

# prosense® PLS Series Rotating Paddle Bulk Solids Level Switches

## Overview

The ProSense PLS Series is a rotating paddle point level switch for dry, granular bulk solids. Its robust and compact design makes the level switch an ideal sensor for detecting the full, empty, refill, or point level status in silos, hoppers, and bins containing bulk solids such as cereals, sugar, animal feeds, washing powders, chalk, dry plaster, dry cement, granulates, or wood chips.

The PLS Series is available with three different shaft lengths or a rope version that can be shortened in the field based on the application. The industry standard 1-1/4" male NPT threads and hinged paddle make installation easy in most any type of mounting fitting and storage vessel wall thickness.

Operating voltages of 115VAC, 230VAC and 24VDC are available and a SPDT relay output is provided for use as a PLC input or for direct control of bulk solids handling equipment. An optional switch status indicating light is easily field installed.

Models are available with Factory Mutual (FM) certification for Dust Ignition Proof, Class II, III, Division 1, Groups EFG applications.

## Features

- Rotating paddle point level switch for dry, granular bulk solids
- 1-1/4" male NPT threads and hinged paddle make installation easy
- 100mm, 200mm, 300mm shaft lengths or 2000mm cuttable rope version
- Operating voltages of 115VAC, 230VAC and 24VDC
- SPDT relay output for PLC input or direct control of bulk solids handling equipment
- Optional switch status amber indicating light
- Models with Factory Mutual (FM) certification for Dust Ignition Proof, Class II, III, Division 1, Groups EFG
- Adjustable switching sensitivity can be set without tools and even during operation in non-hazardous areas
- Screw-cover housing with captive clear cap
- Optical shaft rotation monitoring for operational verification is visible with the device installed
- Switch testing function is easily performed using just a screwdriver
- Push-in style wiring terminals
- Housing can be rotated 360° for optimal alignment after installation
- IP66 environmental protection rating



Part No. PLS-4P-1-24D



Part No. PLS-4P-R-24D



PLS-4P-1-24D shown with optional indicator light PLS-L24

## Rotating Paddle Bulk Solids Level Switch Operation

The ProSense PLS Series of Rotating Paddle Bulk Solids Level Switch is commonly used to detect the full or refill (empty) status in silos, hoppers and bins containing bulk solids. When used as a refill switch, it is typically mounted at an angled position at the bottom of the storage vessel. When used as a full switch, it is mounted at the top of the storage vessel.

The shaft and paddle are driven using a reduction gear and synchronous motor. If the paddle is stopped by material covering it, the motor in the housing moves from the rest to the switch position. This movement operates two switch contacts; the first is for external level indication and the second switches off the power to the motor.

The paddle starts to rotate once the material level is no longer in contact with the paddle, the motor returns to its rest position and the two contacts switch to normal operation.



Click on the thumbnail or go to <https://www.automationdirect.com/VID-PC-0002> for a short video introduction to our ProSense Rotating Paddle Bulk Solids Level Switches.

Silo, Hopper,  
Bin Full Switch  
Application



Silo, Hopper,  
Bin Refill (Empty)  
Switch Application



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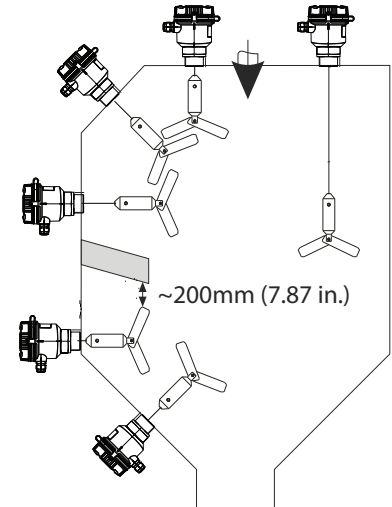
PLS Series Rotating Paddle Bulk Solids Level Switch Selection									
Model	Price	Insertion Length	Process Connection	Output	Operating Voltage	Paddle Type	Hazardous Location Rated	Weight (lbs)	Drawing Link
<a href="#">PLS-4P-1-115</a>	\$210.00	100mm [3.94]	1-1/4" male NPT	(1) SPDT / optional indicator light (not for use with -HAZ models)	115VAC	Hinged	No	4.50	<a href="#">PDF</a>
<a href="#">PLS-4P-1-230</a>	\$210.00				230VAC			4.50	<a href="#">PDF</a>
<a href="#">PLS-4P-1-24D</a>	\$236.00				20 to 28 VDC			4.50	<a href="#">PDF</a>
<a href="#">PLS-4P-1-115-HAZ</a>	\$252.00				115VAC		Yes	4.50	<a href="#">PDF</a>
<a href="#">PLS-4P-1-230-HAZ</a>	\$252.00				230VAC			4.50	<a href="#">PDF</a>
<a href="#">PLS-4P-1-24D-HAZ</a>	\$303.00				20 to 28 VDC			4.50	<a href="#">PDF</a>
<a href="#">PLS-4P-2-115</a>	\$213.00	200mm [7.87]			115VAC		No	5.20	<a href="#">PDF</a>
<a href="#">PLS-4P-2-230</a>	\$213.00				230VAC			5.20	<a href="#">PDF</a>
<a href="#">PLS-4P-2-24D</a>	\$239.00				20 to 28 VDC			5.20	<a href="#">PDF</a>
<a href="#">PLS-4P-2-115-HAZ</a>	\$256.00				115VAC		Yes	5.20	<a href="#">PDF</a>
<a href="#">PLS-4P-2-230-HAZ</a>	\$256.00				230VAC			5.20	<a href="#">PDF</a>
<a href="#">PLS-4P-2-24D-HAZ</a>	\$306.00				20 to 28 VDC			5.20	<a href="#">PDF</a>
<a href="#">PLS-4P-3-115</a>	\$216.00	300mm [11.81]			115VAC		No	5.40	<a href="#">PDF</a>
<a href="#">PLS-4P-3-230</a>	\$216.00				230VAC			5.40	<a href="#">PDF</a>
<a href="#">PLS-4P-3-24D</a>	\$243.00				20 to 28 VDC			5.40	<a href="#">PDF</a>
<a href="#">PLS-4P-3-115-HAZ</a>	\$259.00				115VAC		Yes	5.40	<a href="#">PDF</a>
<a href="#">PLS-4P-3-230-HAZ</a>	\$259.00				230VAC			5.40	<a href="#">PDF</a>
<a href="#">PLS-4P-3-24D-HAZ</a>	\$309.00				20 to 28 VDC			5.40	<a href="#">PDF</a>
<a href="#">PLS-4P-R-115</a>	\$275.00	2000mm [78.74] rope insertion length			115VAC		No	5.90	<a href="#">PDF</a>
<a href="#">PLS-4P-R-230</a>	\$275.00				230VAC			5.90	<a href="#">PDF</a>
<a href="#">PLS-4P-R-24D</a>	\$302.00				20 to 28 VDC			5.90	<a href="#">PDF</a>
<a href="#">PLS-4P-R-115-HAZ</a>	\$318.00				115VAC		Yes	5.90	<a href="#">PDF</a>
<a href="#">PLS-4P-R-230-HAZ</a>	\$318.00				230VAC			5.90	<a href="#">PDF</a>
<a href="#">PLS-4P-R-24D-HAZ</a>	\$368.00				20 to 28 VDC			5.90	<a href="#">PDF</a>

# prosense® PLS Series Rotating Paddle Bulk Solids Level Switches

## PLS Series Rotating Paddle Bulk Solids Level Switch Specifications

Input	
<b>Measured Variable</b>	Level (in line with the orientation and length)
<b>Measuring Range</b>	The measuring range depends on the installation location of the device and the selected length of the shaft 100, 200, 300 mm (3.94 to 11.81 in) or the rope extension up to max. 2m (6.56 ft).
Output	
<b>Output Signal</b>	Binary
<b>Switch Output<sup>1</sup></b>	Function: Switch a floating changeover contact (SPDT). Switching behavior: On/off Switching time: From paddle standstill until output of the switch signal: 20°, corresponds to 3.5 s Switching capacity: According to EN 61058: 250VAC 5E4, 6(2) A 24VDC, 3A Min. switching load 300mW (5V or 5mA minimum)
Power Supply	
<b>Supply Voltage<sup>2</sup></b>	20 to 28 VDC 115 VAC 50/60 Hz 230 VAC 50/60 Hz
<b>Power Consumption</b>	Max. 3.5 VA
<b>Terminals<sup>3</sup></b>	Terminals with spring terminal design Permitted cable cross-sections Rigid - 0.2 to 2.5 mm² (24 to 14 AWG) Flexible - 0.2 to 2.5 mm² (24 to 14 AWG) Flexible with wire end ferrule without plastic ferrule - 0.5 to 2.5 mm² (22 to 14 AWG) Flexible with wire end ferrule with plastic ferrule - 0.5 to 1.5 mm² (22 to 16 AWG)
Performance	
<b>Shaft Speed</b>	1 rpm
<b>Sensitivity</b>	Can be adjusted using an operating element accessible from the top Minimum: 80 g/l (4.99 lb/ft³) Depending on the density of the bulk solids adjustable in three stages: low, medium (default), high
<b>Mechanical operating life</b>	500,000 switching operations
Installation	
<b>Process Connection</b>	1-1/4" male NPT
<b>Paddle Type</b>	Hinged, foldable
<b>Mounting Location</b>	Vertical from the top Angled from the top From the side From the side with protective cover against falling solids From the bottom (device must be protected against shock-type loads) See Mounting Orientations Illustration for more detail  Do not use: In direction of solids flow
Special Mounting Instructions	
<b>Side Load on the Shaft</b>	Max. 60N
<b>Load on the Rope</b>	Max. 1,500N
<b>Operating Pressure (abs.)</b>	0.5 to 2.5 bar (7.25 to 36.3 psi)
<b>Housing Rotation 360°</b>	To adjust to the direction of the cable entries (pointing downwards)
<b>Cable Entries</b>	The plugs delivered with the device provide dust protection during transport and storage. If a cable entry is not used the cable gland must be tightened around the included plug or an appropriately rated M20 x 1.5 blanking plug must be installed to maintain IP rating.
<b>Mechanical Load of Signal Lamp (Optional)</b>	The optional signal lamp must be protected against mechanical load (impact energy > 1 J).

## Mounting Orientations



<sup>1</sup> After a current >100mA is actuated, it is no longer possible to guarantee switching function with a switching current I <100mA.

<sup>2</sup> An overload protection element (rated current ≤ 10A) is required for the power cable.

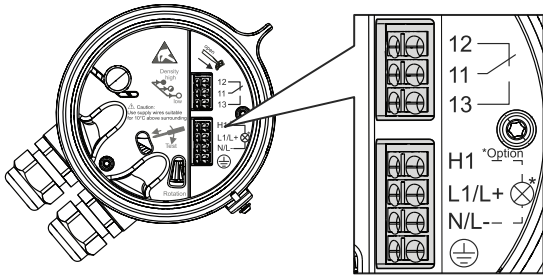
<sup>3</sup> Use supply wires suitable for 10 °C (18 °F) above surrounding.

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PLS Series Rotating Paddle Bulk Solids Level Switch Specifications	
Process	
<b>Process Temperature Range</b>	-20 to 80 °C (-4 to 176 °F)
<b>Process Pressure Range</b>	≤ 1.5 bar (21.8 psi) overpressure (e.g. when silo is filled)
<b>Solids Weight</b>	≥ 80 g/l (4.99 lb/ft³)
<b>Grain Size</b>	≤ 50mm (1.97 in)
Environment	
<b>Ambient Temperature Range</b>	-20 to +60°C (-4 to +140°F)
<b>Storage Temperature</b>	-20 to +60°C (-4 to +140°F)
<b>Climate Class</b>	EN60654-1, Class C2
<b>Degree of Protection</b>	IP66
<b>Shock Resistance</b>	As per EN 60068-2-27: 30g
<b>Vibration Resistance</b>	As per EN 60068-2-64: 0.01g²/Hz
<b>Electromagnetic Compatibility</b>	Electromagnetic compatibility in accordance with all the relevant requirements of the EN 61326 series. - Interference immunity: as per IEC 61326-1, industrial environment - Interference emission: as per IEC 61326-1, Class B
<b>Electrical Safety</b>	Class I equipment, overvoltage category II, pollution degree 2
<b>Altitude</b>	< 2,000m (6,560ft) above sea level
Mechanical	
<b>Housing</b>	Polycarbonate (PC)
<b>Captive Screw Cap</b>	Polyamide (PA)
<b>Cover Seal</b>	Silicone
<b>Housing Seal</b>	Viton
<b>Shaft</b>	303 Stainless steel
<b>Rope Extension</b>	316 Stainless steel
<b>Paddle</b>	304 Stainless steel
<b>Shaft Seal</b>	NBR (Nitrile Butadiene Rubber)
<b>Process Connections</b>	PBT (Polybutylene Terephthalate)
<b>Cable Entries</b>	2 x cable gland, M20 x1.5 (optionally 1 x cable gland M20 x 1.5 and indicator lamp) Permitted cable diameter - 5 to 9 mm (0.2 to 0.35 in)
Approvals	
<b>CE</b>	The product meets the requirements of the harmonized European standards. As such, it complies with the legal specifications of the EC directives. The manufacturer confirms successful testing of the product by affixing to it the CE-mark.
<b>FM (-HAZ Models)</b>	FM Certified Dust Ignition Proof, Class II, III, Division 1, Groups EFG - Reference FM drawing PLS-4P-x-xxx-HAZ-DWG available at AutomationDirect.com

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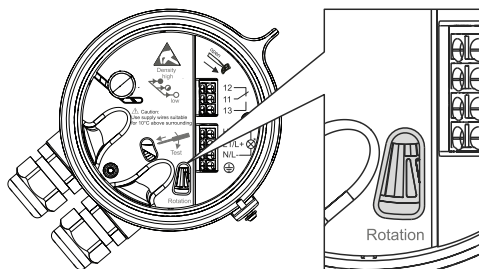
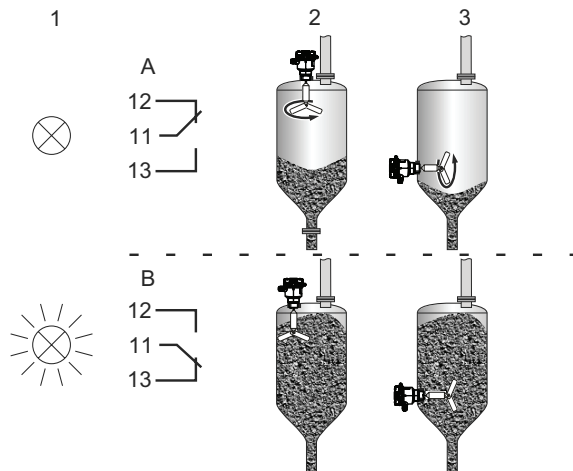
## Wiring



Symbol	Description	Symbol	Description
	Protective ground	H1	Connections for optional PLS Series indicator light
N (AC) / L- (DC)	Power connection	N/L-	
L1 (AC) / L+ (DC)	Power connection	11	Changeover contact
		12	Normally closed contact
		13	Normally open contact

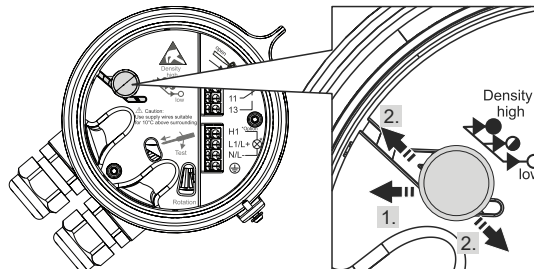
## Switching States

	1 = Indicator light (optional, not for -HAZ models)	2 = Full signaling	3 = Refill signaling	Shaft rotation	Internal light
A	OFF	OFF	ON	YES	ON
B	ON	ON	OFF	NO	ON



### Rotational Movement Display

The ProSense PLS shaft rotational movement can be checked by visually observing the rotating disc in the lighted inspection window through the clear cover.



### Switching Threshold (Sensitivity)

The ProSense PLS switching threshold (sensitivity) is easily set to one of three settings depending on the density of the bulk solids.

### Setting the switching threshold (sensitivity)

1. Move the operating element to the left until it can freely move up or down as illustrated.
2. Move the operating element to the desired position and let it move back to the right in the desired slot.

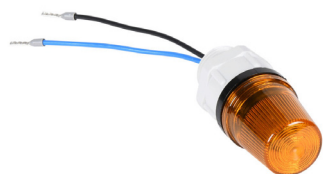
Click the QR Code or go to the following for a copy of the PLS Series Rotation Paddle Bulk Solids Level Switch Manual  
<https://cdn.automationdirect.com/static/manuals/prosense/plsseriesmanual.pdf>



# prosense® PLS Series Rotating Paddle Bulk Solids Level Switch Accessories

## Rotating Paddle Bulk Solids Level Switch Accessories

The ProSense PLS Series point level switch can be fitted in the field with an optional amber incandescent indicating light that illuminates when the rotating paddle stops. **This accessory is NOT for use with the -HAZ hazardous area models.**



Part No. [PLS-L24](#)

PLS Series Rotating Paddle Bulk Solids Level Switch Accessories				
Model	Description	Price	Weight (lbs)	Drawing Link
<a href="#">PLS-L24</a>	ProSense indicating light, 20-28 VDC. For use with ProSense PLS Series 20-28 VDC rotating paddle level switches.	\$30.50	0.07	<a href="#">PDF</a>
<a href="#">PLS-L115</a>	ProSense indicating light, 115 VAC. For use with ProSense PLS Series 115VAC rotating paddle level switches.	\$30.50	0.07	<a href="#">PDF</a>
<a href="#">PLS-L230</a>	ProSense indicating light, 230 VAC. For use with ProSense PLS Series 230VAC rotating paddle level switches.	\$30.50	0.07	<a href="#">PDF</a>

Replacement bulbs are not available from AutomationDirect. We recommend purchasing a new indicating light assembly as a replacement.



[PLS-4P-1-24D](#) shown with optional indicator light [PLS-L24](#)