

HUMITRON® DP1000

Flush-mounted differential pressure transmitter



User Manual

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Cautions

1. This product may cause an electric shock in handling. Please do not attempt to open it with power turned on.
 2. This product should be installed in a place fixed secured by a rack or panel.
 3. This product can be used under the following environmental condition. ① Indoor ②Pollution Degree 2 ③At an altitude of 2000m or below
 4. Power input must be within the designated ranges.
 5. To turn on or turn off power supply for this product, please the circuit breaker or switch of a standard product of IEC 60947-1 or IEC 60947-3 product and install it within a close distance allowing convenient operation by user.
 6. Please be understood that if this product is dismantled or modified discretionary, after sales service will not be able to be provided.
 7. An output wire to be used for this product should be inflammable grade FV1 (V-1 grade or above), the thickness of the wire should be AWG No. 20 or above(0.50mm2).
 8. In order to prevent it from an inductive noise, please maintain the high-voltage wire and power wire separated.
 9. Please avoid installing the product in a place where a strong magnetism, noise, severe vibration and impact exist.
 10. When extending the sensor wire, use a shield wire and do not extend it unnecessary long.
 11. The sensor wire and signal wire should be away from the power and load wires using conduits separately installed.
 12. Please avoid using the product near a device generating strong high frequency noise (high-frequency welding machine, high-frequency sewing machine, high-frequency radiotelegraph, high capacity SCR controller)
 13. Product's damages other than those described in the guarantee conditions provided by the manufacturer shall not be responsible by us.
 14. If this unit is used to control machineries (Medical equipment, vehicle, train, airplane, combustion apparatus, entertainment, processing and transportation equipment, elevator and various safety device etc.) enabling to effect on human or property, it is required to install fail-safe device.
- ※ The Aforementioned precautions must be observed, and if you fail to do so, it may cause a product's breakdown.
 ※ The specifications, dimensions, and etc. are subject to change for enhancement without a prior notice.

Flush-mounted differential pressure transmitter DP1000



- Best Price & Compact Design
- 4-Digit FND Displays
- Capacitive touch button
- 1 - CH digital alarm output
- 1 - CH analog (4~20mA) output
- RS485 Modbus RTU communication
- Front cover made of stainless steel

Applications

- Measure differential pressure of Semi-conductor clean room
- Measure differential pressure of Pharmaceutical & hospital clean room
- Various semiconductor equipments
- Measure filter differential pressure
- Measure differential pressure of a precision instrument

Pressure indicate range

Unit	Measurement range	Range of decimal point representation (automatic transfer)
Pa	-500 ~ 500	-199.9 ~ 500.0 / -500 ~ -200
kPa	-5 ~ 5	-1.999 ~ 5.000 / -5.00 ~ -2.00
hPa	-0.5 ~ 0.5	0.000 ~ 0.500 / -0.50 ~ -0.01
mmAq	-50 ~ 50	-19.99 ~ 50.00 / -50.0 ~ -20.0
mbar	-2 ~ 2	-1.999 ~ 2.000 / -2.00
inchH ₂ O	-3.75 ~ 3.75	-1.999 ~ 3.750 / -3.75 ~ -2.00
mmHg	-0.15 ~ 0.15	-0.150 ~ 0.150

※ There may be a difference in measurement range in accordance with order specifications. Parameter value related to pressure will be initialized when changing unit of pressure.

: Specifications

Differential pressure

Pressure range	±25Pa, ±125Pa, ±500Pa
Accuracy	±3% of reading
Zero span	±0.1Pa(±25Pa, ±125Pa) / ±0.2Pa(±500Pa)
Repeatability	0.5% of reading
Reliability	< 0.1Pa/year
Type of fluid	Air, N ₂ , O ₂
Display unit of pressure	Pa, mmHg, InH ₂ O, mmAq(mmH ₂ O), hPa, kPa, mbar, inchHg

Specification for input & output

Power supply	24Vdc ±10%
Current consumption	max. 120mA @24Vdc
Relay output	1-CH, 5A, 250Vac
Current output	1-CH, 4-20mA
Digital output	RS485 Modbus RTU
Material	SUS303 Hairline
Operating temperature	Temperature: -10 ~ 60°C, (Non condensation)
Storage temperature	Temperature: -20 ~ 70°C, Humidity: Below 95%RH
Dimensions	90(W)mm X 180(H)mm X 40(D)mm
IP rating	IP65 (Front panel)
Weight	260g

: Ordering guide

DP1000 -	①	②	Details
① Output Specification	00-		Relay output
	A1-		Relay output+4-20mA
	R4-		Relay output+RS485
	A1R4-		Relay output+4-20mA+RS485
② Differential pressure range		25	-25 ~ +25Pa
		125	-125 ~ +125Pa
		500	-500 ~ +500 Pa

Accessory (Options)

Model	Description
AX7241, AX7243	RS485 communication converter (RS485 to USB converter)

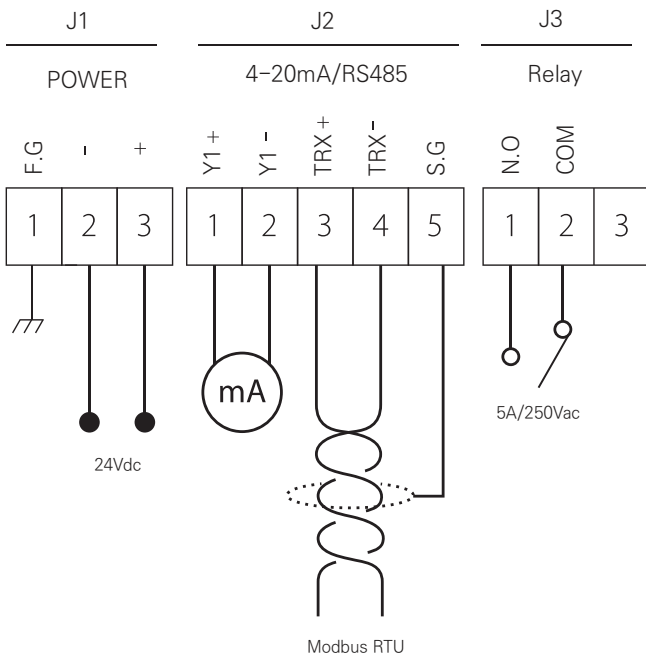
Specifications by Model Order

DP1000 - 00 - 500 : Relay output
 Range of differential pressure -500 ~ 500Pa

DP1000 - A1R4 - 25 : Relay output + 4-20mA + RS485
 Range of differential pressure -25 ~ 25Pa

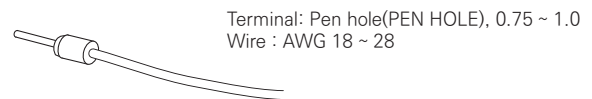
: Installation

□ Wiring

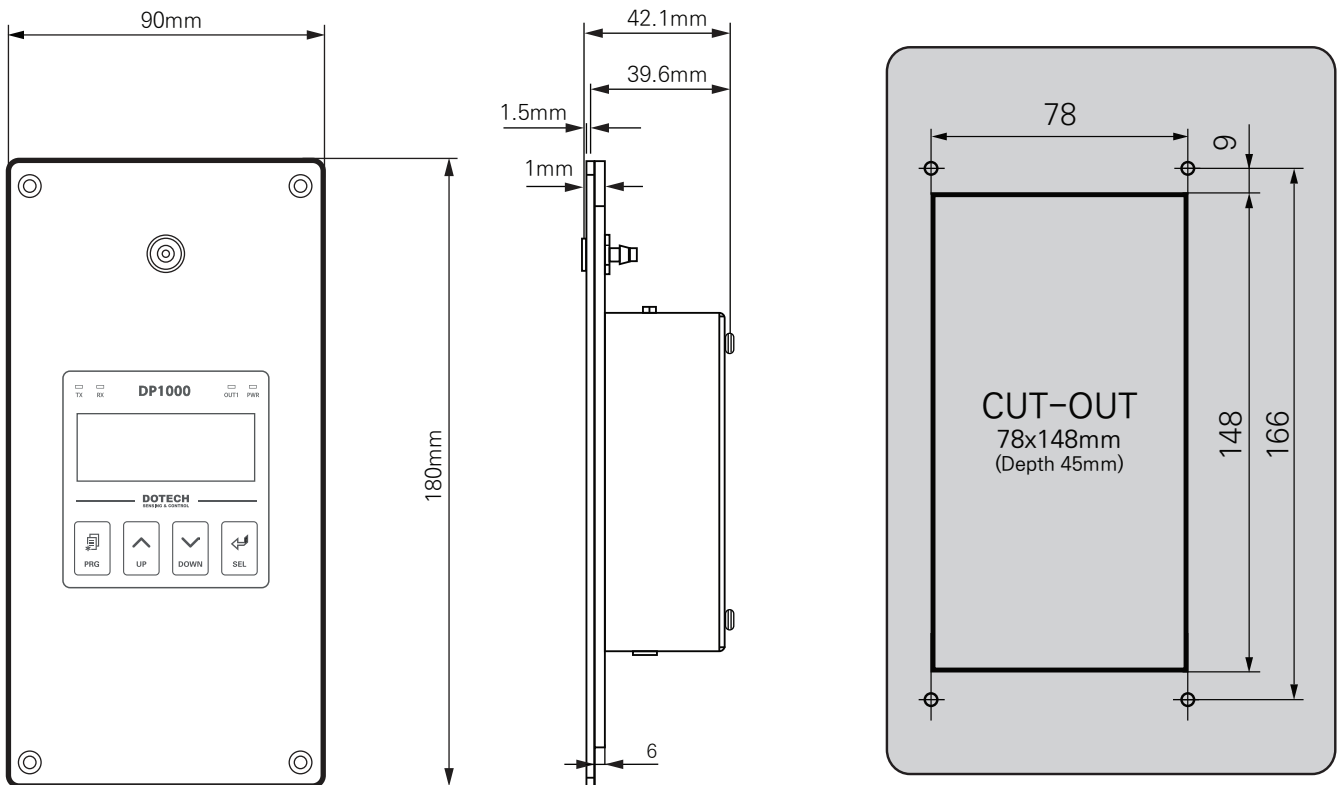


PIN		Definition	Description
J1	1	Power supply	F.G
	2		GND
	3		+24Vdc
J2	1	4~20mA output	Y1+
	2		Y1-
	4	RS485 communication	TRX+
	5		TRX-
	6		S.G
J3	1	Relay output	N.O (Normal Open) Contact
	2		Common
	3		

※ Recommendations for terminal and wire



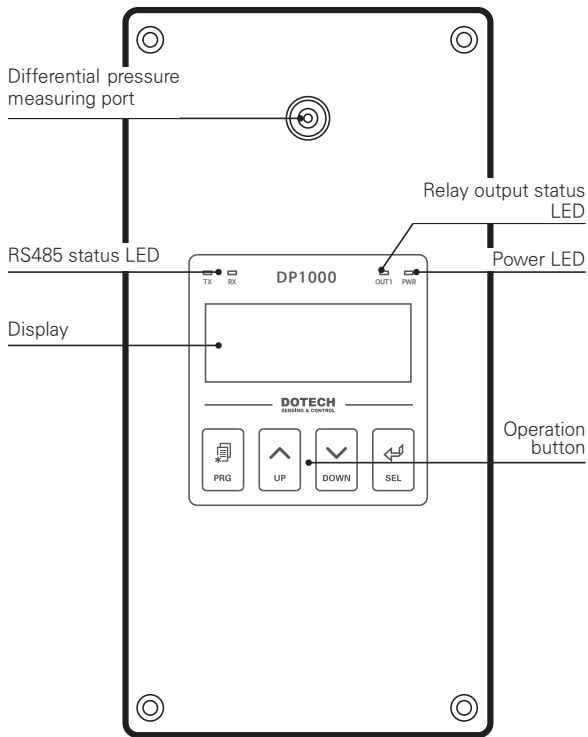
□ Dimensions and panel cut out



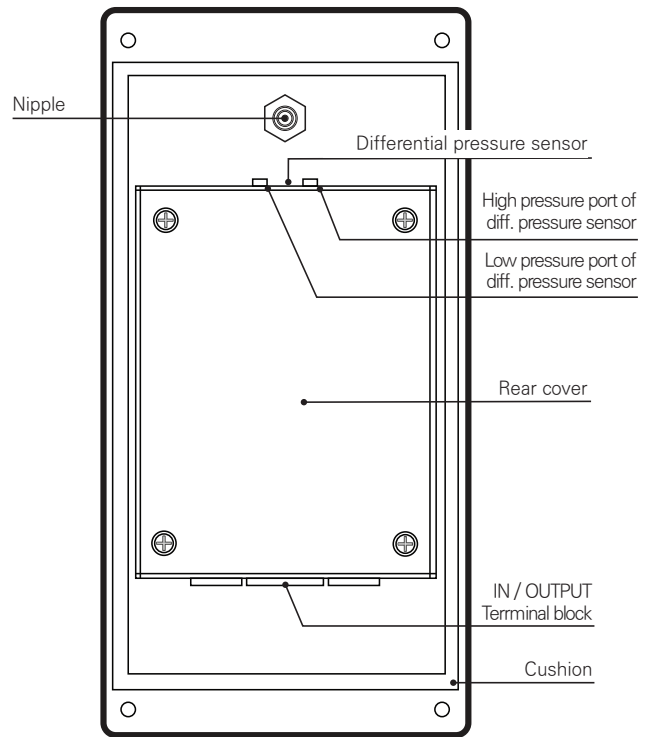
※ Precautions for mounting

: Structure & operation

□ Structure

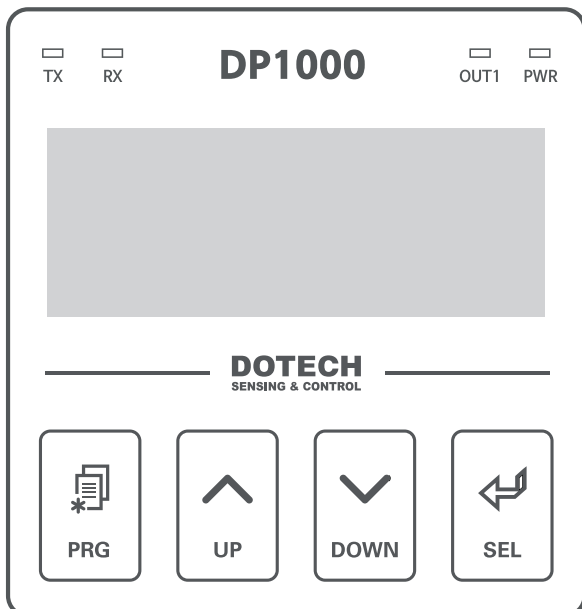


Front side



Rear side

□ Operation and status display

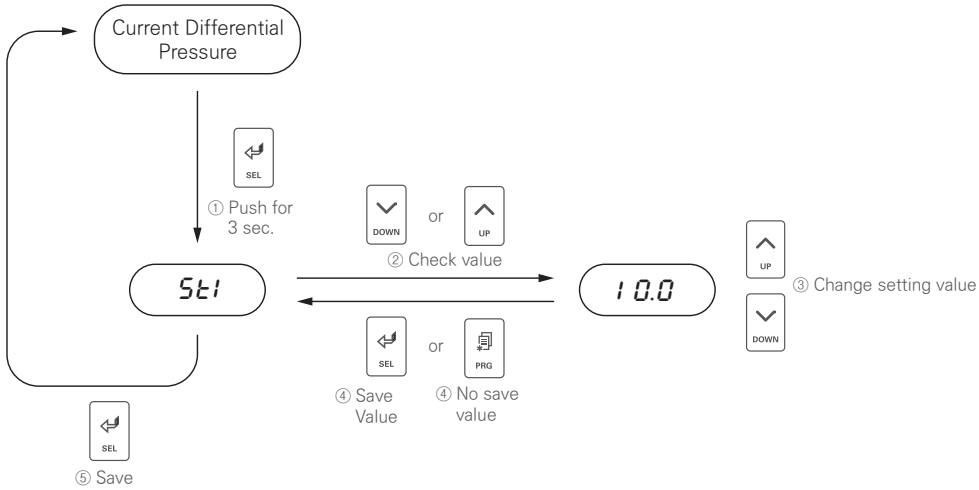


	Definition	Description
Button	PRG	Program setup and check unit of display Press twice successively when clearing alarm
	UP	increase set value
	DOWN	decrease set value Identify peak value when pressing for 0.5 seconds Initialize peak value when pressing 5 seconds
	SEL	Enter that setting the desired value & input the setting value Move menu and save the value
	PRG + DOWN	Initialization when pressing simultaneously for 10 seconds
	UP + DOWN	Internal temperature of differential pressure sensor
LED	TX	RS485 status LED Flickering when RS485 communication is transmitted
	RX	
	OUT1	Relay output status LED LED On at the state of relay output (Flickering LED every 0.5 when ON delay time Flickering LED every 1 seconds when maximum OFF)
	PWR	Power LED Turn ON when input supply power

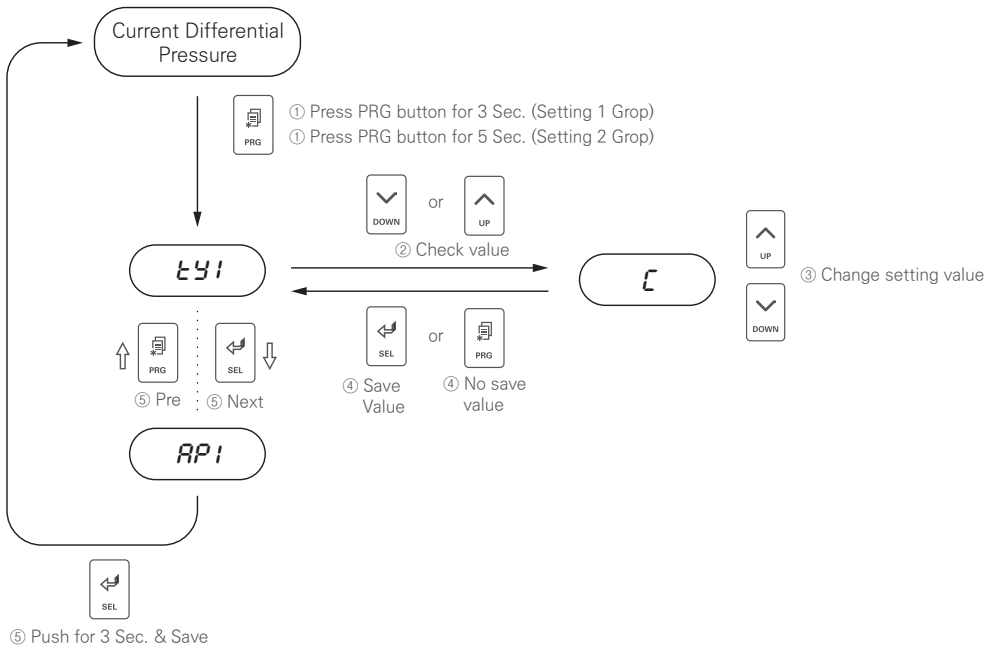
: Parameter

□ Parameter change

Setting desired value (ST1)



Setting 1,2 Group



- Press SEL button for 3 seconds to change desired setting during operating
Press PRG button for 3 seconds to change setting 1 group.
Press PRG button for 5 seconds to change setting 2 group.
- Press PRG button at parameter setup to move to next parameter.
- Movement to next menu and storage of set value during parameter setup are performed by SEL button
- Set value will be flickering in every 0.5 seconds and change set value using ▲ or ▼ button.
- If there was no input for 1 minutes during setup, it will be returned to operation value.

Desired Setting Value Table (Press the SEL button during 3 seconds)

Address	Menu	Code	Unit	Step	Min	Max	Default	Scale
40001	Desired differential pressure value	<i>SEI</i>	Pa	0.1	<i>USL</i>	<i>USH</i>	10.0	1/10

Setting 1 Group (PRG Button Push for 3 sec.)

Address	Menu	Code	Unit	Step	Min	Max	Default	Scale
40016	Select Control Type (※1)	<i>LYI</i>	<i>oFF</i> (0) : Unuse <i>CL</i> (1) : Decompression Mode <i>H</i> (2) : Pressurization Mode <i>RL1</i> (3) : Deviation Upper Limit Alarm <i>RL2</i> (4) : Deviation Lower Limit Alarm			<i>RL3</i> (5) : Deviation U/L Limit Alarm <i>RL4</i> (6) : Deviation U/L Reverse Alarm <i>RL5</i> (7) : Absolute Value Upper Limit Alarm <i>RL6</i> (8) : Absolute Value Lower Limit Alarm <i>SbA</i> (9) : Sensor Wire Disconnection Alarm		<i>CL</i> (1)
40017	Deviation Value (※1)	<i>dFI</i>	K	0.1	-999.9	999.9	10.0	1/10
40018	Select Deviation Type (※1)	<i>LPi</i>	<i>P</i> : +Deviation			<i>Pn</i> : ±Deviation		<i>P</i> (0)
40020	ON Delay Time	<i>dTi</i>	Sec.	1	0	999	1	1/1
40020	Minimum OFF Time	<i>Fti</i>	Sec.	1	0	999	5	1/1
40022	Minimum ON Time	<i>nti</i>	Sec.	1	0	999	5	1/1
40023	Output when Sensor Error	<i>SFi</i>	<i>oFF</i> (0) = Unuse			<i>on</i> (1) = Use		<i>oFF</i> (0)
40024	Alarm Deviation Value (※1)	<i>HYI</i>	K	0.1	-999.9	999.9	1.0	1/10
40025	Alarm Option (※2)	<i>APi</i>	<i>RLA</i> (0): General alarm <i>RLb</i> (1): Maintain alarm			<i>RLC</i> (2): Standby alarm <i>RLd</i> (3): Maintain alarm, Standby alarm		<i>RLA</i> (0)

※1 Operating setting table according to select the control type (*LYI*)

Code	Operating	Description
<i>oFF</i>	Not using control output	
<i>CL</i>	Desired differential pressure value(<i>SEI</i>) = -7.0 Deviation Value(<i>dFI</i>) = 2.0 	Decompression Mode Operating according to select the deviation type (<i>LPi</i>) P deviation : if current D.P were upper than desired D.P value + deviation value, output is ON if current D.P were lower than desired D.P value output is OFF. PN deviation : if current D.P were upper than desired D.P value+ (deviation value/2), output is ON if current D.P were lower than desired D.P value - (deviation value/2), output is OFF.
<i>H</i>	Desired differential pressure value(<i>SEI</i>) = 30.0 Deviation Value(<i>dFI</i>) = 2.0 	Pressurization Mode Operating according to select the deviation type (<i>LPi</i>) P deviation : if current D.P were less than desired D.P value - deviation value, output is ON if current D.P were upper than desired D.P value output is OFF. PN deviation : if current D.P were less than desired D.P value - (deviation value/2), output is ON if current D.P were upper than desired D.P value + (deviation value/2), output is OFF.
<i>RL1</i>		Deviation Upper Limit Alarm Output is ON when the deviation between PV and SV is upper than setup value of deviation. Deviation differential pressure is set up at DF in setting 1 group
<i>RL2</i>		Deviation Lower Limit Alarm Output is ON When the deviation between PV and SV is lower than setup value of deviation. Deviation differential pressure is set up at DF in setting 1 group
<i>RL3</i>		Deviation U/L Limit Alarm Output is ON When the deviation between PV and SV is upper or lower than set value of deviation. Deviation differential pressure is set up at DF in setting 1 group
<i>RL4</i>		Deviation U/L Reverse Alarm Output is OFF When the deviation between PV and SV is upper or lower than setup value of deviation. Deviation differential pressure is set up at DF in setting 1 group
<i>RL5</i>		Absolute Value Upper Limit Alarm Output is ON When PV is upper than or equal to SV. Alarm differential pressure is set up at DF in setting 1 group
<i>RL6</i>		Absolute Value Lower Limit Alarm Output is ON When PV is lower than or equal to SV. Alarm differential pressure is set up at DF in setting 1 group
<i>SbA</i>	Sensor Wire Disconnection Alarm : Output is ON When sensor wire disconnection.	

※ PV = PV, SV = *SEI*, DF = *dFI*, HY = *HYI*

※2 Alarm Option

Code	Operation Title	Description for alarm option operation
RLA	General alarm	Standard alarm operation without option
RLb	Maintain alarm	Maintain output ON after alarm occurs
RLC	Standby alarm	No output initial operation (until achieve the 1st setup value)
RLd	Maintain alarm, Standby alarm	Execute both RLb & RLC at the same time

Setting 2 Group (PRG Button Push for 5 sec.)

Address	Menu	Code	Unit	Step	Min	Max	Default	Scale
40076	Select Lock Function	L_oL	oFF (0) : Lock cancel L_L1 (1) : Setting 2 Group Lock L_L2 (2) : Setting 1, 2 Group Lock L_L3 (3) : Setting 1, 2 Group, Desired Setup Value Lock				oFF (0)	
40077	Unit of D.P	U_nt	Pa (0) = Pa mbar (1) = mbar kPa (2) = kPa hPa (3) = hPa			mmH₂O (4) = mmH ₂ O inchH₂O (5) = inchH ₂ O mmHg (6) = mmHg inchHG (7) = inchHG		Pa (0)
40078	Max. User Desired Setup Value(※1)	U_SH	-	0.1	U_SL	999.9	500.0	1/10
40079	Min. User Desired Setup Value(※1)	U_SL	-	0.1	-999.9	U_SH	0.0	1/10
40080	Offset value of Differential Pressure Sensor (※2)	oFS	Pa	0.1	-999.9	999.9	0.0	1/10
40081	Display Method of Decimal Place of Current Differential Pressure(※3)	dP	oFF (0) : Unuse			oN (1) : Use		oFF (0)
40082	Span gain setup	S_Pn	Pa	0.001	0.000	9.999	1.000	1/1000
40083	Setup Sensor Input Filter(※4)	S_Ft	Sec.	0.1	0.1	5.0	0.5	1/10
40084	Sensor Value Display Cycle (※5)	S_dt	Sec.	0.1	0.0	5.0	0.5	1/10
40086	Communication Address (※6)	i_d	-	1	1	128	1	1/1
40087	Communication BPS (※6)	b_PS	48 (0)=4800 96 (1)=9600 192 (2)=19200 384 (3)=38400				96 (1)	
40089	Analog Trans. Output (20mA) (※7)	r_tH	-	0.1	-500.0	500.0	500.0	1/10
40090	Analog Trans. Output(4mA) (※7)	r_tL	-	0.1	-500.0	500.0	0.0	1/10
40091	Offset mode	oFt	-	-	oFF	oN	oN	
40092	Auto tuning	A_tt	-	-	oFF	oN	oFF	
40093	User Desired Setup Value	P_St	Pa	0.1	-999.9	999.9	10.0	
40094	Proportional band	P_b	%	0.1	1	999.9	50.0	
40095	Integral time	i	초	1	0	9999	120	
40096	Derivative time	d	초	1	0	9999	30	
40097	Output way	y_it	-	-	oFF (0), 420 (1), 204 (2), 55r (3)		420 (1)	
40098	Output Cycle	oP_t	초	1	1	999	5	
40102	Manual output value	R_oo	%	1	-1	100	-1	
40103	Upper limit output value	R_oH	%	1	0	100	100	
40104	Lower limit output value	R_oL	%	1	0	100	0	

(※1) User Setup Max./Min. : Input the range of desired setup value which user can set.

(※2) Offset setup: Correct deviation of differential pressure sensor.

e.g) If the displayed differential pressure is 19.0 and measured differential pressure is 18.0, you can revise to enter -1.0

(※3) Decimal place: OFF = don't reduce the decimal place ON = Display to 1 place of decimals.

e.g) OFF: 1.93 / ON: 1.9

(※4) Sensor Input Filter Value : In case of frequent hunting of the current differential pressure, it is corrected by increasing filter value.

(※5) Sensor value display cycle: Set display cycle of present differential value.

(※6) Activated only on model with RS485 function.

(※7) Activated only on model with 4-20mA output function.

Trip message (TRIP / ALARM MESSAGE)

No.	Menu	Code	Description / Instruction	Response at Detection	Reset Type
1	Internal Parameter Error	S_YS	In case of change of set value by an unknown case	Immediate Stop	Manual reset
2	Sensor Open / Short	oP_n	In case of differential pressure sensor error (Please ask A/S)	Immediate Stop	Manual reset
3	Lower Input	L_LL	Lower sensor input than measuring range (-500Pa)	Immediate Stop	Manual reset
4	Upper Input	H_HH	Upper sensor input than measuring range (500Pa)	Immediate Stop	Manual reset

: Communucation Protocol

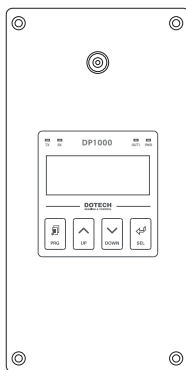
Communication specifications (-R4, -A1R4 Model)

Transmission line connection	Multiple line
Communications method	RS-485 (2-wire, half-duplex)
Baud-rate	4800, 9600, 19200, 38400 BPS default 9600 BPS
Parity, Data, Stop bit	None, 8 Data, 1 Stop
Protocol Type	Modicon Mod-Bus RTU MODE
Function Code	Read HOLD REGISTERS (0x03) / Preset Single Register (0x06)
Maximum Read Word	32 Word
Media Type	BELDEN 9841 / 9842, LG LIREV-AMESB
Pollinterval	100msec

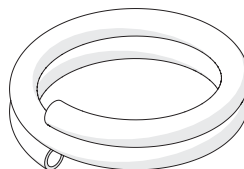
STATUS Communication Table

Address	Menu	Code	Type	Size(word)	DP1000	MIMI	Scale
40061	Measured Diff. Pressure (Applying unit of Pa)	Pa	analog	INT16	-500.0~500.0	-5000~5000	1/10
40062	Measured Diff. Pressure (Applying unit of mbar)	mbar	analog	INT16	-5.000~5.000	-5000~5000	1/1000
40063	Measured Diff. Pressure (Applying unit of kPa)	kPa	analog	INT16	-0.500~0.500	-500~500	1/1000
40064	Measured Diff. Pressure (Applying unit of hPa)	hPa	analog	INT16	-5.000~5.000	-5000~5000	1/1000
40065	Measured Diff. Pressure (Applying unit of mmH2O)	mmH2O	analog	INT16	-5.000~5.000	-5000~5000	1/100
40066	Measured Diff. Pressure (Applying unit of inchH2O)	inchH2O	analog	INT16	-2.000~2.000	-2000~2000	1/1000
40067	Measured Diff. Pressure (Applying unit of mmHg)	mmHg	analog	INT16	-3.750~3.750	-3750~3750	1/1000
40068	Measured Diff. Pressure (Applying unit of inchHg)	inchHg	analog	INT16	-0.15~0.15	-150~150	1/1000
40106	Status code of product	-	analog	INT16	Refer to bit status below		
Bit 0	Status of Relay output	-	digital	Bit	0 = OFF	1 = ON	
Bit 1	-	-	digital	Bit			
Bit 2	-	-	digital	Bit			
Bit 3	-	-	digital	Bit			
Bit 4	-	-	digital	Bit			
Bit 5	-	-	digital	Bit			
Bit 6	-	-	digital	Bit			
Bit 7	-	-	digital	Bit			
Bit 8	-	-	digital	Bit			
Bit 9	-	-	digital	Bit			
Bit 10	-	-	digital	Bit			
Bit 11	-	-	digital	Bit			
Bit 12	-	-	digital	Bit			
Bit 13	-	-	digital	Bit			
Bit 14	Fault of sensor measurement	-	digital	Bit	0 = Normal	1 = Abnormal	
Bit 15	Internal Parameter Error	-	digital	Bit	0 = Normal	1 = Abnormal	
40107	Displayed differential pressure		analog	INT16			

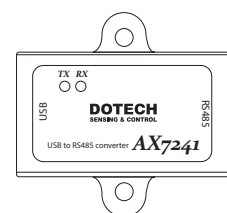
: Components



DP1000



Silicon tube



AX7241, AX7243
AX7241
USB-RS485 Converter
Communications converter
(*Options)