

# Photoelectrics Through-beam, Transistor Output Type PA12BNT20..

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- Elevators, Escalators and Entrance control
- Range 20 m
- ESPE-Type 2, PL C.
- Modulated, infrared light
- Supply voltage: 10 to 30 VDC
- Output: 100 mA, NPN or PNP type
- Make or break switching
- Protection: reverse polarity, short circuit, transients
- Cable versions with or without connector
- Emitter mute and power adjustment
- CE, UL325 and UL508 approved



## Product Description

The PA12BNT. is a through beam sensor set specially designed for elevators, escalators, entrance control to meet the requirements in the door market. The housing is very robust and is

known for its high long-term reliability. The emitter has a mute input to turn it off for evaluation of the sensor function. Available in 10-30 VDC version.

## Ordering Key

**PA12BNT20NO-C2**

Type \_\_\_\_\_  
Housing style \_\_\_\_\_  
Housing size \_\_\_\_\_  
Housing material \_\_\_\_\_  
Neutral \_\_\_\_\_  
Detection principle \_\_\_\_\_  
Sensing distance \_\_\_\_\_  
Output type \_\_\_\_\_  
Output configuration \_\_\_\_\_  
Connection type \_\_\_\_\_  
Cable connector \_\_\_\_\_

## Type Selection

| Housing diameter | Range S <sub>n</sub> | Connector | Ordering no. Receiver NPN, NO | Ordering no. Receiver NPN, NC | Ordering no. Receiver PNP, NO | Ordering no. Receiver PNP, NC | Ordering no. Emitter |
|------------------|----------------------|-----------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|----------------------|
| M12              | 20 m                 | NO        | PA12BNT20NO                   | PA12BNT20NC                   | PA12BNT20PO                   | PA12BNT20PC                   | PA12BNT20            |
| M12              | 20 m                 | YES       | PA12BNT20NO-C2                | PA12BNT20NC-C2                | PA12BNT20PO-C2                | PA12BNT20PC-C2                | PA12BNT20-C2         |

**Note:** Please order emitter and receiver separately

## Specifications Emitter

|                                                |                              |                         |                              |
|------------------------------------------------|------------------------------|-------------------------|------------------------------|
| <b>Rated operational volt. (U<sub>B</sub>)</b> | 10 to 30 VDC                 | <b>Light source</b>     | LED, 860 nm                  |
| <b>Ripple (U<sub>rrp</sub>)</b>                | ≤ 10%                        | <b>Light type</b>       | Infrared, modulated          |
| <b>Supply current</b>                          | ≤ 20 mA                      | <b>Light spot</b>       | 1580 mm @ 12 m               |
| <b>Protection</b>                              | Reverse polarity, transients | <b>Emitter angle</b>    | ± 3.8° @ 12 m                |
| <b>Power ON delay (t<sub>v</sub>)</b>          | ≤ 100 ms                     | <b>Power adjustment</b> | R <sub>x</sub> ~ 3 kΩ -10 kΩ |
| <b>Control input</b><br>Normal oper.<br>Mute   | > 1.5 VDC<br>< 1.2 VDC       |                         | 4...24 m in 19 steps         |

## Specifications Receiver

|                                                       |                                               |                                          |                                                                               |
|-------------------------------------------------------|-----------------------------------------------|------------------------------------------|-------------------------------------------------------------------------------|
| <b>Rated operating dist. (<math>S_n</math>)</b>       | 20 m                                          | <b>Protection</b>                        | Short-circuit, reverse polarity, transients                                   |
| <b>Blind zone</b>                                     | None                                          | <b>Utility category</b>                  | DC12 Control of resistive loads and solid state loads with optical insulation |
| <b>Temperature drift</b>                              | $\leq 0.4\%/^{\circ}\text{C}$                 | DC13                                     | Control of electromagnets                                                     |
| <b>Hysteresis (H)</b>                                 | 3 - 20%                                       | <b>Ambient light</b>                     | $> 20.000$ Lux (EN60947-5-2)                                                  |
| <b>Rated operational volt. (<math>U_B</math>)</b>     | 10 to 30 VDC (ripple included)                | <b>Detection angle</b>                   | $\pm 2.9^{\circ}$ @ 12 m                                                      |
| <b>Ripple (<math>U_{rp}</math>)</b>                   | $\leq 10\%$                                   | <b>Operating frequency (f)</b>           | 100 Hz                                                                        |
| <b>No load supply current (<math>I_o</math>)</b>      | $\leq 16$ mA                                  | <b>Response time</b>                     | OFF-ON ( $t_{ON}$ ) $\approx 6.5$ ms<br>ON-OFF ( $t_{OFF}$ ) $\approx 3.5$ ms |
| <b>Output current</b>                                 |                                               | <b>Power ON delay (<math>t_v</math>)</b> | $\leq 100$ ms                                                                 |
| Continuous ( $I_a$ )                                  | $\leq 100$ mA                                 | <b>Output function</b>                   | NPN or PNP                                                                    |
| Short-time (I)                                        | $\leq 100$ mA,<br>(max. load capacity 100 nF) |                                          | Make or break (NO or NC)                                                      |
| <b>Minimum operational current (<math>I_m</math>)</b> | 0.5 mA                                        |                                          |                                                                               |
| <b>OFF-state current (<math>I_r</math>)</b>           | $\leq 100$ $\mu\text{A}$                      |                                          |                                                                               |
| <b>Voltage drop (<math>U_d</math>)</b>                | $\leq 1.6$ VDC @ 100 mA                       |                                          |                                                                               |

## General Specifications

|                                                          |                                                                                                                                     |                                         |                                                                                            |
|----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|--------------------------------------------------------------------------------------------|
| <b>Environment</b>                                       |                                                                                                                                     | <b>Electrical fast transients/burst</b> |                                                                                            |
| Overvoltage category                                     | III (IEC 60664/60664A, 60947-1)                                                                                                     | (EN 61000-4-4)                          | $\pm 4$ kV                                                                                 |
| Pollution degree                                         | 3 (IEC 60664/60664A, 60947-1)                                                                                                       | <b>Surge</b> (EN 61000-4-5)             |                                                                                            |
| Degree of protection                                     | IP67 (IEC 60529; EN60947-1)<br>1, 2, 3, 4, 6, 12, 13 (NEMA types)                                                                   | Power-supply                            | $> 1$ kV (with 500 $\Omega$ )                                                              |
|                                                          |                                                                                                                                     | Sensor output                           | $> 1$ kV (with 500 $\Omega$ )                                                              |
| <b>Temperature</b>                                       |                                                                                                                                     | <b>Wire conducted disturbances</b>      |                                                                                            |
| Operating                                                | $-20^{\circ}$ to $+50^{\circ}\text{C}$ ( $-4^{\circ}$ to $+122^{\circ}\text{F}$ )                                                   | (EN 61000-4-6)                          | $> 10$ Vrms                                                                                |
| Storage                                                  | $-25^{\circ}$ to $+80^{\circ}\text{C}$ ( $-13^{\circ}$ to $+176^{\circ}\text{F}$ )                                                  | <b>Power-frequency magnetic fields</b>  |                                                                                            |
| <b>Rated insulation voltage</b>                          | 75 VDC                                                                                                                              | (EN 61000-4-8)                          |                                                                                            |
| <b>Dielectric test voltage</b>                           | 500 Vac rms (EN60947-1)                                                                                                             | Continuous                              | $> 30$ A/m, 38 $\mu$ tesla                                                                 |
| <b>Rated impulse withstand test</b>                      | 800 V (1.2 / 50 $\mu\text{s}$ ) (EN60947-1)                                                                                         | Short-time                              | $> 300$ A/m, 380 $\mu$ tesla                                                               |
| <b>ESPE</b>                                              | Type 2                                                                                                                              | <b>Vibration</b> (IEC 60068-2-6)        | 10 to 150 Hz, 1 mm / 15 g                                                                  |
| <b>PFH<sub>d</sub></b>                                   | $6 \times 10^{-8}$ failure per hour (worst case SRP for CS)                                                                         | <b>Shock</b> (IEC 60068-2-27)           | 30 G / 11 ms, 6 pos, 6 neg per axis                                                        |
| <b>Diagnostic coverage</b>                               | 99 % (EN13849-1: 2008)                                                                                                              | <b>Free fall</b> (IEC 60068-2-31)       | 2 times from 1 m<br>100 times from 0.5 m                                                   |
| <b>Performance level</b>                                 | C (EN13849-1: 2008)                                                                                                                 | <b>Pig-tail connector (-C2)</b>         | 3-pol micro MATE-N-LOK Series, AMP/TE                                                      |
| <b>MTTF<sub>d</sub></b> (worst case full sensor)         | 345 Years (worst case full receiver)<br>EN ISO 13849-1, SN 29500<br>412 Years (worst case full emitter)<br>EN ISO 13849-1, SN 29500 | <b>Housing material</b>                 |                                                                                            |
|                                                          |                                                                                                                                     | Body                                    | M12-Stainless Steel                                                                        |
| <b>Electrostatic discharge</b>                           |                                                                                                                                     | Front                                   | PC black                                                                                   |
| (EN61000-4-2)                                            |                                                                                                                                     | <b>Connection</b>                       |                                                                                            |
| Contact discharge                                        | $> 12$ kV                                                                                                                           | Cable                                   | PVC, Emitter: grey / Receiver: black, 5 m, 3 x 0.14 mm <sup>2</sup> , $\varnothing$ 2.9 mm |
| Air discharge                                            | $> 8$ kV                                                                                                                            | <b>Weight</b>                           |                                                                                            |
| <b>Radiated RF electromagnetic fields</b> (EN 61000-4-3) | $> 10$ V/m                                                                                                                          | Emitter                                 | 80 g                                                                                       |
|                                                          |                                                                                                                                     | Receiver                                | 80 g                                                                                       |
|                                                          |                                                                                                                                     | <b>CE-marking</b>                       | EN12445, EN12453, EN12978, EN 60947-5-2                                                    |
|                                                          |                                                                                                                                     | <b>UL-Approval</b>                      | UL325<br>UL508, CSA-C22.2 No.247                                                           |

## Operation Diagram

tv = Power ON delay

Power supply

Target emitter present

Object present

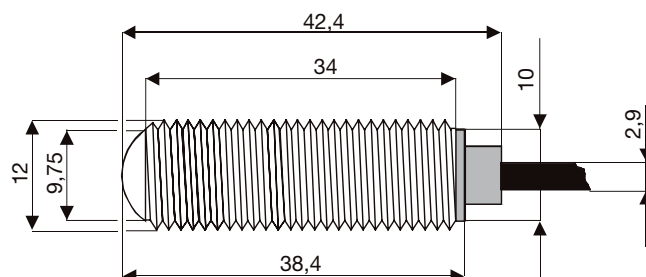
Break (NC) Output ON

Make (NO) Output ON

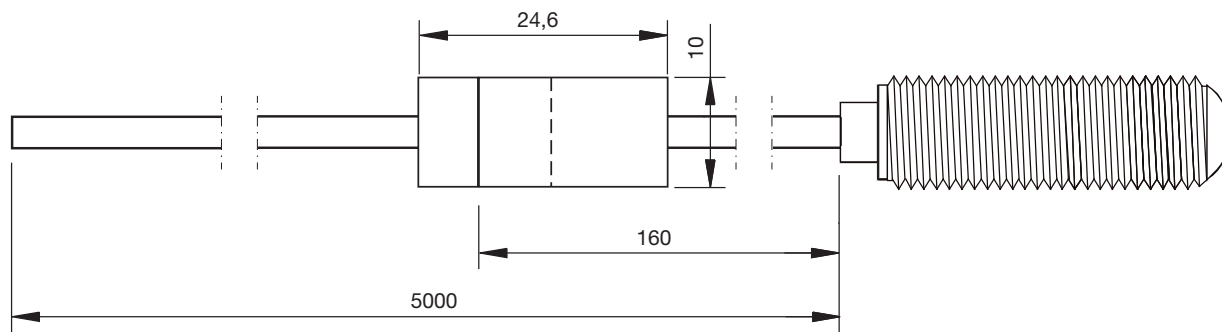
Mute active  $\leq 1.2$  VDC

## Dimensions

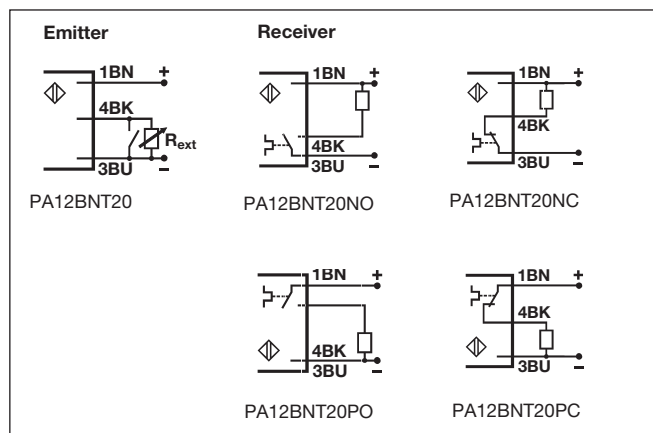
PA12.....



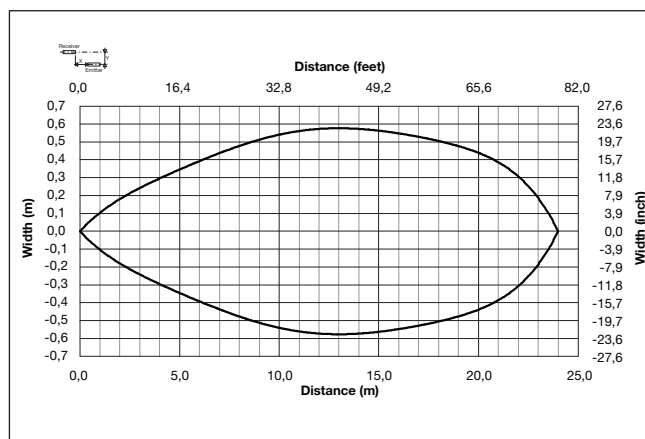
PA12.....-C2 with connector



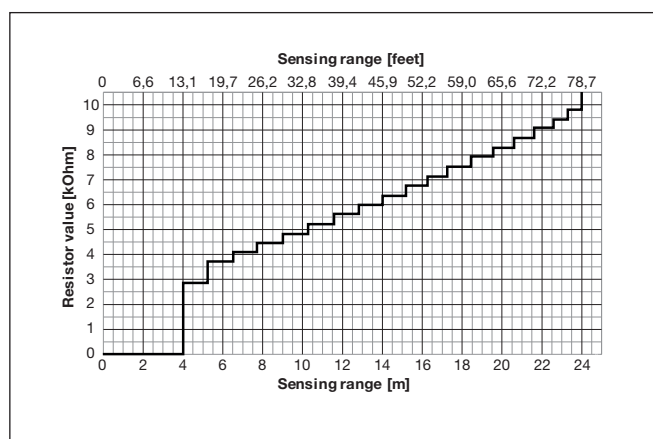
## Wiring Diagram



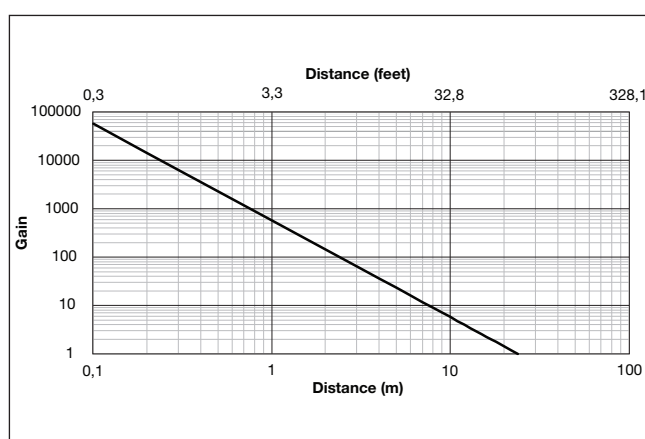
## Detection Diagram



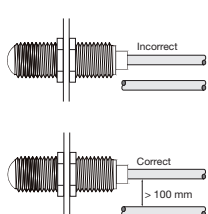
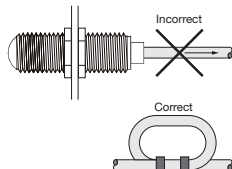
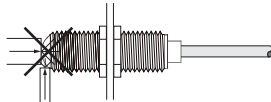
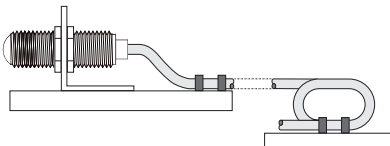
## Power adjustment curve



## Excess Gain



## Installation Hints

|                                                                                                                                                                                                                                                                     |                                                                                                                                                         |                                                                                                                                                                                         |                                                                                                                                                                                            |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>To avoid interference from inductive voltage/current peaks, separate the prox. switch power cables from any other power cables, e.g. motor, contactor or solenoid cables</p>  | <p>Relief of cable strain</p>  <p>The cable should not be pulled</p> | <p>Protection of the sensing face</p>  <p>A proximity switch should not serve as mechanical stop</p> | <p>Switch mounted on mobile carrier</p>  <p>Any repetitive flexing of the cable should be avoided</p> |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## Delivery Contents

- PA12
- Packaging: plastic bag