Jun.14th'02

# MEASURING DISTANCE TYPE OBSTACLE DETECTION SENSOR PBS SERIES

# SPECIFICATIONS

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| △1 × 2 | Added hysteresis min. value, Corrected to "Detection state" | | | | 3 | Jul.3rd'02 | Terawaki | PR-4452 |
| Symbol | Amended reason | | | | Pages | Date | Corrector | Amended No. |
| Approved by | Checked by | Drawn by | Designed by | Title | Measuring Distance Type Obstacle Detection Sensor PBS Series Specifications | | | |
| | | | TERAWAKI | Drawing No. | C-42-3143A | | | 1/6 |

**HOKUYO AUTOMATIC CO.,LTD.**

1.General

(1)Operation principle

Operation principle is that semicircular field is scanned by LED(lambda = 880nm) and the coordinates is calculated by measuring distance to object and its step angle and it detects obstacle in setting area.

(2)Detection area setting

Shape of detection and setting value can be changed by PC(RS-232C). Detection distance with 3 steps output for each detection area can be set.(Except for synchronous type)

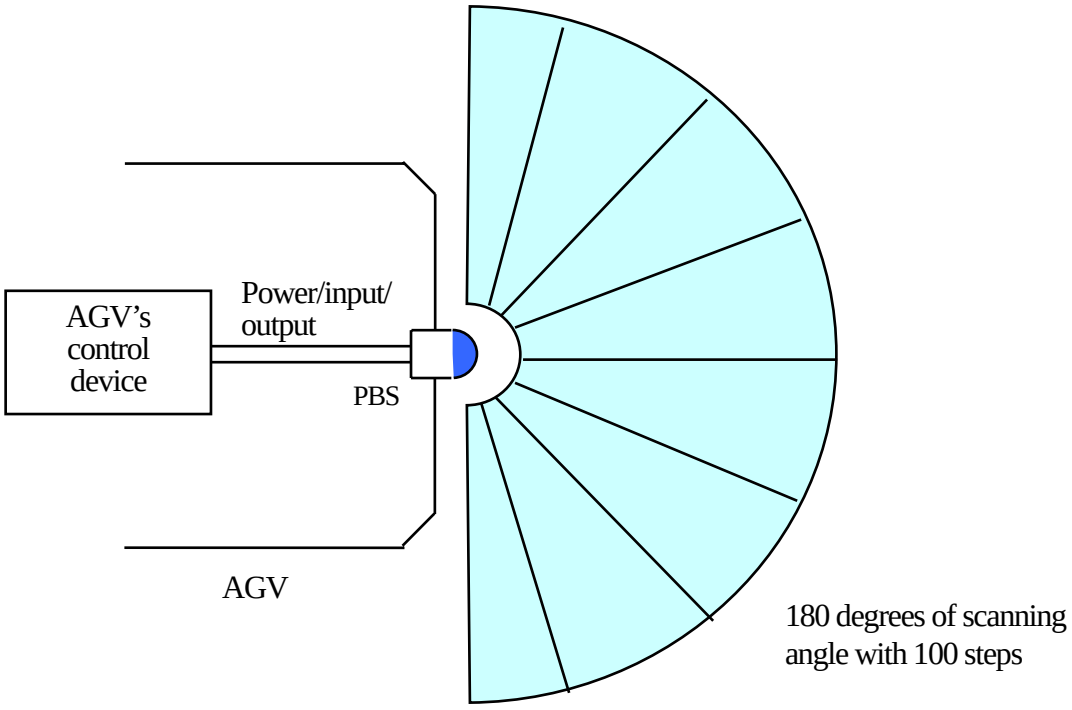
(3)Detection area changeover

Max. 15 kinds(different from the type) of area changeover that was set by PC beforehand can be made by outer bit input.

(4)Trouble output

This device provides self-diagnosis function such as LED emission or motor revolution trouble and this output is executed when such trouble.

2.Structure(Light scanning image)



3.Specifications

| | |
|---|---|
| Model No. | PBS series |
| Power source | 18 to 30VDC(Including ripple) |
| Current consumption | 250mA or less(100mA or less when emission stops) |
| Detectable object and detection distance | White kent paper with 300 by 300mm(Placed in parallel with sensor projection/ reception surface)<br>Area with vertical direction 0.2 to 3m and width 2m(Origin point is scanning center position) but within scanning angle 180 degrees |
| Hysteresis | 10% or less of detection distance(It is not getting 60mm or less) ⚠1 |
| Output(Note) | Photo-coupler/open-collector output(30VDC 50mA Max.)<br>Output 1 : OFF when detected in area<br>Output 2 : OFF when detected in area<br>Output 3 : OFF when detected in area(Except for synchronous type)<br>Trouble output : ON during normal operation |
| Response time | 180msec or less when normal operation(Scanning speed 1 rev./100msec)<br>(280msec or less when using interference avoidance mode)<br>Except for 100msec, area changeover time |
| Starting time | Within 1sec after putting power source on or stopping LED emission |
| Lamps | Power lamp(Green) : Flickered when trouble<br>Output 1 lamp(Orange) : Lit when detected in area<br>Output 2 lamp(Orange) : Lit when detected in area<br>Output 3 lamp(Orange) : Lit when detected in area(Except for synchronous type) |
| Connection method | Lead wire 1m long |
| Ambient illuminance | Halogen/mercury lamp : 10000lux or less<br>Fluoresncet lamp : 6000lux(Max. illuminance)<br>Note) It may malfunction when receiving strong light such as sun light etc. |
| Ambient temperature/ humidity | -10 to +50 degrees C, 85%RH or less(Not dew-drop and frozen) |
| Vibration resistance | 10 to 55Hz, double amplitude 1.5mm Each 2 hour in X, Y and Z directions |
| Impact resistance | 490m/s$^2$(50G) Each 10 time in X, Y and Z direction |
| Protective structure | IP64 |
| Weight | 500g |
| Life | 5 years during normal temperature(motor life) |
| Material | Front case : Polycarbonate, rear case : ABS |

(Note)Output logic and output 3 function is depending on type. When trouble output was executed, all output 1 to 3 is indicating detection state. ⚠1

| | |
|---|---|
| Setting of detection area | Setting of output 1 : Free to set with pointer(Max. 7 points)(Possible to set from 0 to to 6m for optical axis direction)<br>Setting of output 2 : Linear setting to progressive direction<br>Fan-shaped setting to optical axis direction<br>Percentage(%) setting against output 1 pointer<br>Setting of output 3 : Same as output 2 |
| Interference error output avoidance mode | Each detection output for detection area can be set with PC. |

<table>
<tr><td>Input and each area</td><td>Photo-coupler input(Anode common, Each input current 4mA MIN.)<br>Setting detection area changeover<br>Set area No. by [Input 1], [Input 2], [Input 3] and [Input 4]<br>Stop emission by getting all [Input 1], [Input 2], [Input 3] and [Input 4] to ON<br>(OFF : H level input, ON : L level input)
<table>
<tr><th>[Input 1]</th><th>[Input 2]</th><th>[Input 3]</th><th>[Input 4]</th><th>Area patterns</th></tr>
<tr><td>ON</td><td>ON</td><td>ON</td><td>ON</td><td>Emission stop</td></tr>
<tr><td>OFF</td><td>ON</td><td>ON</td><td>ON</td><td>Area 1</td></tr>
<tr><td>ON</td><td>OFF</td><td>ON</td><td>ON</td><td>Area 2</td></tr>
<tr><td>OFF</td><td>OFF</td><td>ON</td><td>ON</td><td>Area 3</td></tr>
<tr><td>ON</td><td>ON</td><td>OFF</td><td>ON</td><td>Area 4</td></tr>
<tr><td>OFF</td><td>ON</td><td>OFF</td><td>ON</td><td>Area 5</td></tr>
<tr><td>ON</td><td>OFF</td><td>OFF</td><td>ON</td><td>Area 6</td></tr>
<tr><td>OFF</td><td>OFF</td><td>OFF</td><td>ON</td><td>Area 7</td></tr>
<tr><td>ON</td><td>ON</td><td>ON</td><td>OFF</td><td>Area 8</td></tr>
<tr><td>OFF</td><td>ON</td><td>ON</td><td>OFF</td><td>Area 9</td></tr>
<tr><td>ON</td><td>OFF</td><td>ON</td><td>OFF</td><td>Area 10</td></tr>
<tr><td>OFF</td><td>OFF</td><td>ON</td><td>OFF</td><td>Area 11</td></tr>
<tr><td>ON</td><td>ON</td><td>OFF</td><td>OFF</td><td>Area 12</td></tr>
<tr><td>OFF</td><td>ON</td><td>OFF</td><td>OFF</td><td>Area 13</td></tr>
<tr><td>ON</td><td>OFF</td><td>OFF</td><td>OFF</td><td>Area 14</td></tr>
<tr><td>OFF</td><td>OFF</td><td>OFF</td><td>OFF</td><td>Area 15</td></tr>
</table>
Note)The above is for 15 area pattern type and function of input 4 type is different about 7 area pattern type.</td></tr>
<tr><td>Input response time</td><td>Input taking-in cycle : 1 scanning time(100msec)<br>(When selecting emission stop by external input, input taking-in cycle is 1msec)</td></tr>
</table>

(Note) Interference error output avoidance mode can be set by PC. It judges as existing object when both data for 2 scan is coincident. Interference between PBS's hardly cause under interference error output avoidance mode but response time is getting slower.(Worst value including detection area changeover time is 380msec.)

4. Cables and signals

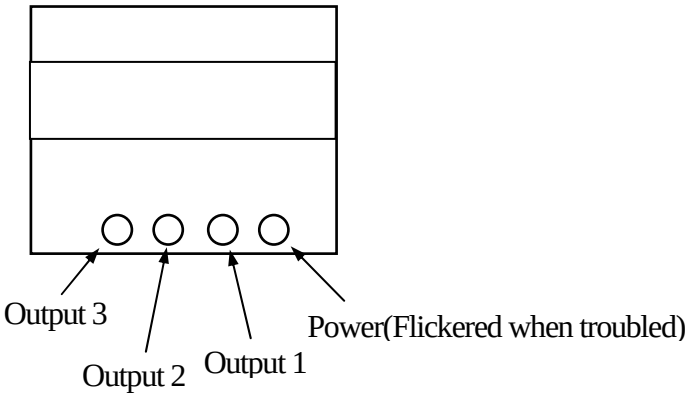
| Colors | Functions |
|---|---|
| Black | Output 1 |
| White | Output 2 |
| White(Blue) | Output 3 |
| Orange | Trouble output |
| Gray | Output common minus |
| Red | Input common plus |
| Green | Input 1 |
| Yellow | Input 2 |
| Purple | Input 3 |
| White(Yellow) | Input 4 |
| Brown | +VIN |
| Blue | -VIN |
| Yellow(Red) | Serial input(RXD) |
| Yellow(Green) | Serial output(TXD) |
| Yellow(Black) | Serial GND |

Note : Colors in parenthesis indicate ink color of both sides line printing. Connect unused input wires to input common plus(Red) or open it. Connect unused output wires to output common minus(Gray) or open it. Input/output direction is mentioned on the basis of PBS.

5. Notice when installation

Don't close projection/reception part or interrupt the view when installation. It doesn't operate correctly.

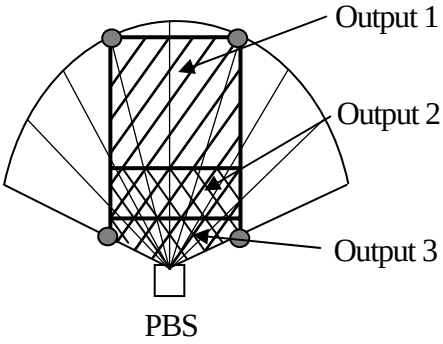
6. Lamp arrangement



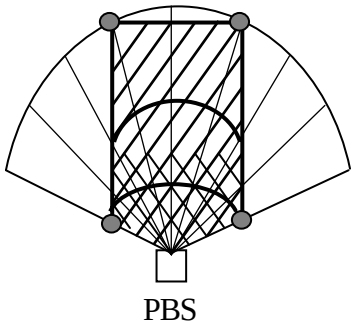
7. Detection judgment area and detection area diagram

PBS is indicating detection area on the basis of scanning center position.

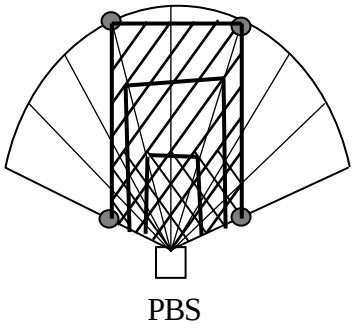
Linear setting

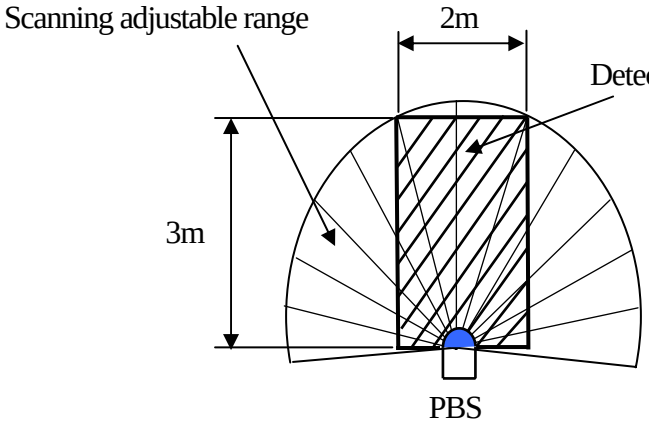



Fan-shaped setting




Percentage(%) setting




White kent paper with 300 x 300mm
(Placed in parallel with sensor reception surface)
Area with vertical direction 0.2 to 3m and width 2m
but within scanning angle 180 degrees

Detection area can be set up to 19 degrees for right/left(full angle 218 degrees, 121 steps) to oblique backward directions by editing area with PC but it can't be guaranteed.