

PVA & PVD: Parts verification arrays



M & I

Light screens for error proofing or bin-picking

- Highly-visible job lights on each emitter and receiver guide assembler operators through correct part-gathering sequence, reducing occurrence of missed parts and parts assembled in wrong order
- Increased quality percentages/decreased production costs
- Also functions as a part sensor for objects > 35 mm diameter
- Diagnostic LEDs indicate setup and system errors at a glance
- Compact system: 30 mm wide x 15 mm deep
- PVA: Range of 2 m in opposed mode, both emitter and receiver have embedded job lights
- PVD: Range is up to 2 m when used with retroreflective target, up to 400 mm when used in diffuse mode
- Easy DIP-switch adjustments: PNP/NPN output, N.O./N.C., solid/flashing job light, gate polarity for job light activation
- Choose 2 m unterminated cable or 2 m cable with 5-pin M12x1 quick-disconnect connector
- Heavy-duty protective brackets available





PVA & PVD Series Table of Contents

| | |
|-----------------------------|---------|
| Model Selection | 159 |
| Retroreflective Tapes | 159 |
| Specifications | 160-161 |
| Cables | 161 |
| Wiring Diagrams | 162 |
| Dimensions | 162-163 |
| Indicators | 163 |
| Brackets | 164-165 |

PVA & PVD Series Detection Modes



| | | | |
|--|----------------------------|--|------------------------------------|
| | Opposed Mode Light Screens | | Retroreflective Mode Light Screens |
| | Diffuse Mode Light Screens | | |



| E/R Pair Model (Kit) | Array Length/ Beams | Connection | Output* | P/N |
|----------------------|---------------------|--|---------|-----------|
| PVA100P6 | 100 mm | 2 m unterminated cable | PNP | 30 529 01 |
| PVA100P6Q | 100 mm | 2 m pigtail with M12 connector | PNP | 30 529 03 |
| | 5 beams |  | | |
| PVA225P6 | 225 mm | 2 m unterminated cable | PNP | 30 529 05 |
| PVA225P6Q | 225 mm | 2 m pigtail with M12 connector | PNP | 30 529 07 |
| | 10 beams |  | | |
| PVA300P6 | 300 mm | 2 m unterminated cable | PNP | 30 529 09 |
| PVA300P6Q | 300 mm | 2 m pigtail with M12 connector | PNP | 30 529 11 |
| | 13 beams |  | | |
| PVA375P6 | 375 mm | 2 m unterminated cable | PNP | 30 529 13 |
| PVA375P6Q | 375 mm | 2 m pigtail with M12 connector | PNP | 30 529 15 |
| | 16 beams |  | | |

* NPN models also available



| Model | Array Length/ Beams | Connection | Output | P/N |
|---------|---------------------|---|--------------------|-----------|
| PVD100 | 100 mm | 2 m unterminated cable | PNP/NPN selectable | 30 709 88 |
| PVD100Q | 100 mm | 2 m pigtail with M12 connector | PNP/NPN selectable | 30 709 89 |
| | 4 beams |  | | |
| PVD225 | 225 mm | 2 m unterminated cable | PNP/NPN selectable | 30 709 90 |
| PVD225Q | 225 mm | 2 m pigtail with M12 connector | PNP/NPN selectable | 30 709 91 |
| | 8 beams |  | | |

Retroreflective Tape for use with PVD Series

| Model | Size | P/N |
|---------------|----------------------------|-----------|
| BRT-THG-1-100 | 25 mm width x 2,5 m length | 37 185 00 |
| BRT-THG-2-100 | 50 mm width x 2,5 m length | 37 135 00 |
| BRT-THG-3-100 | 76 mm width x 2,5 m length | 37 830 00 |

PVA & PVD Series Specifications

| | | | |
|------------------------------------|---|---|--|
| Supply Voltage and Current | <p>PVA: 12 to 30 Vdc (10% maximum ripple) at < 62 mA for the emitter and 50 mA for the receiver (exclusive of load) PVD: 12 to 30 Vdc (10% maximum ripple) at < 40 mA at 24 Vdc and < 70 mA at 12 Vdc (exclusive of load)</p> | | |
| Supply Protection Circuitry | Protected against reverse polarity and transient over-voltage | | |
| Sensing Beam | <p>PVA: IR PVD: 630 nm visible red</p> | | |
| Sensing Range | <p>PVA: 2 m with 2x excess gain remaining PVD: Retroreflective applications: 2 m, using BRT-THG-1-100 Diffuse applications: 400 mm, with 18% reflectivity grey card target</p> | | |
| Sensing Height | <p>PVA: 100 mm, 225 mm, 300 mm or 375 mm PVD: 111 mm or 240 mm</p> | | |
| Beam Spacing | <p>PVA: 25,0 mm PVD: 28,6 mm</p> | | |
| Sensing Resolution | <p>PVA: minimum \varnothing 35 mm PVD: Retroreflective: \varnothing 51 mm at 406 mm range, \varnothing 100 mm at 2 m Diffuse: \varnothing 55 mm at 400 mm range</p> | | |
| Output Configuration | <p>PVA: Solid-state dc output, programmable for light or dark operate, PVA...P6R models have a PNP open-collector transistor PVD: User-selectable via DIP-switch: 1 open-collector PNP or 1 open-collector NPN</p> | | |
| Output Rating | <p>PVA: 150 mA maximum Off-state leakage current: < 2 μA On-state saturation voltage: < 1 Vdc at 10 mA and < 1,5 Vdc at 100 mA PVD: 150 mA maximum Off-state leakage current: < 10 μA On-state saturation voltage: NPN: < 1 Vdc at 150 mA; PNP: < 2 Vdc at 150 mA</p> | | |
| Output Protection Circuitry | Protected against false pulse at power-up and continuous overload or short circuit of outputs | | |
| Output Response Time | <p>PVA: Sensor size:</p> <p>100 mm</p> <p>225 mm</p> <p>300 mm</p> <p>375 mm</p> | <p>Standard:</p> <p>20 ms</p> <p>40 ms</p> <p>52 ms</p> <p>64 ms</p> | <p>With crosstalk from adjacent units</p> <p>30 ms</p> <p>60 ms</p> <p>78 ms</p> <p>96 ms</p> |
| Delay at Power-Up | < 1,0 s | | |
| Operating Conditions | <p>Temperature: 0 to +50 °C Maximum relative humidity: 90% relative humidity at 50 °C (non-condensing)</p> | | |

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PVA & PVD Series Specifications (cont'd)

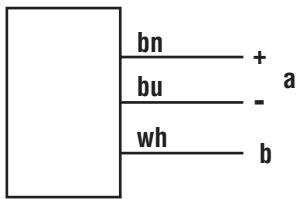
| | |
|--------------------------|--|
| Status Indicators | <p>PVA: Emitter: 1 green LED to indicate power ON/OFF, 1 red LED to indicate frequency selected Receiver: 1 green LED to indicate power ON/OFF, 1 yellow LED to indicate output state Emitter & Receiver: Both have 2 highly visible “job lights” which are turned ON and OFF by applying an external signal to the white wire. The job lights may be programmed for steady or flashing green.</p> <p>PVD: Green LED to indicate power ON/OFF Yellow LED to indicate output ON/OFF Job Light: (Diffused Green LED): Turned ON and OFF by applying an external signal to the job input (white wire). Error Light: (Diffused Red LED): Turned ON and OFF by detection of an output event when job light is not ON.</p> |
| Adjustments | <p>PVA: 4 DIP-switches, located behind access panel: 1) Frequency A / Frequency B 2) Light Operate / Dark Operate 3) Job light ON solid / Job light flashing 4) Job light input high / Job light input low</p> <p>PVD: 4 DIP-switches, located behind access panel: 1) PNP output / NPN output 2) Normally Open operation / Normally Closed Operation 3) Job light ON solid / Job light flashing 4) Job light input high / Job light input low</p> |
| Construction | Black painted aluminum housing; acrylic lenses; thermoplastic polyester endcaps; thermoplastic elastomer programming switch cover; stainless steel mounting brackets and hardware. Rated IEC IP62 |
| Connections | <p>PVA Emitter: 3-conductor PVC-jacketed 2 m cable which is either unterminated or terminated with a 4-pin M12x1 quick-disconnect connector, depending on model, cable is \varnothing 3,3 mm</p> <p>PVA Receiver: 4-conductor PVC-jacketed 2 m cable which is either unterminated or terminated with a 4-pin M12x1 quick-disconnect connector, depending on model, cable is \varnothing 3,3 mm</p> <p>PVD: 5-conductor PVC-jacketed 2 m cable which is either unterminated or terminated with a 5-pin M12x1 quick-disconnect connector, depending on model, cable is \varnothing 3,3 mm</p> |

PVA & PVD Series Cables

| Model | For use with | Length | Description | P/N |
|-----------|--------------|--------|----------------------------------|-----------|
| MQDC-406 | PVA | 2 m | M12x1, 4-pin connector, straight | 30 451 36 |
| MQDC-415 | PVA | 5 m | M12x1, 4-pin connector, straight | 37 487 00 |
| MQDC-430 | PVA | 9 m | M12x1, 4-pin connector, straight | 30 271 42 |
| MQDC1-506 | PVD | 2 m | M12x1, 5-pin connector, straight | 30 511 27 |
| MQDC1-515 | PVD | 5 m | M12x1, 5-pin connector, straight | 30 478 12 |
| MQDC1-530 | PVD | 9 m | M12x1, 5-pin connector, straight | 30 478 14 |

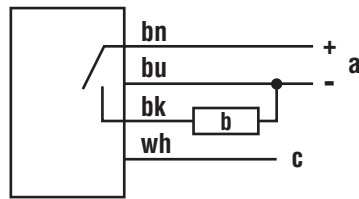
PVA & PVD Wiring Diagrams

PVA Emitter



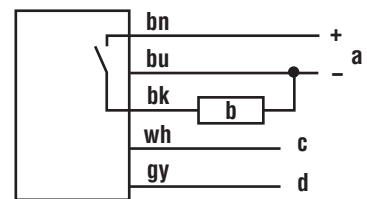
a) 12-30 Vdc, b) Job light enable input

PVA Receiver PNP



a) 12-30 Vdc, b) Load, c) Job light enable input

PVD PNP

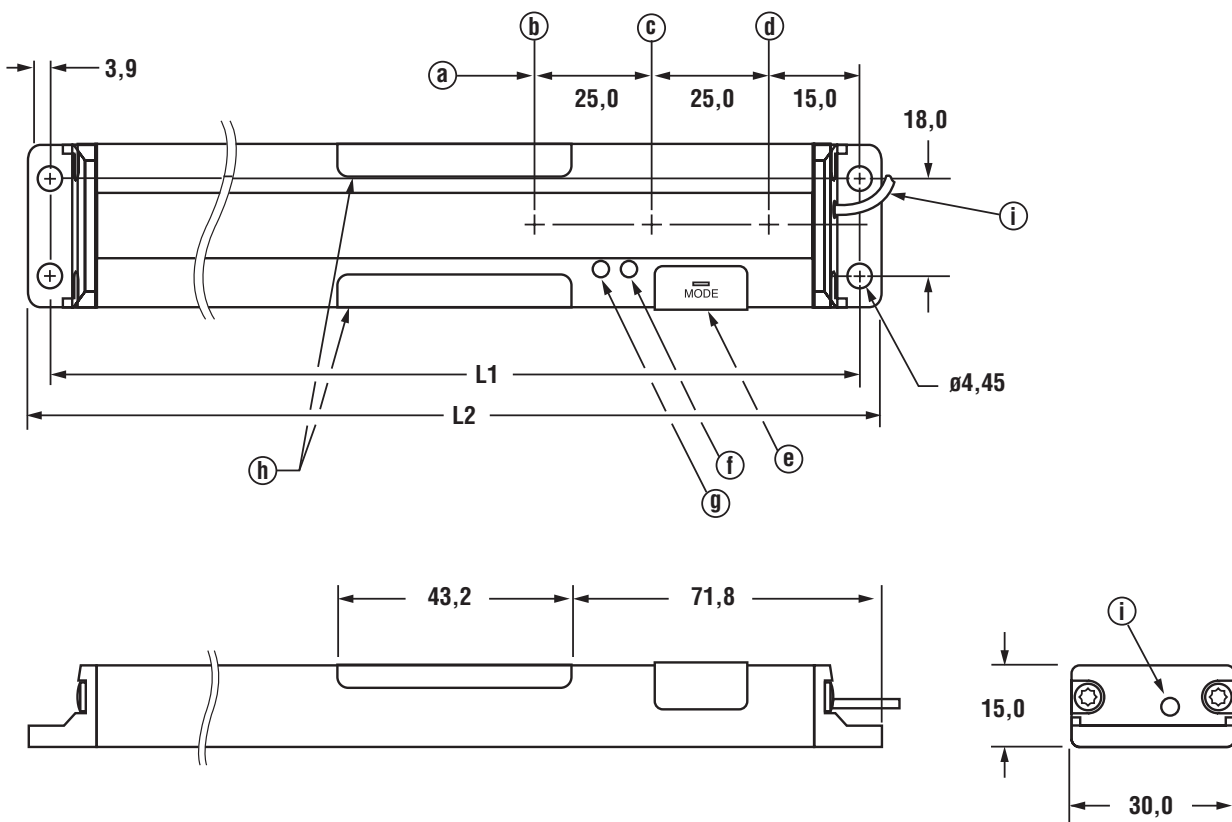


a) 12-30 Vdc, b) Load, c) Job light enable input, d) Datacom*

Note: Blue wire (dc common) is internally connected to emitter and receiver housings.

* Datacom: for specialised applications requiring custom configuration options. Contact Banner for detailed information.

PVA Series Emitter & Receiver Dimensions (mm)



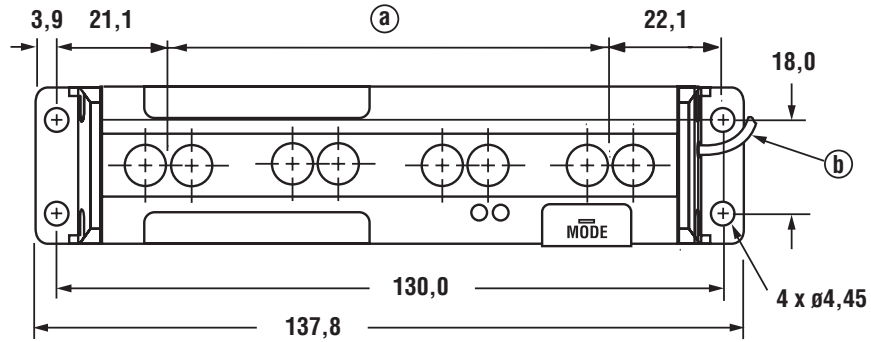
Legend:

- a) Beams continue at 25,0 mm spacing
- b) Beam 3
- c) Beam 2
- d) Beam 1
- e) Configuration switch cover
- f) Status indicator 2
- g) Status indicator 1
- h) Job lights
- i) Cable

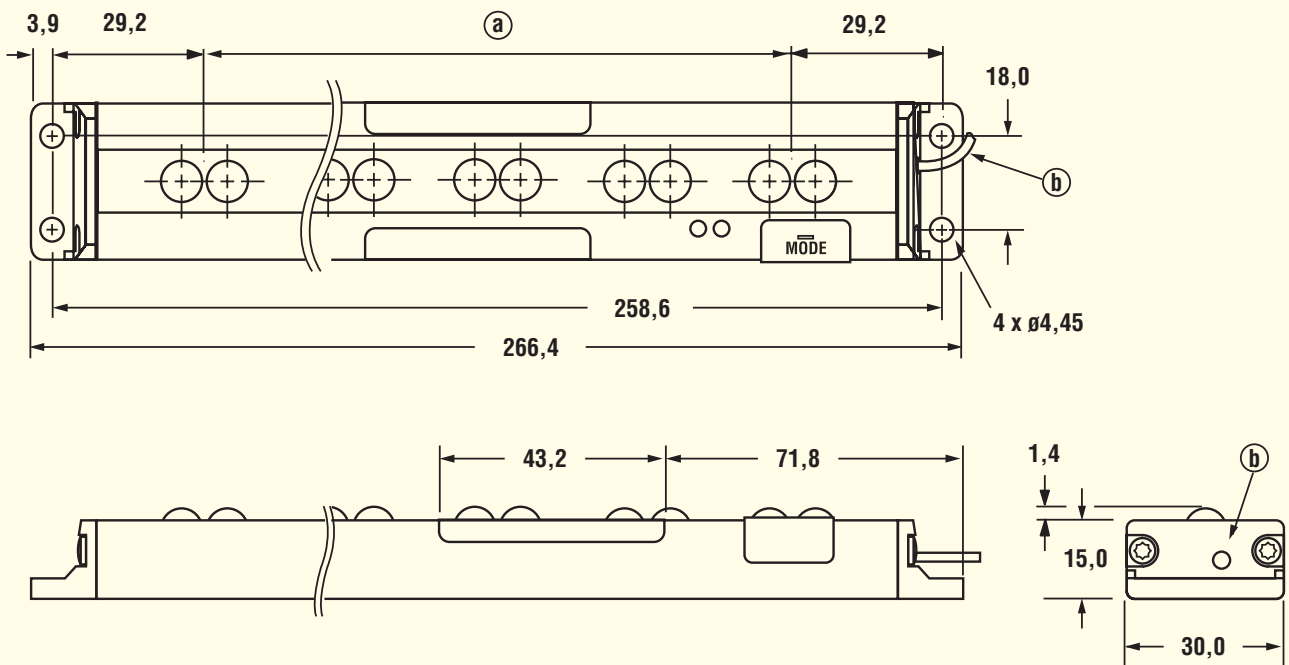
| Number of Beams | L1 | L2 |
|-----------------|----------|----------|
| 5 | 130,0 mm | 137,8 mm |
| 10 | 258,5 mm | 266,4 mm |
| 13 | 333,5 mm | 341,4 mm |
| 16 | 408,5 mm | 416,6 mm |

PVD Series Emitter & Receiver Dimensions (mm)

PVD100..



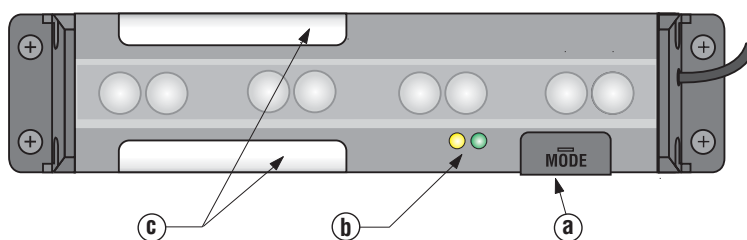
PVD225..



Legend:

- a) Minimum object detection zone
- b) Cable

PVA & PVD Series Indicators

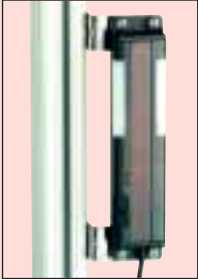
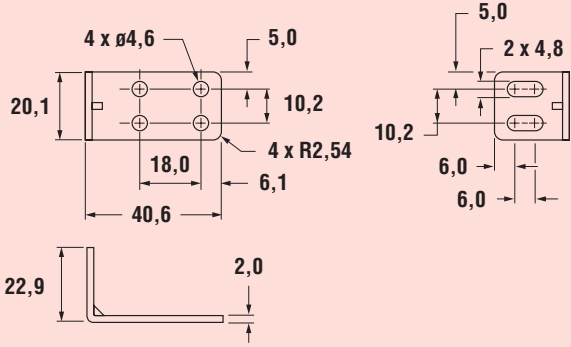

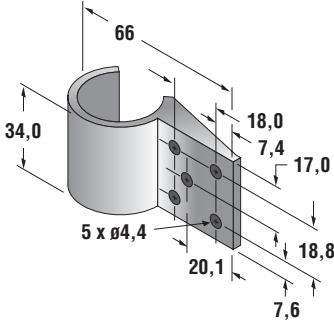

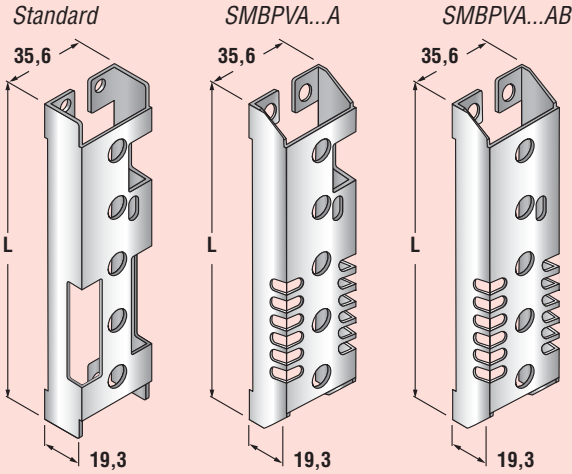


PVD model shown

Legend:


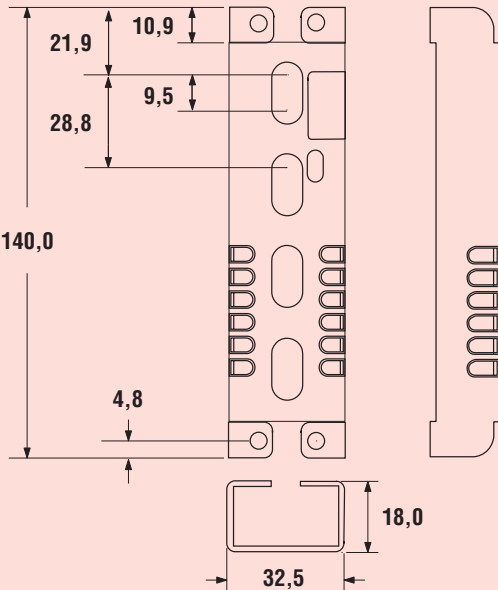
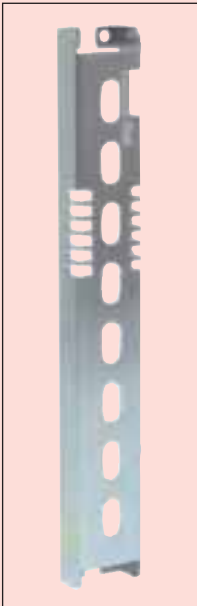
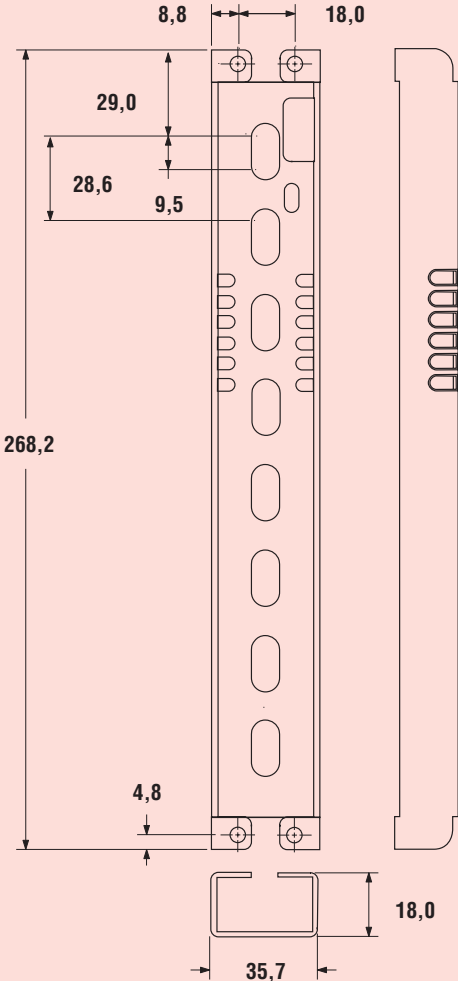
- a) Configuration switch cover
- b) Status indicators
- c) Job lights

PVA & PVD Series Brackets

| Model | Description | Dimensions (mm)/Description | P/N |
|---|--|--|-----------|
| SMBPVA1  | <ul style="list-style-type: none"> Stainless steel standard L-shaped bracket Included with PVA and PVD series Set of 4 |  | 30 568 84 |
| SMBPVA2  | <ul style="list-style-type: none"> Molded bracket Snaps onto 28 mm pipe For use with PVA & PVD series Set of 4 |  | 30 544 51 |
| SMBPVA5  | <ul style="list-style-type: none"> Heavy-duty protective bracket Openings for job lights and DIP-switches access Protects sensor against impact For use with PVA 100 mm Heavy-duty cold-rolled steel, zinc finish L = 139,7 mm Set of 2 |  | 30 565 00 |
| SMBPVA5A | use with PVA 100 mm | job lights protected, DIP-switches access, L: 139,7 mm | 30 624 46 |
| SMBPVA5AB | use with PVA 100 mm | job lights protected, no DIP-switches access, L: 139,7 mm | 30 708 05 |
| SMBPVA10 | use with PVA 225 mm | job lights unprotected, DIP-switches access, L: 268,2 mm | 30 568 09 |
| SMBPVA10A | use with PVA 225 mm | job lights protected, DIP-switches access, L: 268,2 mm | 30 624 47 |
| SMBPVA10AB | use with PVA 225 mm | job lights protected, no DIP-switches access, L: 268,2 mm | 30 708 06 |
| SMBPVA13 | use with PVA 300 mm | job lights unprotected, DIP-switches access, L: 343,3 mm | 30 568 10 |
| SMBPVA13A | use with PVA 300 mm | job lights protected, DIP-switches access, L: 343,3 mm | 30 624 48 |
| SMBPVA13AB | use with PVA 300 mm | job lights protected, no DIP-switches access, L: 343,3 mm | 30 708 07 |
| SMBPVA16 | use with PVA 375 mm | job lights unprotected, DIP-switches access, L: 418,2 mm | 30 568 11 |
| SMBPVA16A | use with PVA 375 mm | job lights protected, DIP-switches access, L: 418,2 mm | 30 624 49 |
| SMBPVA16AB | use with PVA 375 mm | job lights protected, no DIP-switches access, L: 418,2 mm | 30 708 08 |

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PVD Series Brackets

| Model | Description | Dimensions (mm)/Description | P/N |
|--|--|--|------------------|
| <p>SMBPVD100A</p>  | <ul style="list-style-type: none"> • Heavy-duty protective bracket • Access to DIP-switches • For use with PVD 100 mm • Cold-rolled steel, zinc finish |  | <p>30 713 38</p> |
| <p>SMBPVD100AB</p> | <p>use with PVD 100 mm</p> | <p>identical to SMBPVD100A, but no DIP-switches access</p> | <p>30 713 39</p> |
| <p>SMBPVD225A</p>  | <ul style="list-style-type: none"> • Heavy-duty protective bracket • Access to DIP-switches • For use with PVD 225 mm • Cold-rolled steel, zinc finish |  | <p>30 713 40</p> |
| <p>SMBPVD225AB</p> | <p>use with PVD 225 mm</p> | <p>identical to SMBPVD225A, but no DIP-switches access</p> | <p>30 713 41</p> |

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VTB – Verification Optical Touch Buttons



Features

- Optical touch buttons provide bright visual instruction for sequential parts assembly
- Reduces occurrence of parts missed or assembled out of order
- Increases assembler efficiency
- Can be used as an automated “call for parts” system: users touch a bin's VTB button when parts run low, lighting the VTB base to notify the supplier and user
- Visual “illuminated” instruction eliminates communication barriers
- Multilingual workforces learn new assembly procedures quickly
- Ergonomic design promotes repetitive-injury free operation
- No physical force required, touch buttons are activated when finger inserted in “touch area” breaks infrared beam
- Ergonomically designed buttons increase production quality and efficiency, without the hand, wrist and arm stress associated with repeated mechanical switch operation
- Replace capacitive touch switches and mechanical push-buttons

VTB Series Table of Contents

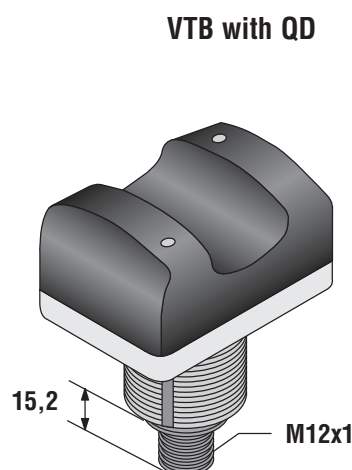
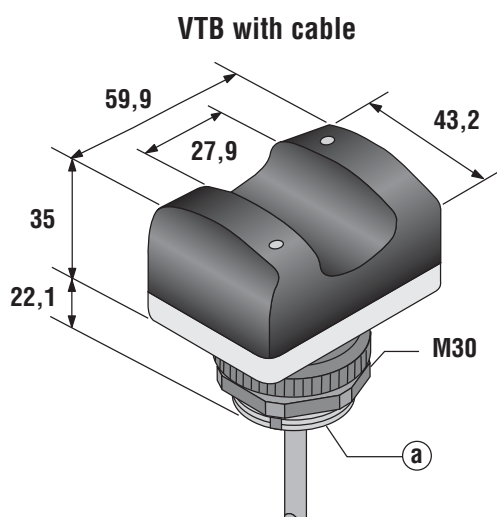
| | |
|-----------------------|-----|
| Model Selection | 167 |
| Dimensions | 167 |
| Indicators | 167 |
| Mounting Styles | 167 |
| Specifications | 168 |
| Field Covers | 169 |
| Wiring Diagrams | 169 |
| Cables | 169 |
| Bracket | 169 |

VTB Series, Bin-Picking Sensors

| Model | View | Housing material | Connection | Output* | P/N |
|---------|------|--------------------|---------------|---------|-----------|
| VTBP6 | | Black polysulphone | 2 m cable | PNP | 30 675 04 |
| VTBP6Q | | Black polysulphone | M12 connector | PNP | 30 675 05 |
| VTBP6L | | Red polycarbonate | 2 m cable | PNP | 30 675 07 |
| VTBP6LQ | | Red polycarbonate | M12 connector | PNP | 30 675 08 |

* NPN models also available

VTB Series Dimensions (mm)



Legend:

a) M30 external threads, NPSM internal threads; jam nut, lock ring and seal washers supplied

VTB Series Indicators



Legend:

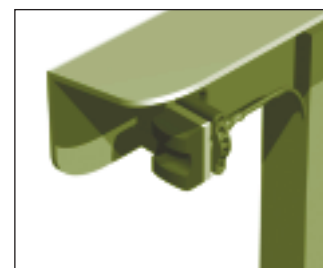
a) Output conducting LED, b) Switch "Touch Area", c) Translucent white polycarbonate base/job light, d) Black polysulfone or red polycarbonate cover, e) Power ON/OFF LED

VTB Mounting Styles

Top mount, with field cover in place



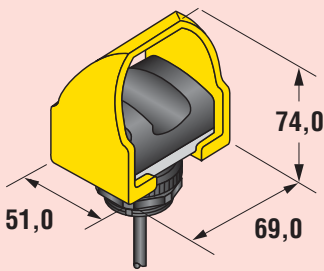

Side mount, shielded by mounting bracket



VTB Series Specifications

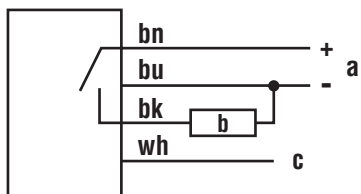
| | |
|------------------------------------|---|
| Supply Voltage and Current | 12 to 30 Vdc (10% maximum ripple), < 120 mA max current at 12 Vdc (exclusive of load) < 70 mA max current at 30 Vdc (exclusive of load) |
| Supply Protection Circuitry | Protected against transient voltages, over-voltage and reverse polarity |
| Output Configuration | 1 PNP open collector transistor or 1 NPN open collector transistor, depending on model |
| Output Rating | Maximum load: 150 mA On-state saturation voltage: < 1,5 V at 150 mA Off-state leakage current: < 10 µA |
| Output Protection | All models protected against false pulse on power-up, overload and short-circuit |
| Response Time | 100 ms ON/OFF |
| Delay at Power-up | 1 s |
| Indicators | 2 red LED indicators: Power ON and Output Conducting Base: Lights green as a job light when input line is enabled |
| Construction | Totally encapsulated, non-metallic enclosure. Black polysulfone or red polycarbonate upper housing; translucent white polycarbonate base. Electronics fully epoxy-encapsulated. |
| Environmental Rating | Rated IEC IP66 |
| Connections | PVC-jacketed 2 m cables or 4-pin M12x1 QD fitting, depending on model |
| Ambient Light Immunity | Up to 120.000 lux (direct sunlight) |
| EMI/RFI Immunity | Immune to EMI and RFI noise sources, per IEC 947-5-2 |
| Operating Conditions | Temperature: -20 to +50 °C Maximum relative humidity: 90% at +50 °C (non-condensing) |
| Application Notes | Environmental considerations for models with polysulfone upper housings: The polysulfone upper housing becomes brittle with prolonged exposure to outdoor sunlight. Window glass effectively filters longer wavelength ultraviolet light and provides excellent protection from sunlight. Avoid contact with strong alkalis. Clean periodically using mild soap solution and a soft cloth. Environmental considerations for models with polycarbonate upper housings: Avoid prolonged exposure to hot water and moist high-temperature environments above 66 °C. Avoid contact with aromatic hydrocarbons (such as xylene and toluene), halogenated hydrocarbons and strong alkalis. Clean periodically using mild soap solution and a soft cloth. |

VTB Series Field Covers

| Model | Description | Dimensions (mm) | View | P/N |
|----------|--------------|---|---|-----------|
| OTC-1-BK | Black cover |  |  | 38 807 00 |
| OTC-1-GN | Green cover | | | 38 809 00 |
| OTC-1-RD | Red cover | | | 30 309 77 |
| OTC-1-YW | Yellow cover | | | 30 309 78 |

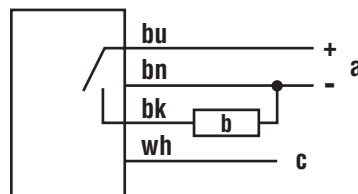
VTB Series Wiring Diagrams

PNP with solid job light



a) 12-30 Vdc, b) Load, c) Job light enable input: 10-30 Vdc

PNP with flashing job light

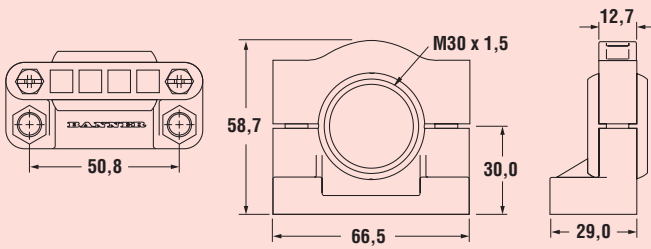


a) 12-30 Vdc, b) Load, c) Job light enable input: 10-30 Vdc

VTB Series Cables

| Model | Length | Description | P/N |
|----------|--------|----------------------------------|-----------|
| MQDC-406 | 2 m | M12x1, 4-pin connector, straight | 30 451 36 |
| MQDC-415 | 5 m | M12x1, 4-pin connector, straight | 37 487 00 |
| MQDC-430 | 9 m | M12x1, 4-pin connector, straight | 30 271 42 |

VTB Series Bracket



| Model | Description | Dimensions (mm) | P/N |
|---------|---|--|-----------|
| SMB30SC | <ul style="list-style-type: none"> M30 swivel bracket Black reinforced thermoplastic polyester Includes stainless steel mounting and swivel locking hardware |  | 30 525 21 |

**M & I Sensors:
Laser Gauging
Sensors**



| Series | LT3 | Q50 | LG5 & LG10 |
|---|---|--|--|
| Catalogue page | 108 | 114 | 120 |
| Description | Long-range time-of-flight sensor for precision inspection applications | Linear displacement sensor with analogue output | Ultra-precise triangulation sensor with analogue and digital outputs |
| Technology | Laser Time-of-Flight | LED/PSD triangulation | Laser/PSD triangulation |
| Outputs | Analogue and digital or Dual-digital | Analogue or digital | Analogue and digital |
| Light source | Class 1 and 2 laser | Visible red and Infrared LEDs | Class 2 laser |
| Sensing range | Retroreflective: 0,5 - 50 m Diffuse: 0,3 - 5 m | Q50A: Red, 50 - 150 mm Q50A: IR, 50 - 200 mm Q50B: Red, 100 - 300 mm Q50B: IR, 100 - 400 mm | LG5: 45 - 60 mm LG10: 75 - 125 mm |
| Analogue resolution or digital repeatability* | Diffuse: Slow: 1 mm Fast: 3,2 mm Retro: Slow: 5 mm Fast: 10 mm | 0,25 to 8 mm, depending on model | LG5: 3 µm at 50 mm LG10: 10 µm at 100 mm |
| Response speed | 1 to 192 ms, depending on model and output | 4 ms to 64 ms (depending on model) | 1 ms (fast); 10 ms (medium); 100 ms (slow) |
| Adjustments | Near & far window limits response speed | Near & far window limits response speed | Near & far window limits response speed |
| Power supply | 12 to 24 Vdc | Analogue: 15 to 30 Vdc Digital: 12 to 30 Vdc | 12 to 30 Vdc |
| Digital output(s) | One PNP or NPN or Dual PNP or NPN, depending on model | Complementary PNP or NPN | One PNP or NPN |
| Analogue output | 0 to 10 Vdc or 4 to 20 mA | 0 to 10 Vdc to 4 to 20 mA | 0 to 10 Vdc or 4 to 20 mA |
| Dimensions (h x w x d) | 69 x 36 x 87 mm | 60 x 20 x 50 mm | 55 x 20 x 82 mm |
| Housing material | ABS/polycarbonate | ABS/polycarbonate | Zinc alloy die-cast; black painted finish |
| Protection rating | IP67 | IP67 | IP67 |
| Operating temperature | 0 to +50 °C | -10 to +55 °C | -10 to +50 °C |

* in optimum conditions

| M & I Sensors: Measuring Light Screens | |  |  |
|---|------------------------------|---|---|
| | | Standard MINI-ARRAY™ | High-Resolution MINI-ARRAY™ |
| Catalogue page | | 148 | 148 |
| Description | | Compact array housings with flexible output configurations, long range | High-speed, high resolution scanning with 2,5 mm minimum object detection |
| Minimum object detection size | | 19 mm (for 9,7 mm beam spacing) 38 mm (for 19 mm beam spacing) | 2,5 mm |
| Sensing range | | For arrays with 9,5 mm beam spacing: 0,6 to 6,1 m for < 1210 mm arrays 0,6 to 4,6 m for ≥ 1210 mm arrays For arrays with 19 mm beam spacing: 0,9 to 17 m for < 1210 mm arrays 0,9 to 14 m for ≥ 1210 mm arrays | 380 mm to 1,8 m |
| Emitter and Receivers | Dimensions | 38,1 mm (W) x 38,1 mm (D) x 140 mm to 1810 mm (H) | 38,1 mm (W) x 38,1 mm (D) x 163 mm to 1951 mm (H) |
| | Power supply | 12 Vdc supplied by controller | 12 Vdc supplied by controller |
| | Construction | Black anodised aluminum | Black anodised aluminum |
| | Protection rating | IP65 | IP65 |
| | Operating temperature | -20 to +70 °C | 0 to +50 °C |
| Controllers | Power supply | 16 to 30 Vdc | 16 to 30 Vdc |
| | Output configuration | MACP-1: Two PNP MACV-1: One 0-10 Vdc analogue + one NPN MACI-1: One 4-20 mA analogue + one NPN MAC16P-1: Sixteen PNP All models: Serial RS-232, RS-485 | MAHCVP-1: Two analogue 0 to 10 V + two PNP MAHCIP-1: Two analogue 4 to 20 mA + two PNP All models: Serial RS-232, RS-485 |
| | Protection rating | IP 20 | IP 20 |
| | Operating temperature | -20 to +70 °C | 0 to +50 °C |





M & I

**M & I Sensors:
Ultrasonic
Sensors**







| Series | S18U | T30U | QT50U |
|---|---|---|---|
| Catalogue page | 126 | 132 | 138 |
| Description | Compact ultrasonic sensor with integrated push-button programming and diagnostic LEDs | Compact, versatile "T" packaging with both analogue and digital outputs and push-button teach | Long-range programmable precision ultrasonic sensor that senses up to 8 m |
| Outputs | Analogue or digital | Analogue and digital or Dual-digital | Analogue or Dual-digital |
| Sensing range | 30 to 300 mm | 0,15 to 2,0 m (depending on model) | 200 mm to 8 m |
| Analogue resolution or digital repeatability* | 0,5 mm | 0,5 mm | 1,0 mm |
| Adjustments | Near & far window limits | Near & far window limits | Near & far window limits; DIP-switch functions |
| Dimensions (h x w x d) | Straight: 18 x 18 x 91 mm Right-angle: 18 x 18 x 95 mm | 52 x 40 x 45 mm | 84 x 74 x 67 mm |
| Housing material | ABS/Polycarbonate | PBT polyester | ABS/Polycarbonate |
| Protection rating | IP67 | IP67 | IP67 |
| Operating temperature | -20 to +60 °C | -20 to +70 °C | -20 to +70 °C |
| Power supply | 10 to 30 Vdc | Digital output models: 12 to 24 Vdc Analogue output models: 15 to 24 Vdc | 10 to 30 Vdc |
| Digital output(s) (when available) | PNP and NPN | PNP or NPN, depending on model | Dual PNP or NPN, selectable |
| Analogue output (when available) | 0 to 10 Vdc or 4 to 20 mA, depending on model | 0 to 10 Vdc or 4 to 20 mA, depending on model | 0 to 10 Vdc or 4 to 20 mA, selectable |
| High/low limit control (pump control) | – | ✓ | ✓ |

* in optimum conditions

| M & I Sensors: Ultrasonic Sensors |  |  |  |
|---|---|---|---|
| Series | Q45U | Q45UR | T18U |
| Find more info on  | www.bannerengineering.com | www.bannerengineering.com | www.bannerengineering.com |
| Description | High accuracy teach sensor with built-in temperature compensation | High precision inspection sensor with remote sensing transducer | Fast, sealed opposed-mode sensor excellent for clear object detection |
| Outputs | Analogue or digital | Analogue or digital | Complementary discrete |
| Sensing range | Proximity mode 0,1 to 3,0 m (depending on model) | Proximity mode 50 to 250 mm | Opposed mode 0,6 m |
| Analogue resolution or digital repeatability* | 0,25 mm | 0,1 mm | – |
| Adjustments | Near & far window limits; DIP-switch functions | Near & far window limits; DIP-switch functions | – |
| Dimensions (h x w x d) | 88 x 45 x 55 or 79 mm | ø 18 mm or 12 mm flat | 52 x 40 x 30 mm |
| Housing material | PBT polyester | PBT polyester or stainless steel | PBT polyester |
| Protection rating | IP67 | Sensor: IP65, Controller: IP67 | IP67 |
| Operating temperature | -25 to +70 °C | -25 to +70 °C | -40 to +70 °C |
| Power supply | Digital output models: 12 to 24 Vdc Analogue output models: 15 to 24 Vdc | Digital output models: 12 to 24 Vdc Analogue output models: 15 to 24 Vdc | 12 to 30 Vdc |
| Digital output(s) (when available) | Bipolar: one PNP plus one NPN | Bipolar: one PNP plus one NPN | Complementary PNP or NPN, depending on model |
| Analogue output (when available) | 0 to 10 Vdc or 4 to 20 mA, selectable | 0 to 10 Vdc or 4 to 20 mA, selectable | – |
| High/low limit control (pump control) | ✓ | – | – |

* in optimum conditions

| M & I Sensors: Part Sensing & Bin-Picking Sensors |  |  |  |  |
|--|--|--|--|---|
| Series | LX Series | PVA Series | PVD Series | VTB Series |
| Catalogue page | 144 | 158 | 158 | 166 |
| Description | Highest-speed light screens detect the smallest objects | Visible “pick” light & reliable error-proofing for assembly and bin-picking operations | Diffuse or retroreflective sensor for error proofing or bin-picking operations | Ultra-bright verification optical touch buttons for bin-picking sequences |
| Sensing range | Standard Normal: 300 mm to 2 m Standard Reduced: 150 to 600 mm Short-range Normal: 100 mm to 200 mm Short-range Reduced: 75 to 150 mm | 2 m | Retroreflective Mode: up to 2 m Diffuse Mode: up to 400 mm | n/a |
| Minimum object detection size | Standard: ø 9,5 mm Short-range: ø 5,6 mm | 35 mm | < 100 mm, depending on range | n/a |
| Dimensions | 25 mm (W) x 32 mm (D) x 113 mm to 190 mm (H) | 30 mm (W) x 15 mm (D) x 100 mm to 375 mm (H) | 30 mm (W) x 15 mm (D) x 100 mm to 225 mm (H) | 58 x 70 x 43 mm (H x W x D) |
| Construction | Aluminum | Black anodised aluminum | Black painted aluminum housing with acrylic lenses | Black polysulfone or red polycarbonate with white polycarbonate base |
| Protection rating | IP65 | IP62 | IP62 | IP66 |
| Operating temperature | -20 to +70 °C | 0 to +50 °C | 0 to +50 °C | -20 to +50 °C |
| Power supply | 10 to 30 Vdc | 12 to 30 Vdc | 12 to 30 Vdc | 12 to 30 Vdc |
| Output configuration | Bipolar PNP + NPN | One PNP or NPN, depending on model; programmable for light or dark operate | User-selectable via Dip-switch: 1 open-collector PNP or 1 open-collector NPN | One PNP or NPN, depending on model |
| Connections | Integral 2 m cable or 5-pin M12x1, 150 mm pigtail quick-disconnect | 2 m cable (unterminated or terminated with M12x1 quick-disconnect) | 2 m cable (unterminated or terminated with M12x1 quick-disconnect) | Integral 2 m cable or 4-pin M12x1 quick-disconnect |

Notes

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