Autonics

SENSOR CONTROLLER
PA10 SERIES

INSTRUCTION MANUAL

Thank you for choosing our Autonics product.
Please read the following safety considerations before use.

▣ Safety Considerations

※Please observe all safety considera ions for safe and proper product opera ion to avoid hazards.

※Safety considerations are categorized as follows.
⚠**Warning** Failure to follow these instruc ions may result in serious injury or death.
⚠**Caution** Failure to follow these instructions may result in personal injury or product damage.

※The symbols used on the product and instruction manual represent the following
⚠ symbol represents caution due to special circumstances in which hazards may occur.

⚠ Warning

1. **Fail-safe device must be installed when using the unit with machinery that may cause serious injury or substantial economic loss. (e.g. nuclear power control, medical equipment, ships, vehicles, railways, aircraft, combustion apparatus, safety equipment, crime/disaster prevention devices, etc.)**
   Failure to follow this instruc ion may result in fire, personal injury, or economic loss.
2. **Install on a device panel or DIN rail to use.**
   Failure to follow this instruc ion may result in electric shock or fire.
3. **Do not connect, repair, or inspect the unit while connected to a power source.**
   Failure to follow this instruc ion may result in electric shock or fire.
4. **Check 'Connections' before wiring.**
   Failure to follow this instruc ion may result in fire.
5. **Do not disassemble or modify the unit.**
   Failure to follow this instruc ion may result in electric shock or fire.

⚠ Caution

1. **When connecting the power/sensor input and relay output, use AWG 24 (0.20mm²) to AWG 15 (1.65mm²) cable or over and tighten the terminal screw with a tightening torque of 0.98 to1.18N·m.**
   Use proper cables for the rated load current.
   Failure to follow this instruc ion may result in fire or malfunction due to contact failure.
2. **Use the unit within the rated specifications.**
   Failure to follow this instruc ion may result in fire or product damage.
3. **Use dry cloth to clean the unit, and do not use water or organic solvent.**
   Failure to follow this instruc ion may result in electric shock or fire.
4. **Do not use the unit in the place where flammable/explosive/corrosive gas, humidity, direct sunlight, radiant heat, vibration, impact, or salinity may be present.**
   Failure to follow this instruc ion may result in fire or explosion.
5. **Keep metal chip, dust, and wire residue from flowing into the unit.**
   Failure to follow this instruc ion may result in fire or product damage.

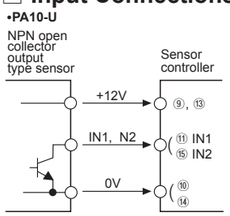
▣ Ordering Information

PA10 — U □

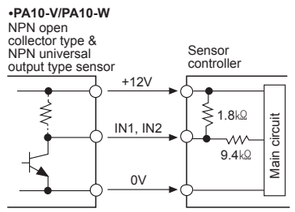
Input	**No mark**	NPN input
	P	PNP input
Function	**U**	High function controller
	V	Controller
	W	2 Channel controller
tem	**PA10**	Multi-function power amplifier

▣ Input Connections

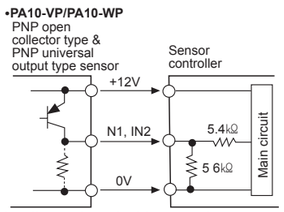
•PA10-U



•PA10-V/PA10-W



•PA10-VP/PA10-WP



※**The above specifications are subject to change and some models may be discontinued without notice.**
※**Be sure to follow cautions written in the instruction manual and the technical descriptions (catalog, homepage).**

▣ Specifications

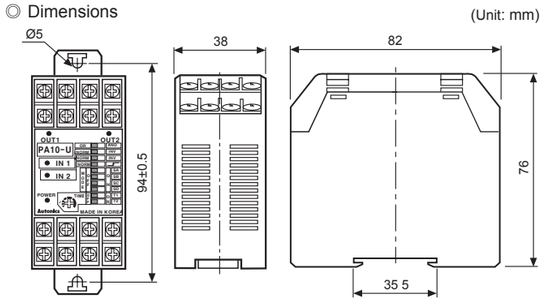
Model		PA10-U	PA10-V	PA10-VP	PA10-W	PA10-WP
Power supply		100-240VAC~ 50/60Hz				
Allowable voltage range		90 to 110% of rated voltage				
Power consumption		Max. 10VA (condotion:12VDC/200mA resistive load)				
Power for external sensor		12VDC⎓ ±10% approx. 200mA				
Input(IN1, IN2)		Selectable NORM/INV. Selectable OR/AND operation for IN1, IN2 input. Selection function for N2 derivative action.	Selectable NORM/INV. Operation for IN1, IN2 AND.		Selectable NORM/INV. Selection func ion for IN1, IN2 individual operation.	
		NPN input type	**NPN input type**	**PNP input type**	**NPN input type**	**PNP input type**
Input method		**•PA10-U** [No-voltage input] Impedance at short-circuit: Max. 680Ω, Residual voltage at short-circuit: Max. 0.8V, Impedance at open: Min. 100kΩ **•PA10-V/PA10-W** [No-voltage input] Impedance at short-circuit: Max. 300Ω, Residual voltage at short-circuit: Max. 2V, Impedance at open: Min. 100kΩ **•PA10-VP/PA10-WP** [Voltage input] Input impedance: 5.6kΩ, "H" level voltage: 5-30VDC⎓, "L" level voltage: 0-2VDC				
Out-put	Contact output	OUT[250VAC~ 3A(Resistive load)]			OUT1, OUT2 [250VAC~ 3A(Resistive load)]	
	Solid-state output	O・C OUT1, O・C OUT2	O・C OUT		—	
		NPN open collector output Max. 30VDC⎓ Max. 100mA				
Response time		Relay output : Max. 10ms, Transistor output : Max. 0.05ms				
Time setting function by each mode ※**Only for PA10-U**	Have	• ON-DELAY MODE • ONE-SHOT DELAY MODE • FLICKER ONE-SHOT MODE • HIGH-SPEED DETECTION MODE		• OFF-DELAY MODE • FLICKER MODE • LOW-SPEED DETECTION MODE • ON/OFF-DELAY MODE		
	Non	• NORMAL MODE • FLIP-FLOP MODE • ENCODER(MODE 9 to 11)				
Relay life cycle	Mechanical	Min.10,000,000 times				
	Electrical	Min.100,000 times(250VAC 3A resis ive load)				
Dielectric strength		2000VAC 50/60Hz for 1 minute				
Insulation resistance		Over 100MΩ(at 500VDC megger)				
Envi-ron ment	Ambient temperature	-10 to 55℃ [Storage: -25 to 60℃]				
	Ambient humidity	35 to 85%RH [Storage: 35 to 85%RH]				
Unit weight		Approx. 150g			Approx. 160g	

※If the load is connected over 200mA at the sensor output, it may cause mechanical trouble.
※Environment resistance is rated at no freezing or condensation.

▣ Dimensions and Installation Interval

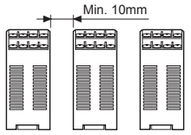
◎ Dimensions

(Unit: mm)



◎ Installation interval

When installing multiple sensor controllers, please keep space between units at least 10mm for heat radiation.

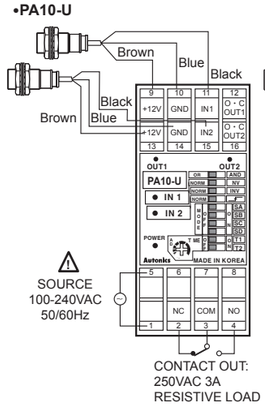


▣ Connections

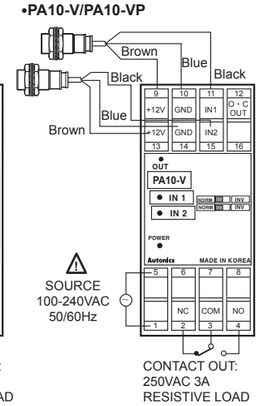
※Use teminals of size specified below.

	a	b
<Forked>	Min. 3.5mm	Max. 7.0mm

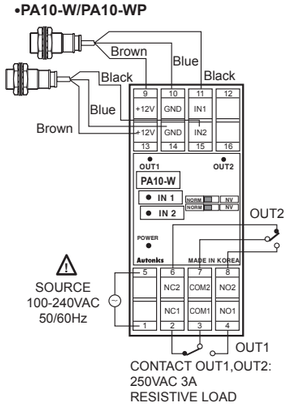
•PA10-U



•PA10-V/PA10-VP

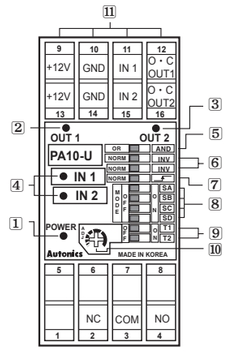


•PA10-W/PA10-WP



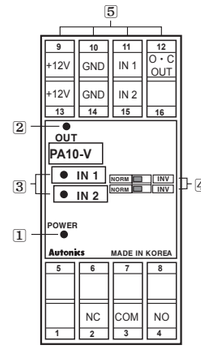
▣ Front Panel Indentification

•PA10-U



1 **Power indicator** LED turns on when AC power applied
2 **Output indicator 1** Indication of output 1 operation status
3 **Output indicator 2** Indication of output 2 operation status
4 **Sensor input indicator** Indication of sensor input signal (LED turns on when sensor input is Low)
5 **AND/OR selection switch** Select "AND" or "OR" for IN1, IN2 Input
6 **Selection switch of sensor input signal**
NORM INV (Input signal reverse turn function)
• NORM : When input signal is low, it is valid signal. (_┐_)
• INV : When input signal is high, it is valid signal. (_┌_)
7 **Derivative action selection of IN2 input signal (AND/OR selection switch: AND)**
NORM (When input signal is high(_┌_), it is effective signal)
• NORM : IN2 input signal is operating as reverse turn function
• _┌_: Derivative action of IN2 input signal. ※See "▣ Derivation action applications"
8 **Selection switch for operation mode** See "▣ Operation mode" in next page.
9 **Selection switch of time range and max. input frequency** It is the switch to select time range(1 to 7 mode) or allowable input frequency(9 to 11 mode).
• Time range: Approx. 0.01 to 0.1sec, Max. input frequency: 100kHz
• Time range: Approx. 0.1 to 1sec, Max. input frequency: 10kHz
• Time range: Approx. 0.1 to 10sec, Max. input frequency: 1kHz
• Time range: Approx. 10 to 100sec, Max. input frequency: 100Hz
10 **Timer volume** Adjust time within the range which is set with 9.
11 **Terminal block**

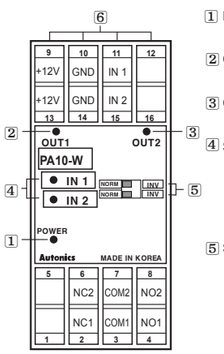
•PA10-V/PA10-VP



1 **Power indicator** LED turns on when AC power applied.
2 **Output indicator** Indication of output signal.
3 **Sensor input indicator** Indication of sensor input signal.
• PA10-V: LED turns on when sensor input is Low
• PA10-VP: LED turns on when sensor input is High
4 **Selection switch of sensor input signal**
• NORM: When sensor input signal is Low, it is vaild signal.
• INV: When sensor input signal is High, it is vaild signal.
5 **Terminal block**

※When IN1, N2 input signal is AND, OUT will work.

•PA10-W/PA10-WP

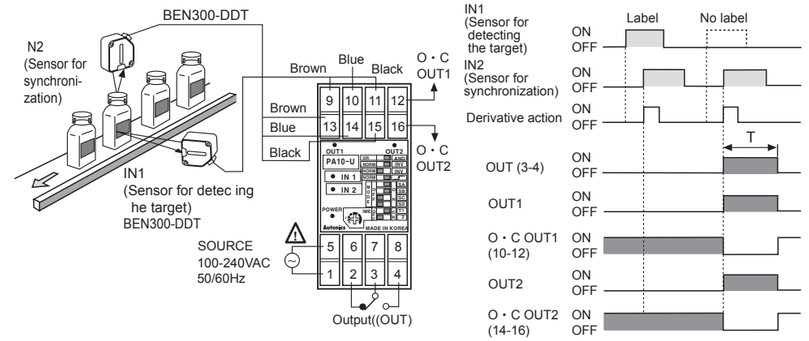


1 **Power indicator** LED turns on when AC power applied
2 **Output 1 indicator** Indication of output 1 operation status.
3 **Output 2 indicator** Indication of output 2 operation status.
4 **Sensor input indicator** Indication of sensor input signal.
• PA10-W: LED turns on when sensor input is Low.
• PA10-WP: LED turns on when sensor input is High.
5 **Selection switch of sensor input signal**
• NORM: When sensor input signal is Low, it is vaild signal.
• INV: When sensor input signal is High, it is vaild signal.
6 **Terminal block**

※IN1, IN2 operates individually.

▣ Derivative Action Applications

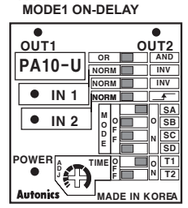
◎ Detect label of glass bottle



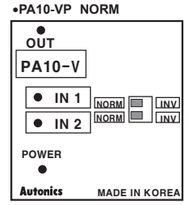
•Operation
When IN1 is ON and IN2 is ON, OUT will not work.
But when there is no label on bottle, OUT will work when IN2 is ON. OUT will be returned after setting time.
Note)Condition of detec ing label on glass bottle is to install with IN1 operating first.

▣ Factory Default for S/W

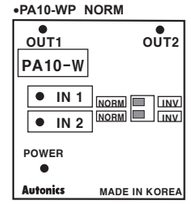
•PA10-U
MODE1 ON-DELAY



•PA10-V NORM
•PA10-VP NORM



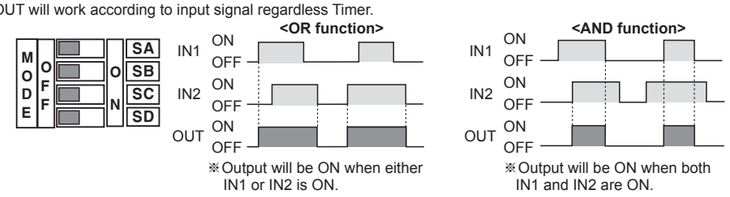
•PA10-W NORM
•PA10-WP NORM



▣ Operation Mode

•MODE 0 NORMAL MODE

: OUT will work according to input signal regardless Timer.

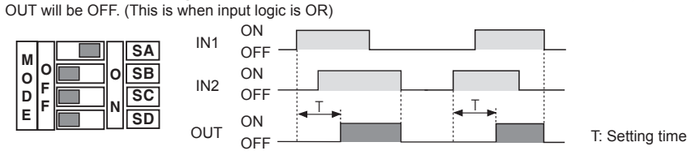


※Output will be ON when either IN1 or IN2 is ON.

※Output will be ON when both IN1 and IN2 are ON.

•MODE 1 ON-DELAY MODE

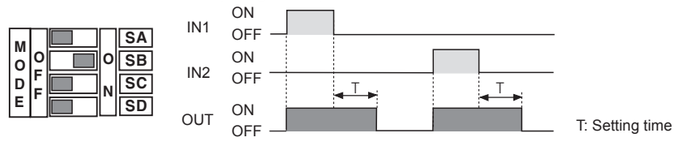
: OUT will be ON after setting time when one of IN1 and IN2 is ON. When IN1 and IN2 are OFF, OUT will be OFF. (This is when input logic is OR)



T: Setting time

•MODE 2 OFF-DELAY MODE

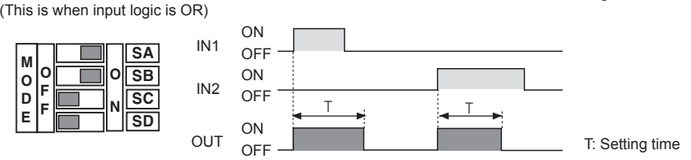
: OUT will be ON at he same time when IN1 or IN2 is ON then OUT will be OFF after setting time when IN1 or IN2 is OFF. (This is when input logic is OR)



T: Setting time

•MODE 3 ONE-SHOT DELAY MODE

: OUT will be ON at the same time when IN1 or IN2 is ON then OUT will be OFF after setting time. (This is when input logic is OR)

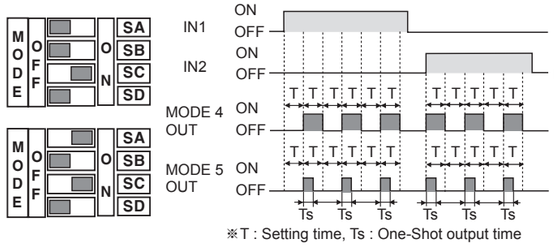


T: Setting time

•MODE 4,5 FLICKER MODE / FLICKER ONE-SHOT MODE

: OUT will be ON after setting time for IN1 input then it is flickering and OUT will be flickering after setting time from ON and IN2 input is same. Incase One-shot Mode, output time(Ts) will be selected by NORM S/W.

(: Ts= Approx. 10ms, NORM: Ts= Approx. 100ms)



※T : Setting time, Ts : One-Shot output time

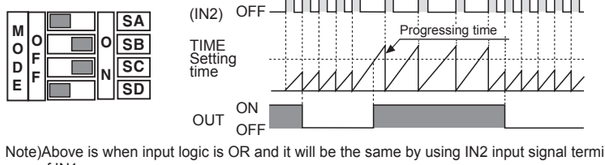
Note)ON/OFF rate of Flicker output is 1:1.

Note)In case of Flicker Mode, it is not different between OR AND and NORM S/W.

Note)In case of One-Shot Mode, it is not different between OR AND S/W selections.

•MODE 6 LOW-SPEED DETECTION MODE

: OUT will be ON when input signal (IN1) is longer than setting time by comparing it to to the setting time by one cycle.

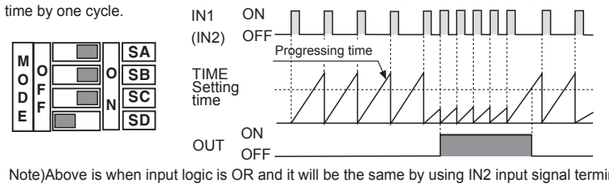


Note)Above is when input logic is OR and it will be the same by using IN2 input signal terminal instead of IN1.

Note)When use MODE 6 as above, be sure that OUT will be work at he same time with power supply.

•MODE 7 HIGH-SPEED DETECTION MODE

: OUT will be ON when input signal (IN1) is shorter than setting time by comparing it to to the setting time by one cycle.



Note)Above is when input logic is OR and it will be the same by using IN2 input signal terminal instead of IN1.

◎TIME S/W function(MODE 1 to MODE 7)

: Set the setting time by TIME S/W(T1, T2) and front TIME VOLUME(ADJ).

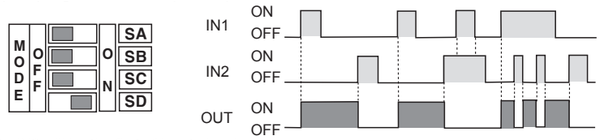
MODE / TIME S/W	MODE 1 to MODE 7, MODE 12 Setting time range	MODE 6 to MODE 7 Input frequency	rpm
OFF ON T1 T2	0.01 to 0.1sec	100 to 10Hz	6,000 to 600rpm
OFF ON T1 T2	0.1 to 1sec	10 to 1Hz	600 to 60rpm
OFF ON T1 T2	1 to 10sec	1 to 0.1Hz	60 to 6rpm
OFF ON T1 T2	10 to 100sec	0.1 to 0.01Hz	6 to 0.6rpm

※Range of operating rpm is 1 pulse per 1 revolution.

※When the pulse is increasing per 1 revolution, range of opera ing rpm is decreasing.

•MODE 8 Flip-Flop MODE [OUT LATCH operation]

: When IN1 signal is input then the Flip-Flop output will be ON(SET). When the IN2 signal is input, Flip-Flop Signal will be OFF(RESET).



Note)IN2 will be the first of input signal.

Note)It is not different between OR and NORM S/W.

Note)There is no Timer function in Flip-Flop Mode, therefore use this unit with Time S/W(T1, T2) as OFF.

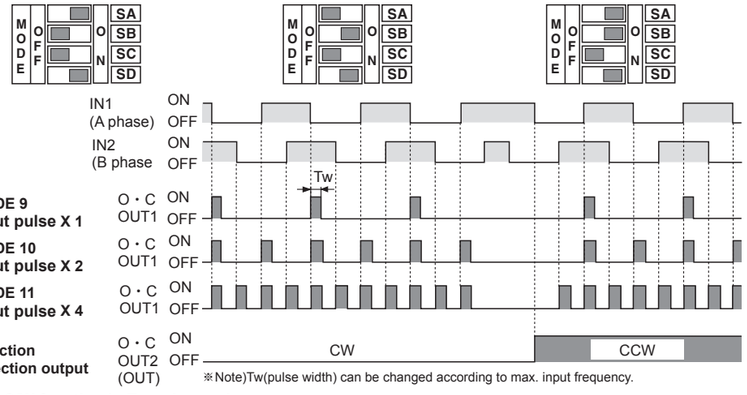
◎ENCODER MODE(MODE 9 ~ MODE 11)

1) There should be 90°phase difference between IN1 and IN2 for input terminal.
2) Please connect A phase output of encoder to IN1 and B phase output of encoder to IN2, when use NPN open collector or Totempole output type of encoder with controller. In this case, turnded to CW direction detection signal(O.C OUT2, OUT) output of controller will be OFF.
3) There are output function of pulse(O.C OUT1) which has been multiplied(×1, ×2, ×4 times) against input signal and direction detection output(O.C OUT2, OUT) function which detects direction of encoder rotation in Encoder mode.
4) Be sure to Input speed(cps) of connected equipment because pulse width of O.C OUT1 is short.
5) OR AND NORM S/W NORM INV Selection S/W can be set at any position.

•MODE 9 ENCODER (Input pulse×1time)

•MODE 10 ENCODER (Input pulse×2times)

•MODE 11 ENCODER (Input pulse×4times)



※Note)Tw(pulse width) can be changed according to max. input frequency.

◎TIME S/W function in Encoder mode

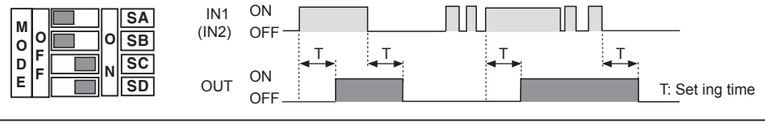
: TIME S/W is to convert output pulse width(Tw).

TIME S/W	Max. input frequency	Output pulse wid h(Tw)	Input speed of connected equipment(cps)
OFF ON T1 T2	100kHz	Approx. 0.5μs	Min. 2000kHz(2,000kcps)
OFF ON T1 T2	10kHz	Approx. 5μs	Min. 200kHz(200kcps)
OFF ON T1 T2	1kHz	Approx. 50μs	Min. 20kHz(20kcps)
OFF ON T1 T2	100Hz	Approx. 500μs	Min. 2kHz(2kcps)

•MODE 12 ON/OFF-DELAY MODE

: OUT will be ON after setting time when IN1 (or IN2) is ON. When IN1 (or IN2) is OFF, OUT will be OFF after setting time. (This is when input logic is OR)

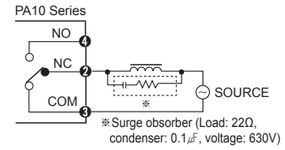
※If IN1 (or IN2) ON/OFF time is shorter than setting ime, OUT does not turn.



T: Set ing time

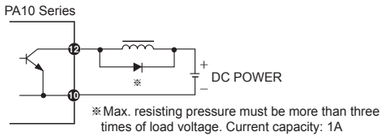
▣ Output

It is able to reduce noise generating if install surge obsorber between inductive loads(Motor, Solenoid, etc) as Picture 1.
When use DC Relay for load, please install a diode at relay coils as Picture 2. (Be sure to power polarity)



※Surge obsorber (Load: 22Ω, condenser: 0.1μF, voltage: 630V)

(Picture 1) Relay output

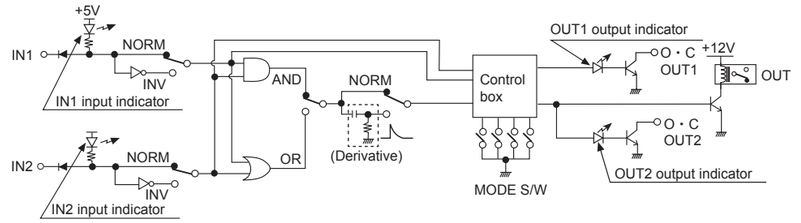


※Max. resisting pressure must be more than three times of load voltage. Current capacity: 1A

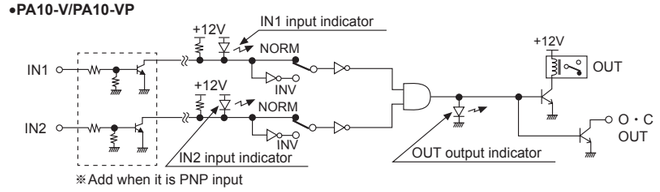
(Picture 2) NPN open collector output

▣ Function Diagram

•PA10-U

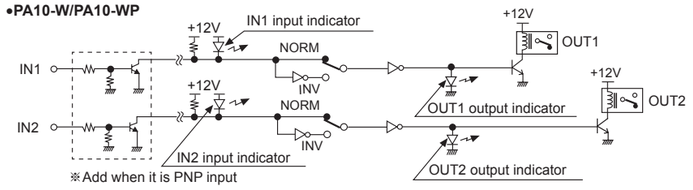


•PA10-V/PA10-VP



※Add when it is PNP input

•PA10-W/PA10-WP



※Add when it is PNP input

▣ Cautions during Use

1. Follow instructions in 'Cautions during Use'. Otherwise, it may cause unexpected accidents.
2. Use the product, 0.1 sec after supplying power.
3. When supplying or turning off the power, use a switch or etc. to avoid chattering.
4. Install a power switch or circuit breaker in the easily accessible place for supplying or disconnecting the power.
5. Keep away from high voltage lines or power lines to prevent inductive noise.
   In case installing power line and input signal line closely, use line filter or varistor at power line and shielded wire at input signal line.
   Do not use near the equipment which generates strong magnetic force or high frequency noise.
6. This unit may be used in the following environments.
   ①Indoors (in the environment condition rated in 'Specifica ions')
   ②Altitude max. 2,000m
   ③Pollution degree 2
   ④Installation category II

▣ Major Products

- Photoelectric Sensors
- Fiber Optic Sensors
- Door Sensors
- Door Side Sensors
- Area Sensors
- Proximity Sensors
- Pressure Sensors
- Rotary Encoders
- Connector/Sockets
- Switching Mode Power Supplies
- Control Switches/Lamps/Buzzers
- I/O Terminal Blocks & Cables
- Stepper Motors/Drivers/Motion Controllers
- Graphic/Logic Panels
- Field Network Devices
- Laser Marking System (Fiber, Co_2, Nd: YAG)
- Laser Welding/Cutting System
- Temperature Controllers
- Temperature/Humidity Transducers
- SSRs/Power Controllers
- Counters
- Timers
- Panel Meters
- Tachometer/Pulse (Rate) Meters
- Display Units
- Sensor Controllers

DRW171160AA