity (Default set: 0(None), available 0(None), 1(Odd), 2(Even), for Modbus option gauge

◇→ P000→ /△→P484→◇→XXx→ /△→XXx→◇ finish. XXX means parity.

Communication parity can be set range 0~2; parity: 0: NONE; 1:ODD; 2:EVEN;

12. "P485": Set RS485 address(Default set: 1, available ranges 1~255, but recommend 1~32) , for Modbus option gauge

◇→ P000→ /△→P485→◇→XX→ /△→XX→◇ finish. XXX means address.

13. "P271"：Calibrate 0-10V output, include zero and range output, for transmitter function option gauge

◇ □ /△□ P271 □◇□ /△□PASSWORD □◇；(Input password 1021)

□ /△（0V calibration）□◇；□ /△（5V calibration）□◇；□ /△（10V calibration）□◇ finish；

14. "P281"：Calibrate 4-20mAoutput, include zero and range output, for transmitter function option gauge

◇ □ /△□ P281 □ ◇ □ /△□PASSWORD □ ◇；(Input password 1021)

□ /△（4mA calibration）□◇；□ /△（12mA calibration）□◇；□ /△（20mA calibration）□◇ finish

Note：P271/P281calibration method

After inputting password and entering the P271/P281 calibration, connect voltage / current output with standard voltage / current

meter, the gauge display will show 0V or 4mA transmitting value, then push /△ to adjust standard voltage / current meter value to

equal 0V or 4mA and confirm. Next time the gauge display will show 5V or 12mA transmitting value, then push /△ to adjust
standard voltage / current meter value to equal 5V or 12mA and confirm. Next time the gauge display will show 10V or 20mA

transmitting value, then push /△ to adjust standard voltage / current meter value to equal 10V or 20mA and confirm

System Error signal:

Err 1 Keys input operation code is wrong, input the correct code.

Err 2 Input data is not available, input the correct data.

Err 7 Sensor is detected error, check connections and installations and retry powering gauge.

Err 8 Sensor error, check connections and installations and retry powering gauge.