

DP500

User's Manual

DOTECH
SENSING & CONTROL

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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
CD Indoor @Pollution Degree 2 @At an altitude of 2000m or below @Installation CategoryII
 4. 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.
 5. Please be understood that if this product is dismantled or modified discretionary, after sales service will not be able to be provided.
 6. An output wire to be used for this product should be inflammable grade FV1(N-1 grade or above), the thickness of the wire should be AWG No. 20 or above. (0.501111)
 7. In order to prevent it from an inductive noise, please maintain the high-voltage wire and power wire separated.
 8. Please avoid installing the product in a place where a strong magnetism, noise, severe vibration and impact exist
 9. When extending the sensor wire, use a shield wire and do not extend it unnecessary long.
 10. The sensor wire and signal wire should be away from the power and load wires using conduits separately installed.
 11. 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)
 12. PRODUCT'S DAMAGES OTHER THAN THOSE DESCRIBED IN THE GUARANTEE CONDITIONS PROVIDED BY THE MANUFACTURER SHALL NOT BE RESPONSIBLE BY US.
- ※ Please use this product after attaching double or more safety device without fail if you use this product for control of equipment which have a big effect on human life or on property (e.g. nuclear control, medical instrument, vehicle, railroad, aviation, combustion apparatus, amusement equipment, safety device, etc.)

1. Overview



※ Features

- Measurement range: -199 ~ 500Pa (-20 ~ 500mmAq)
- Two (2) relay or NPN-TR outputs,
4~20mA transmission output, RS485 Modbus RTU

: Basic Specification

Model	DP500 Series	
Power	-D	24Vdc
	-A	100 ~ 240 Vac, 50/60Hz
Power consumption	MAX6VA (DP500-A)	
Electrical connection	Screw terminal, wire range : 24 ~ 12AWG	
Pressure range	-199 ~ 500Pa / -20 ~ 50 mmAq	
Span Accuracy	±3%	
Zero point Accuracy	±0.2Pa	
Output Specification	Relay Output (250Vac / 30Vdc / 5A) NPN-TR Output	
IP rating	IP65	
Operating condition	Temperature -10 ~50°C, (Non condensation)	
Storage condition	Temperature -20 ~60°C, Humidity 90%RH or less	

: Order Information

Model	Description
DP500-DR-A1	24Vdc / 2-Relay Output / 4~20mA transmission output
DP500-DN-A1	24Vdc / 2-NPN-TR Output / 4~20mA transmission output
DP500-AR-00	100 ~ 240Vac, 50/60Hz / 2-Relay Output
DP500-AR-A1	100 ~ 240Vac, 50/60Hz / 1-Relay Output / 4~20mA transmission output
DP500-AR-R4	100 ~ 240Vac, 50/60Hz / 1-Relay Output / RS485 communication (MODBUS RTU MODE)
DP500-A0-A1R4	100 ~ 240Vac, 50/60Hz / 4 ~ 20mA 전송출력모델 / RS485 communication (MODBUS RTU MODE)

※ -A1: An output cable will be provided free of charge as a standard scope of supply

: Components



※ Silicon Tube $\phi 6.0 \times 3.02M$ (※Standard scope of supply)

: Display range of differential pressure

Model	Description	Display range of decimal point (Automatic switching)
Pa	-199 ~ 500	-199 ~ -20.0 / -19.9 ~ 99.9 / 100 ~ 500
mmAq	-20 ~ 50	-20 / -19.9 ~ 50.0

2. User Interface

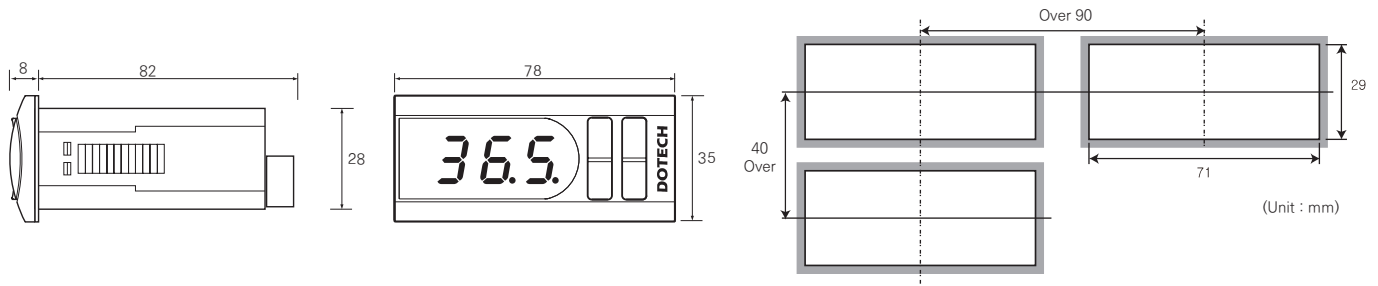
: Constitution (Function of Indicator Lamp and Button)



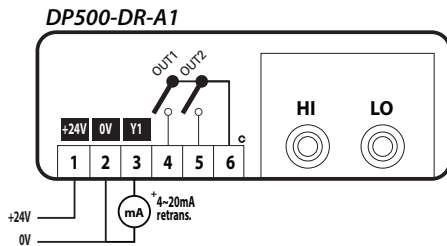
Keypad	Description	
LED	OUT1	Lighting when output 1 is on (flickering when waiting)
	OUT2	Lighting when output 2 is on (flickering when waiting)
Button		Lighting when trip, flickering when alarm
		Program Setup Push twice successively when clearing alarm of manual return type
		Execute selected menu or Input setup value
		Move between menus & Increase setup value Push for 5 sec. when setting zero point
		Move between menus & Decrease setup value Push for 0.5 sec. when checking peak value Push for 5 sec. when resetting peak value
		Initializing Setup Values If pushing for 10 sec. at the same time, setup values are initialized

3. Installation

: Dimensions and Panel Cut-Out Form

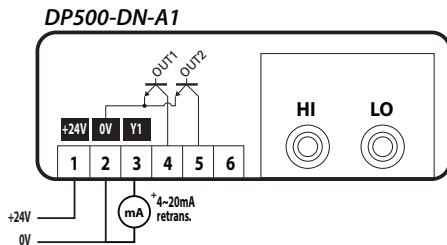


: Connection Diagram



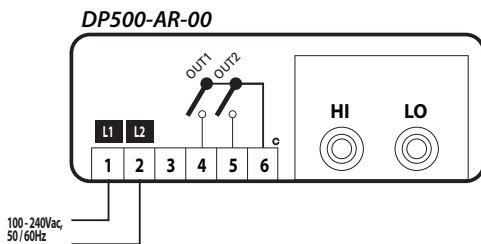
: DP500-DR-A1

Terminals		Description
1	+24V	24Vdc
2	0V	
3	Y1	4 ~ 20mA + SIGNAL Output
4	OUT1	When OUT1 is activated with normally closed (N.C) contact
5	OUT2	When OUT2 is activated with normally closed (N.C) contact
6	COM	Common signal



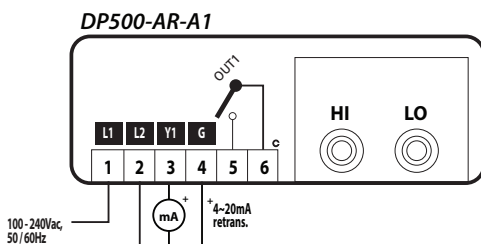
: DP500-DN-A1

Terminals		Description
1	+24V	24Vdc
2	0V	
3	Y1	4 ~ 20mA + SIGNAL Output
4	OUT1	When OUT1 is activated with normally closed (N.C) contact
5	OUT2	When OUT2 is activated with normally closed (N.C) contact



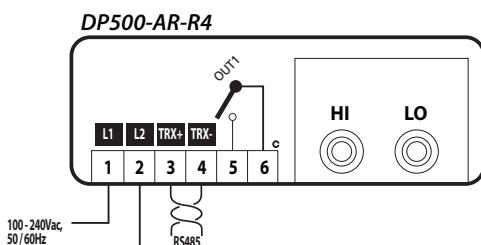
: DP500-AR-00

Terminals		Description
1	L1	100 - 240Vac, 50 / 60Hz
2	L2	
4	OUT1	When OUT1 is activated with normally closed (N.C) contact
5	OUT2	When OUT2 is activated with normally closed (N.C) contact
6	COM	Common signal



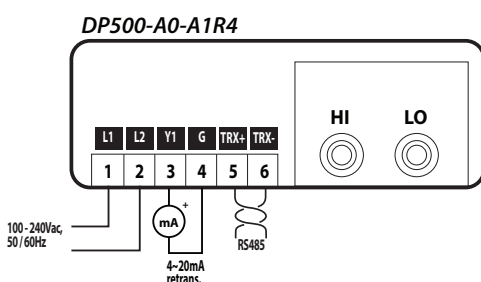
: DP500-AR-A1

Terminals		Description
1	L1	100 - 240Vac, 50 / 60Hz
2	L2	
3	Y1	4 ~ 20mA + SIGNAL Output
4	GND	GND
5	OUT1	When OUT1 is activated with normally closed (N.C) contact
6	COM	Common signal



: DP500-AR-R4

Terminals		Description
1	L1	100 - 240Vac, 50 / 60Hz
2	L2	
3	TRX+	RS485 communication
4	TRX-	
5	OUT1	When OUT1 is activated with normally closed (N.C) contact
6	COM	Common signal

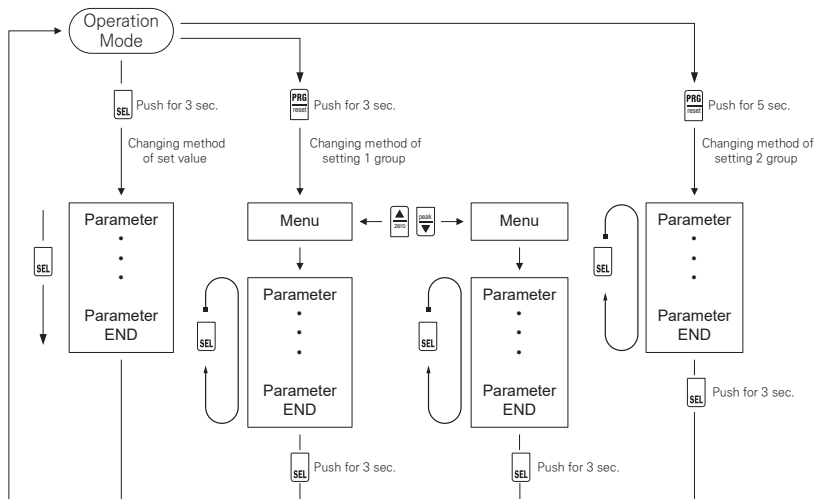


: DP500-A0-A1R4

Terminals		Description
1	L1	100 - 240Vac, 50 / 60Hz
2	L2	
3	Y1	4 ~ 20mA + SIGNAL Output
4	GND	GND
5	TRX+	RS485 communication
6	TRX-	

4. Parameter

: Parameter change



- 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.
- Movement to next menu and storage of set value during setup of parameters are performed by SEL button.
- Set value will be flickering in every 0.5 seconds and change set value by using ▲ or ▼ arrow buttons.
- Current differential pressure will be displayed if pressing SEL button for 3 seconds after setup is finished.
- If there was no input for 1 minutes during setup, it will be returned to operation value.

: Desired Setting Value Table (SEL Button Push for 3 sec.)

No.	Menu	Code	Unit	Step	Min	Max	Default	Scale	Set value by a user
40001	Set value of OUT1	SE1	Pa	0.1	USL	USH	10.0	1/10	
40002	Set value of OUT2	SE2	Pa	0.1	USL	USH	10.0	1/10	

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

No.	Menu	Code	Unit	Step	Min	Max	Default	Scale	Set value by a user
40016	Select Control Type (※1)	LY1	OFF (0) : Unuse H (2) : Compression Mode RL1 (3) : Deviation Upper Limit Alarm RL2 (4) : Deviation Lower Limit Alarm RL3 (5) : Deviation U/L Limit Alarm RL4 (6) : Deviation U/L Reverse Alarm RL5 (7) : Absolute Value Upper Limit Alarm RL6 (8) : Absolute Value Lower Limit Alarm SbR (11) : Sensor Wire Disconnection Alarm		┌ (1) : Decompression Mode RL1 (3) : Deviation Upper Limit Alarm		┌ (1)		
40017	Output1 EB1	Control Deviation Value	dF1	K	0.1	-199.9	999.9	10.0	1/10
40018		Control Deviation Type	EP1	P (0) : + Deviation		Pn (1) : ± Deviation		P (0)	
40020		On Delay Time (※2)	dt1	Sec.	1	0	999	1	1/1
40021		Minimum OFF Time (※3)	Ft1	Sec.	1	0	999	5	1/1
40022		Minimum ON Time (※4)	nt1	Sec.	1	0	999	5	1/1
40023		Output when Sensor Error	SF1	OFF (0) = Unuse		on (1) = Use		OFF (0)	
40024		Alarm Deviation Value	HY1	K	0.1	-199.9	999.9	1.0	1/10
40025		Alarm Option	AP1	RLA (0):General alarm RLb (1):Maintain alarm		RLC (2):Standby alarm RLd (3):Maintain alarm, Standby alarm		RLA (0)	
40031	Select Control Type (※1)	LY2	OFF (0) : Unuse H (2) : Compression Mode RL1 (3) : Deviation Upper Limit Alarm RL2 (4) : Deviation Lower Limit Alarm RL3 (5) : Deviation U/L Limit Alarm RL4 (6) : Deviation U/L Reverse Alarm RL5 (7) : Absolute Value Upper Limit Alarm RL6 (8) : Absolute Value Lower Limit Alarm SbR (11) : Sensor Wire Disconnection Alarm		┌ (1) : Decompression Mode RL1 (3) : Deviation Upper Limit Alarm		┌ (1)		
40032	Output2 EB2	Control Deviation Value	dF2	K	0.1	-199.9	999.9	1.0	1/10
40033		Control Deviation Value	EP2	P (0) : + Deviation		Pn (1) : ± Deviation		P (0)	
40035		On Delay Time (※2)	dt2	초	1	0	999	1	1/1
40036		Minimum OFF Time (※3)	Ft2	초	1	0	999	5	1/1
40037		Minimum ON Time (※4)	nt2	초	1	0	999	5	1/1
40038		Output when Sensor Error	SF2	OFF (0) = Unuse		on (1) = Use		OFF (0)	
40039		Alarm Deviation Value	HY2	K	0.1	-199.9	999.9	1.0	1/10
40040		Alarm Option	AP2	RLA (0):General alarm RLb (1):Maintain alarm		RLC (2):Standby alarm RLd (3):Maintain alarm, Standby alarm		RLA (0)	

(※1) Select Control Type : OFF = Output function is not in use and use it as an indicator

┌ = Use for Decompression(Depressurization) control and detection of high pressure

H = Use for Dompresion(Pressurization) and detection of low pressure

RL1 ~ SbR Refer to descriptions of table of alarm settings at page 4

(※2) On Delay Time : Output is activated only if output condition is maintained during ON delay time. (During ON delay time, the lamp of output will be flickering in a fast cycle)

(※3) Minimum OFF Time : During set timeframe after output is deactivated, OFF state will be maintained despite the conditions in which output is activated.

(※4) Minimum ON Time : During set timeframe after output is activated, ON state will be maintained despite the conditions in which output is deactivated.

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

No.	Menu	Code	Unit	Step	Min	Max	Default	Scale	Set value by a user
40076	Select Lock Function	<i>L o L</i>	<i>o F F</i> (0) : Lock cancel <i>L L L</i> (2) : Setting 1, 2 Group Lock <i>L L L</i> (3) : Setting 1, 2 Group, Setup Value Lock		<i>L L L</i> (1) : Setting 2 Group Lock		<i>o F F</i> (0)		
40077	Unit of D.P	<i>U n t</i>	<i>P a</i> (0) : Pa		<i>m m A q</i> (1) : mmAq		<i>P a</i> (0)		
40078	Max. User Desired Setup Value(※1)	<i>U S H</i>	-	1	<i>U S L</i>	999	500	1/1	
40079	Min. User Desired Setup Value(※1)	<i>U S L</i>	-	1	-199	<i>U S H</i>	0	1/1	
40080	Offset value of D.P Sensor (※2)	<i>o F S</i>	K	0.1	-19.9	99.9	0.0	1/10	
40081	The way of displaying decimal place for current differential pressure (※3)	<i>d P</i>	<i>0 . !</i> (0): Display to one decimal place <i>! (1)</i> : Display without decimal place				<i>0 . !</i> (0)		
40082	Span gain setup	<i>S P n</i>	K	0.01	0	9.99	1.00	1/100	
40083	Setup Sensor Input Filter (※4)	<i>S F t</i>	초	0.1	0.1	5.0	0.5	1/10	
40084	Sensor Value Display Cycle	<i>S d t</i>	초	0.1	0.0	5.0	0.5	1/10	
40085	Unification mode of set value (SV) (※5)	<i>S t o</i>	<i>o F F</i> (0): Individual setup		<i>o n</i> (1): Unification Setup		<i>o F F</i> (0)		
40086	Communication Address (-R4 Model)	<i>i d</i>	-	1	1	128	1		
40087	Communication BPS (-R4 Model)	<i>b P S</i>	<i>4 8</i> (0) = 4800 <i>9 6</i> (1) = 9600 <i>! 9 2</i> (2) = 19200 <i>3 8 4</i> (3) = 38400				<i>9 6</i> (1)		
40089	Analog Trans. Output (20mA)(-A1 Model)	<i>r t H</i>	Pa	1	-199	999	500	1/1	
40090	Analog Trans. Output (4mA)(-A1 Model)	<i>r t L</i>	Pa	1	-199	999	0	1/1	

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

(※2) Offset value of D.P Sensor : Correct deviation of differential pressure sensor.

(※3) The way of displaying decimal place for current differential pressure : It displays current value with only integers and no decimal point in case of setting it to "1"

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

(※5) Unification mode of set value (SV): It is set to "on(1)", set value between ST1 and ST2 become equal. When changing set value, parametric code is invisible and input set value directly.

: Table of alarm settings (Control type in setting 1 group)

Code	Alarm operation	Description for alarm option operation
<i>R L 1</i>	<p>※ <i>d F</i> = 10 Setup</p>	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>R L 2</i>	<p>※ <i>d F</i> = 10 Setup</p>	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>R L 3</i>	<p>※ <i>d F</i> = 10 Setup</p>	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>R L 4</i>	<p>※ <i>d F</i> = 10 Setup</p>	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>R L 5</i>	<p>※ <i>d F</i> = 10 Setup</p>	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>R L 6</i>	<p>※ <i>d F</i> = 10 Setup</p>	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>S b R</i>	Sensor Wire Disconnection Alarm : Output is ON When sensor wire disconnection.	

※ *S V* = *S t 1* ~ *S t 2*, *d F* = *d F 1* ~ *d F 2*, *H Y* = *H Y 1* ~ *H Y 2*

: Table of alarm options (in setting 1 group)

Code	Operation Title	Description for alarm option operation
<i>R L R</i>	General alarm	Standard alarm operation without option
<i>R L b</i>	Maintain alarm	Maintain output ON after alarm occurs
<i>R L L</i>	Standby alarm	No output initial operation (until achieve the 1st setup value)
<i>R L d</i>	Maintain alarm, Standby alarm	Execute both <i>R L b</i> & <i>R L L</i> at the same time

※ Reboot (power up system again) or push PRG button in two (2) successive times when output of maintained alarm (*R L b*) is deactivated.

: Trip message (TRIP / ALARAM MESSAGE)

No.	Menu	Code	Description	Response at Detection	Reset Type
1	Internal Parameter Error	<i>S y S</i>	In case of change of set value by an unknown case	Reset Type	Manual reset
2	Sensor Open/Short	<i>o P n</i>	In case of differential pressure sensor error (Please ask A/S)	Reset Type	Manual reset
4	Lower Input	<i>L L L</i>	Lower sensor input than measuring range (-500Pa)	Reset Type	Manual reset
5	Upper Input	<i>H H H</i>	Upper sensor input than measuring range (500Pa)	Reset Type	Manual reset

※ In case of errors as described above, it will be normally operated once causes of errors are released.

5. Communication Protocol

: Communication specifications (-R4 Model)

Item	Description
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	Unit	Type	Size	DP500	MMI	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)	mmAq	analog	INT16	-20.0 ~ 50.0	-200 ~ 500	1/10
40106	Status code of product	-	analog	INT16	Refer to bit status below		
Bit 0	Output status of OUT1	-	digital	Bit	0 = OFF	1 = ON	
Bit 1	Output status of OUT2	-	digital	Bit	0 = OFF	1 = ON	
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			