PVA Pick-to-Light Array

Features

Light Screen for Error-Proofing of Bin-Picking Operations



- Compact package, available in 4 lengths to fit many sizes and configurations of existing parts bins
- Range up to 2 m (6.5 ft)
- Two-component system (asynchronous emitter and receiver) needs no sync wire or controller box.
- Emitters and receivers sold separately or in pairs for easy ordering.
- Two LEDs on each emitter and receiver indicate proper setup and system errors.
- Clearly visible green job indicator lights mounted on either side of emitter and receiver housings; the light can be remotely controlled to initiate user action with a solid ON or blinking condition
- Two frequency settings to prevent crosstalk in close-proximity, multiple-array installations
- Easy DIP-switch selection of light/dark operate, solid/flashing job light, A/B frequency, and gate polarity for activating the job light indicator
- Choose 2 m (6.5 ft) unterminated PVC-jacketed cable or 2 m (6.5 ft) PVC-jacketed cable with 4-pin M12 male quick-disconnect connector
- PNP or NPN receiver output, depending on model
- 12 V DC to 30 V DC operation
- Minimum resolution 35 mm (1.4 in)
- Wide beam pattern for easy alignment
- Heavy-duty protective brackets available

WARNING:

- **Do not use this device for personnel protection**
- Using this device for personnel protection could result in serious injury or death.
- This device does not include the self-checking redundant circuitry necessary to allow its use in personnel safety applications. A device failure or malfunction can cause either an energized (on) or de-energized (off) output condition.

Models

NOTE: Cable diameter is 3.3 mm (0.13 in) on all models.

Model	Description	Array Length / # Beams	Job Light Input[1]	Receiver Output
PVA100N6	Emitter/Receiver Pair	100 mm (4 in) Long, 5 Beams	0 V DC	NPN
PVA100N6E	Emitter			
PVA100N6R	Receiver			
PVA100P6	Emitter/Receiver Pair		+5 V DC to 30 V DC	PNP
PVA100P6E	Emitter			
PVA100P6R	Receiver			
PVA225N6	Emitter/Receiver Pair	225 mm (9 in) Long, 10 Beams	0 V DC	NPN
PVA225N6R	Receiver			
PVA225P6	Emitter/Receiver Pair		+5 V DC to 30 V DC	PNP
PVA225P6E	Emitter			
PVA225P6R	Receiver			
PVA300N6E	Emitter	300 mm (12 in) Long, 13 Beams	0 V DC	NPN
PVA300N6R	Receiver			
PVA300P6	Emitter/Receiver Pair		+5 V DC to 30 V DC	PNP
PVA300P6E	Emitter			
PVA300P6R	Receiver			
PVA375N6Q	Emitter/Receiver Pair	375 mm (15 in) Long, 16 Beams	0 V DC	NPN
PVA375N6EQ	Emitter			
PVA375P6	Emitter/Receiver Pair		+5 V DC to 30 V DC	PNP

Continued on page 2

[1] See Configuration

Original Instructions
28-Apr-26

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52088
p/n: 52088 Rev. J

ПРОМЭЛЕКТРОНИКА/ sales@prom-elec.com

Continued from page 1

Model	Description	Array Length / # Beams	Job Light Input	Receiver Output
PVA375P6E	Emitter			
PVA375P6R	Receiver			

Only cabled models (2 m (6.5 ft) unterminated PVC-jacketed cable) are listed.

To order the 2 m (6.5 ft) PVC-jacketed cable with a 4-pin M12 male quick-disconnect connector model, add "Q" to the model number (for example, PVA100N6Q).

The following models are no longer available for order but are still covered by the information in this document.

- PVA225N6Q, PVA225N6E, and PVA225N6RQ
- PVA300N6 and PVA300N6Q
- PVA375N6, PVA375N6R, and PVA375N6RQ

Overview

The PVA Series Parts Verification Array is a simple, easy-to-use light screen suited to many part assembly and object detection applications.

The PVA has two components: an emitter and a receiver. The receiver's solid-state output interfaces to a system controller, which is pre-programmed by a supervisor for a specific sequence of tasks. Mounted so that the beams stretch across each bin in an assembler’s work station, the PVA then signals the assembler (by means of easy-to-see job lights) which bins contain items to be picked in a given operation and in what order they should be picked.

As the assembler reaches into each bin, the system senses if the correct part has been taken, then signals the next bin in the sequence. The system may be wired to signal an alarm for the assembler and/or a supervisor in the event an incorrect part is selected.

The major benefit of a PVA-driven system is increased efficiency, due to simplified job training, increased quality control (no skipped components), and reduced rework and inspections. The PVA speeds the resumption of work after breaks and other distractions. And it is ideal for multilingual workplaces where communication may be an issue.

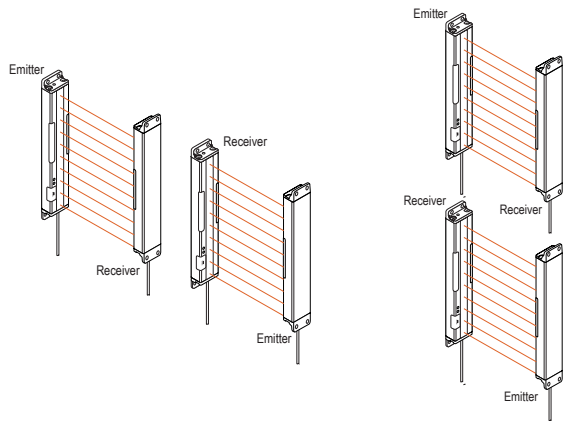
Installation

Multiple sensor pairs located farther than the sensor's effective maximum range (approximately 2 m or 6.5 ft) from one another are unlikely to cause crosstalk problems. However, when multiple sensor pairs are mounted in a confined area, take care to avoid crosstalk between them. To avoid crosstalk:

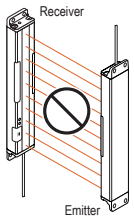
- Alternate the relative position of adjacent emitter/receiver pairs.
- Alternate the Frequency configuration of adjacent pairs.

Mount emitter and receiver pairs parallel, with both cable ends pointing the same direction.

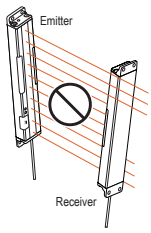
Example—Correct Positions



Example—Incorrect Positions



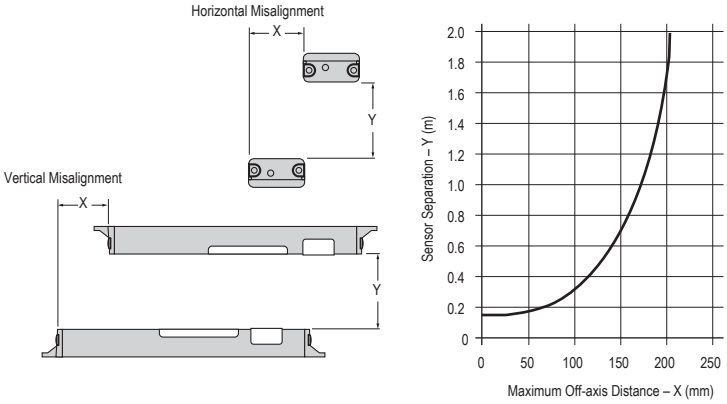
Cable ends pointing in opposite directions



Non-parallel orientation

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Maximum Off-Axis Misalignment



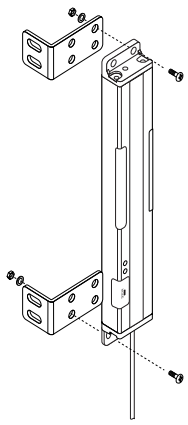
Mounting

The wide beam pattern of PVA emitters and receivers simplifies their alignment. M4 stainless steel fasteners and two stainless steel brackets are included with each sensor.

Mount each emitter and its corresponding receiver parallel to one another in the same plane, with their cable ends pointing the same direction, and their tops and bottoms aligned.

1. From a common point of reference, make measurements to locate the emitter and receiver in the same plane with their midpoints directly opposite each other.
2. Mount the included brackets to the top and bottom of each sensor, as shown.
3. Mount the emitter and receiver in their brackets, being careful to position the red lenses of the two units directly facing each other. (Remember, the cable ends of both sensors must point in the same direction to ensure proper sensing.)
4. Measure from one or more reference planes (for example, the building or bin floor) to the same point(s) on the emitter and receiver to verify their mechanical alignment. (If the sensors are mounted exactly vertical or horizontal, a carpenter's level may be helpful. A straightedge or a string extended between the sensors may also be helpful.)
5. Also check by eye for line-of-sight alignment.
6. Make any necessary final mechanical adjustments, and hand-tighten the bracket hardware.
7. After the electrical wiring is complete, check for beam alignment. If necessary, re-align the emitter and receiver at that time.

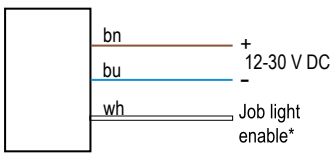
Mounting Hardware



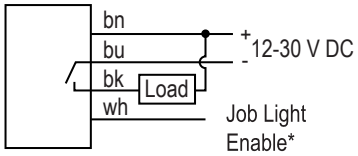
Wiring

All models feature integral 2 m (6.5 ft) long, 3.3 mm (0.13 inch) dia. PVC-jacketed cables. Models whose model numbers end in "Q" are terminated with 4-pin M12 male quick-disconnect (QD) connectors; other models have unterminated ends.

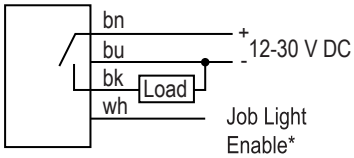
Emitter with unterminated cable



Receiver with NPN output



Receiver with PNP output

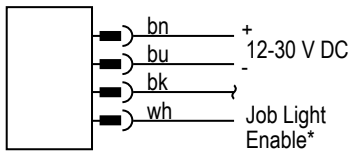


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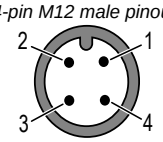
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Continued from page 3

Emitter with 4-pin M12 QD



4-pin M12 male pinout



Wiring is functionally identical for cabled and quick-disconnect receiver models.

* See Configuration for job light enable input requirements.

NOTE: Blue wire (DC common) is internally connected to emitter and receiver housings.

Configuration

PVA configuration is accomplished by using the DIP switches on the emitter and receiver.

To configure the PVA, remove the Configuration Switch Cover using the supplied plastic screwdriver:

Cover Removal



To remove the cover, insert a fingernail or small screwdriver into the slot and apply gentle pressure, angling away from the sensor lens. The cover remains tethered to the sensor housing.

Cover Replacement – Aligning Cover



To replace the switch cover, align one edge of the cover with the edge of the sensor housing opening. Then press the front corners into place.

Cover Replacement – Pressing Cover

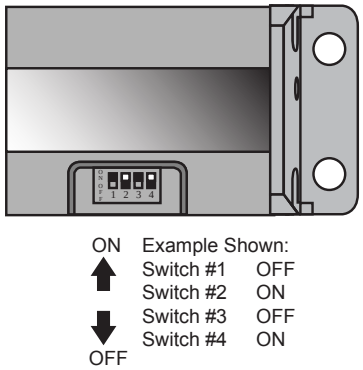


Set the DIP switches as desired, using the same plastic screwdriver to avoid damaging the switches or causing a short circuit.

The switches determine four status operating modes:

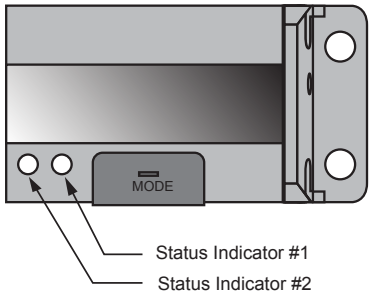
- A/B frequency (to avoid crosstalk from multiple pairs of sensors)
- Light/dark operate
- Solid/flashing job light (depending on assembler and/or supervisor preference)
- Gate polarity

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	Switch	Emitter	Receiver
PVA Configuration DIP switch setting positions  ON Example Shown: Switch #1 OFF Switch #2 ON Switch #3 OFF Switch #4 ON OFF	1[2]	*ON = Frequency A OFF = Frequency B	*ON = Frequency A OFF = Frequency B
	2	No function	ON = Light operate *OFF = Dark operate
	3	*ON = Job light steady OFF = Job light flashes	*ON = Job light steady OFF = Job light flashes
	4	**Job light control input:** connect the white wire of the emitter and receiver as follows: **Models PVA...P6** ON = Job light ON for +5 V DC to 30 V DC (27K input impedance) *OFF = Job light ON for 0 V DC to 2 V DC/open circuit **Models PVA...N6** ON = Job light ON for +5 V DC to 30 V DC/open circuit *OFF = Job light ON for 0 V DC to 2V DC (10K input impedance) * default settings	

Status Indicators/Troubleshooting

Status indicators



Emitter Indicator	Condition	Description
1	OFF	Frequency A selected (Emitter/Receiver Switch #1 both ON)
	Red	Frequency B selected (Emitter/Receiver Switch #1 both OFF)
2	Green	Power is ON and system is OK
	OFF	Power is OFF
	Flashing Green 2x/sec	Emitter Failure (remove and reapply power)

Receiver Indicator	Condition	Description
1	Amber	Output is active (change Switch #2 to Light Operate to turn the amber indicator ON when the system is clear)
	OFF	Output is inactive (change Switch #2 to Dark Operate to turn the amber indicator ON when the system is blocked)
2	Green	Power is ON and the system is OK
	OFF	Power is OFF
	Flashing Green 1x/sec	Receiver Failure (remove and reapply power)

Specifications

Supply Voltage and Current

12 V DC to 30 V DC (10% max. ripple) at less than 62 mA for the emitter and 50 mA for the receiver (exclusive of load)

Supply Protection Circuitry

Protected against reverse polarity

Sensing Range

2 m (6.5 ft) with 2x excess gain remaining

Sensing Height

100 mm (3.9 in), 225 mm (8.9 in), 300 mm (11.8 in), or 375 mm (14.8 in), depending on emitter and receiver models

Beam Spacing

25.0 mm (0.98 in)

Sensing Resolution

35 mm (1.4 in) minimum diameter

[2] Both emitter and receiver must be set to the same frequency in order to operate.

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Output Configuration

Receivers have one solid-state DC output, programmable for light or dark operate:

Models PVA...N6R have NPN open-collector transistor

Models PVA...P6R have PNP open-collector transistor

Output Rating

150 mA maximum

OFF-state leakage current: less than 2 microamps

ON-state saturation voltage: less than 1 V DC at 10 mA and less than 1.5 V DC at 100 mA

Output Protection

Protected against false pulse on power-up and continuous overload or short circuit of output

Output Response Time

Sensor Size	Standard	With Crosstalk from Adjacent Units
100 mm	20 ms	30 ms
225 mm	40 ms	60 ms
300 mm	52 ms	78 ms
375 mm	64 ms	96 ms

Status Indicators

Emitter: Green—power ON/OFF; Red—frequency selected

Receiver: Green—power ON/OFF; Yellow—output state

Emitter and Receiver: Two highly visible job lights turn ON and OFF in response to an external signal to the white wire. Job lights may be configured for steady or flashing green.

Construction

Black painted aluminum housing; acrylic lenses; PBT end caps; thermoplastic elastomer programming switch cover; stainless steel mounting brackets and hardware

Connections

Emitter: 2 m (6.5 ft) 3-conductor PVC-jacketed cable, which is either unterminated or terminated with a 4-pin M12 male quick-disconnect connector, depending on model. Cable diameter is 3.3 mm (0.13 in).

Receiver: 2 m (6.5 ft) 4-conductor PVC-jacketed cable, which is either unterminated or terminated with a 4-pin M12 male quick-disconnect connector, depending on model. Cable diameter is 3.3 mm (0.13 in).

Environmental Rating

NEMA 2; IP62

Operating Temperature

0 °C to +50 °C (+32 °F to +122 °F)

Maximum Off-axis Misalignment

See Maximum Off-Axis Misalignment in Installation

Certifications

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Required Overcurrent Protection

WARNING: Electrical connections must be made by qualified personnel in accordance with local and national electrical codes and regulations.

Overcurrent protection is required to be provided by end product application per the supplied table.

Overcurrent protection may be provided with external fusing or via Current Limiting, Class 2 Power Supply.

Supply wiring leads < 24 AWG shall not be spliced.

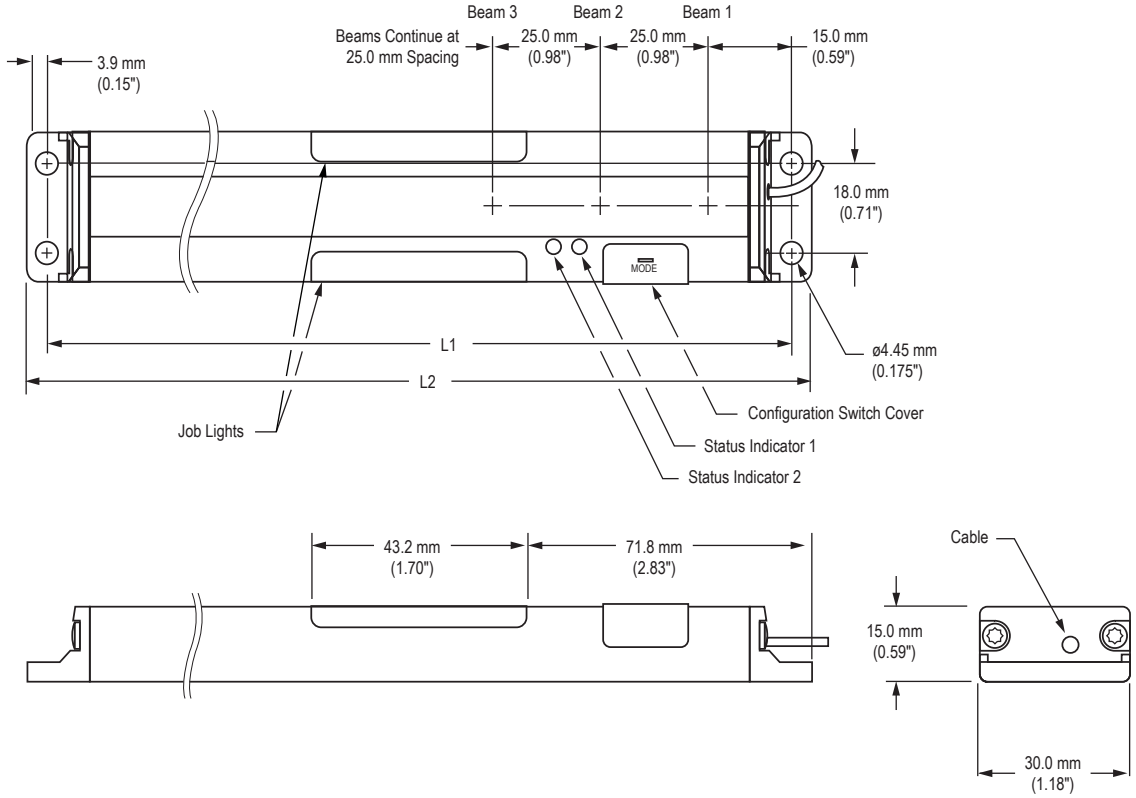
For additional product support, go to www.bannerengineering.com.

Supply Wiring (AWG)	Required Overcurrent Protection (A)	Supply Wiring (AWG)	Required Overcurrent Protection (A)
20	5.0	26	1.0
22	3.0	28	0.8
24	2.0	30	0.5

Dimensions

All measurements are listed in millimeters [inches], unless noted otherwise. The measurements provided are subject to change.

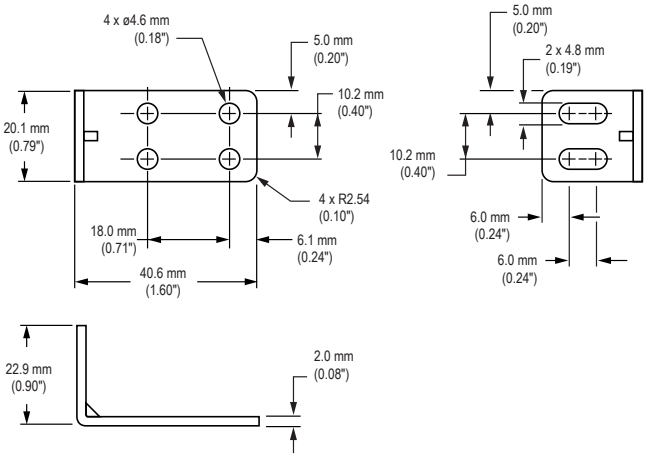
Emitter and Receiver



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Model	Number of Beams	L_1	L_2
PVA100..	5	130.0 mm (5.12 in)	137.8 mm (5.43 in)
PVA225..	10	259.4 mm (10.21 in)	267.3 mm (10.52 in)
PVA300..	13	334.4 mm (13.17 in)	342.3 mm (13.48 in)
PVA375..	16	409.4 mm (16.12 in)	417.3 mm (16.43 in)

SMBPVA1 Standard Bracket (2 Included with PVA)

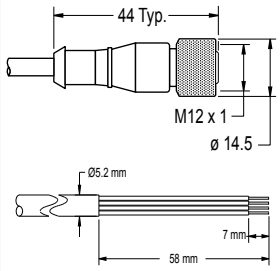
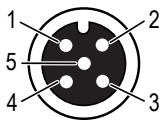


Hardware Included with Each Sensor (kit part number 50532)

Qty	Description
4	Stainless steel Phillips panhead machine screws (M4 x 0.7 x 12)
2	Stainless steel Phillips panhead machine screws (M4 x 0.7 x 6)
2	Stainless steel Phillips panhead machine screws (M4 x 0.7 x 18)
4	Stainless steel hex nuts (M4 x 0.7)
4	Stainless steel lock washers (M4 x 0.7)
1	Plastic screwdriver (3.6 cm/1.4 in long)

Accessories

Cordsets

4-Pin Single-Ended M12 Female Cordsets					
Model	**Length**	**Style**	**Dimensions**	**Pinout (Female)**	
MQDC-403	1 m (3.28 ft)	Straight			1 = Brown 2 = White 3 = Blue 4 = Black 5 = Not used
MQDC-406	2 m (6.56 ft)				
MQDC-410	3 m (9.8 ft)				
MQDC-415	5 m (16.4 ft)				
MQDC-430	9 m (29.5 ft)				
MQDC-450	15 m (49.2 ft)				
MQDC-460	18.3 m (60 ft)				
MQDC-470	21 m (68.9 ft)				
MQDC-4100	30 m (98.43 ft)				

Brackets

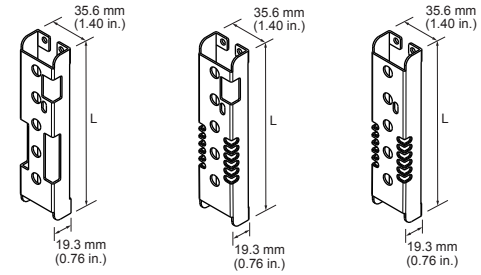
NOTE: Standard SMBPVA1 mounting brackets are included with each PVA System. The following brackets are in addition to the standard brackets.

SMBPVA2

- Set of 4 molded brackets
- Snaps onto standard 28 mm (1.1 in) diameter pipe
- 2 brackets required per sensor
- CAD Files: DXF, PDF, IGS, STP



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SMBPVA.., SMBPVA..A, SMBPVA..AB	Models	CAD Files	DIP Switch Access	Light Protected	Length (L)	Used With
• Protects sensor from impact • Provides DIP-switch and/or indicator light exposure (depending on model) • Heavy-duty cold-rolled steel-zinc finish SMBPVA.. SMBPVA..A SMBPVA..AB  	SMBPVA5	DXF, PDF, IGS, STP	Yes	No	139.7 mm	PVA100
	SMBPVA5A	DXF, PDF, IGS, STP	Yes	Yes		
	SMBPVA5AB	DXF, PDF, IGS, STP	No	Yes		
	SMBPVA10	DXF, PDF, IGS, STP	Yes	No	268.2 mm	PVA225
	SMBPVA10A	DXF, PDF, IGS, STP	Yes	Yes		
	SMBPVA10AB	DXF, PDF, IGS, STP	No	Yes		
	SMBPVA13	DXF, PDF, IGS, STP	Yes	No	343.3 mm	PVA300
	SMBPVA13A	DXF, PDF, IGS, STP	Yes	Yes		
	SMBPVA13AB	DXF, PDF, IGS, STP	No	Yes		
	SMBPVA16	DXF, PDF, IGS, STP	Yes	No	418.2 mm	PVA375
	SMBPVA16A	DXF, PDF, IGS, STP	Yes	Yes		
	SMBPVA16AB	DXF, PDF, IGS, STP	No	Yes		

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