

PWS SERIES

Rotating Paddle Level Sensor

USER MANUAL



Automation Products Group, Inc.

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 **NOTE:** Find additional product documents and specifications on the PWS online product page.
Go to: apgsensors.com/product/pws

INTRODUCTION

Thank you for purchasing a PWS Series Rotating Paddle Level Sensor from APG. We appreciate your business! Please take a few minutes to familiarize yourself with your PWS and this manual.

The PWS rotating paddle level sensor is made specifically for solid level detection. The rotating paddle on the shaft is designed to detect the presence of powders in small bins and hoppers up to 39 inches (1 m).

WARRANTY STATEMENT

This product is covered by APG's warranty to be free from defects in material and workmanship under normal use and service of the product for 24 months. For a full explanation of our Warranty, please visit:

apgsensors.com/warranty-returns/.

Contact Technical Support to receive a Return Material Authorization (RMA) before shipping your product back.

If your product needs to be returned for evaluation, contact us via email, phone, or online chat on our website. We will issue you an RMA number with instructions. You can also find the form on our website by clicking "RMA" in the web footer, or go to apgsensors.com/RMA-form.

- Phone: (435) 753-7300
- Email: sales@apgsensors.com
- Online chat at apgsensors.com

Please have your part number and serial number available.

SPECIFICATIONS & DIMENSIONS

OPERATIONAL VERSIONS

PWS-X	Indoor model
PWS-Z	Outdoor model
PWS-XT	High Temperature

CHARACTERISTICS

Detection Torque Range	630; 560; 470; 390 g/cm (PWS-X) 500; 390; 315; 270 g/cm (PWS-Z)
Supply	24, 100, 110, 120, 200, 240 VAC 50/60 Hz
Power Consumption	1.5 VA
Motor Rotation	1 rpm (50 Hz); 1.2 rpm (60 Hz)
Output Contact Rating (Resistive Load)	(SPDT): 250 V 3 A AC; 30 V 3 A DC

PHYSICAL ATTRIBUTES

Enclosure Protection	IP40 (PWS-X) IP65 (PWS-Z)
Mounting	G 3/4 thread
Material	
Housing	ADC and polycarbonate (PWS-X) ADC and ABS (PWS-Z)
Mounting	Galvanized Brass
Spindle	SS304
Paddle	Polycarbonate; SS 304; SS316
Shaft Seal	PTFE washer, NBR oil seal, and molybdenum grease

PADDLE VARIETY & DIMENSIONS

The **poly carbonate four vane** is designed for general use on bulk density as low as 0.3 g/cm³ (18.7 lb./cu. ft.). Use at high and low level, top and side mounting.

Stainless steel paddles, 304SS or 316SS, are available in one or two vane.

One vane version designed for general use on side mounting. It is suitable for high density as 2.0 g/cm³ (12.5 lb./cu. ft.). Especially suitable for use in high operating temperature, model PWS-T.

Special two vane is designed for use at top or side mounting on very light materials less than 0.02 g/cm³ (1.25 lb./cu. ft.).

INSTALLATION

UNPACKING

When unpacking, do not damage the sensor with mechanical shock. After unpacking, make sure that products you ordered are complete. If any part is missing, wrong, or damaged, please contact APG.

INSTALL

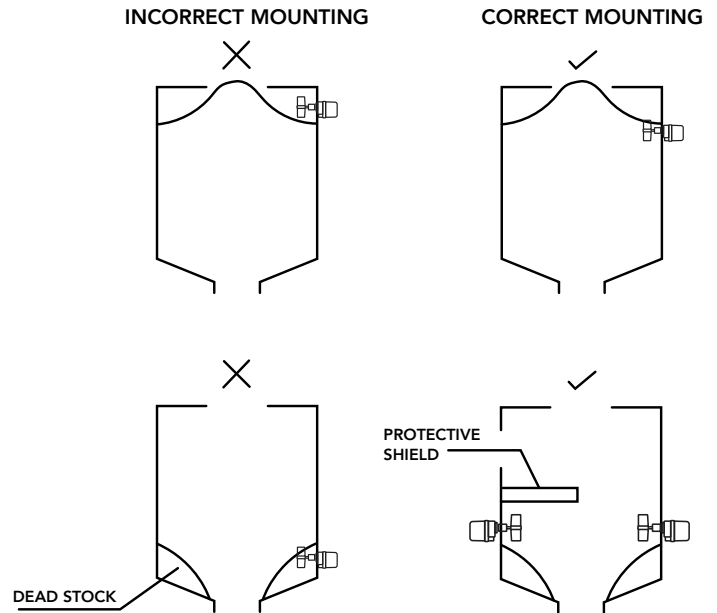
Install the sensor in an area which meets the following conditions:

- The ambient temperature range:
 - Detecting area:** 14 to 160°F (-10 to 70°C)
 - PWS-Xt:** 14 to 250°F (-10 to 120°C)
 - Housing:** 14 to 115°F (-10 to 45°C)
- Indoor environment
- Humidity and vibration are low
- Open container and nonhazardous area
- Ample space for maintenance and inspection

When using for high level control, pay attention to the angle of repose. When using for low level control, prevent the PWS from being surrounded by dead stock.

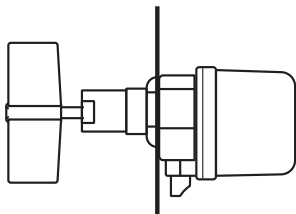
NOTE: Keep the paddle and shaft out of the direct flow. Failure to do this may damage the sensor.

CAUTION: To avoid burns, do not touch the radiator fin. It can be hot.

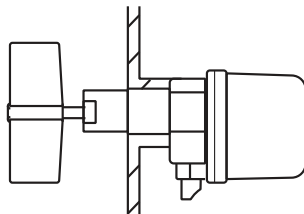


The PWS can be installed using one of the following methods:

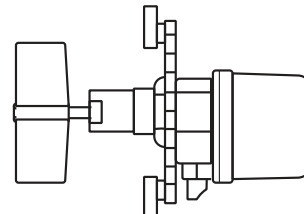
- **Bulkhead Mounting:** Drill a 28 mm (1.1 in. dia.) hole. Insert and tighten the nut, washer, and gasket.
- **Screw-in Mounting:** Provide G 3/4" female thread.
- **Flange Mounting:** Use the optional JIS 5K65A sized flange.



Bulkhead mounting



Screw-in mounting



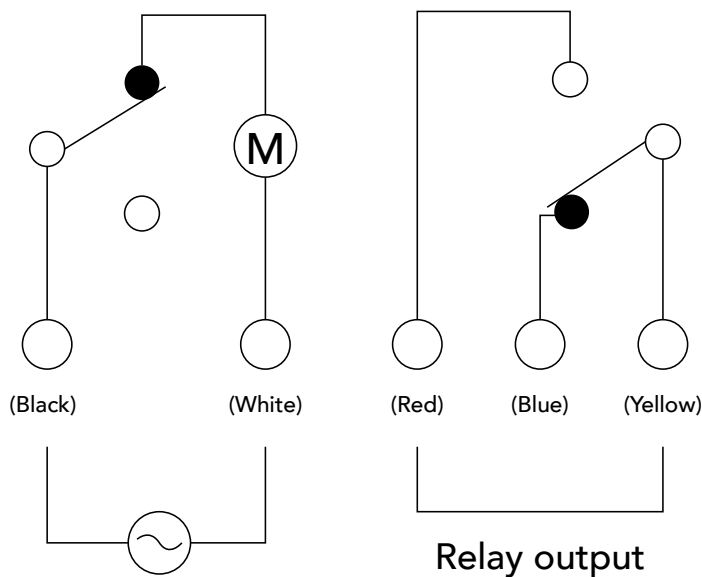
Flange mounting

WIRING

PWS-Z SERIES

Wiring should be in accordance with all local codes. Control cable from 0.5 mm² to 3.5 mm² is recommended.

Contact Capacity (Resistive)
250 V 3 A AC
30 V 4 A DC
Power Consumption 1.5 VA



- ❏ **NOTE:** 1. The earth ground terminal is grounded to the housing.
2. The cable entry must be properly fitted to preserve IP65 after wiring.

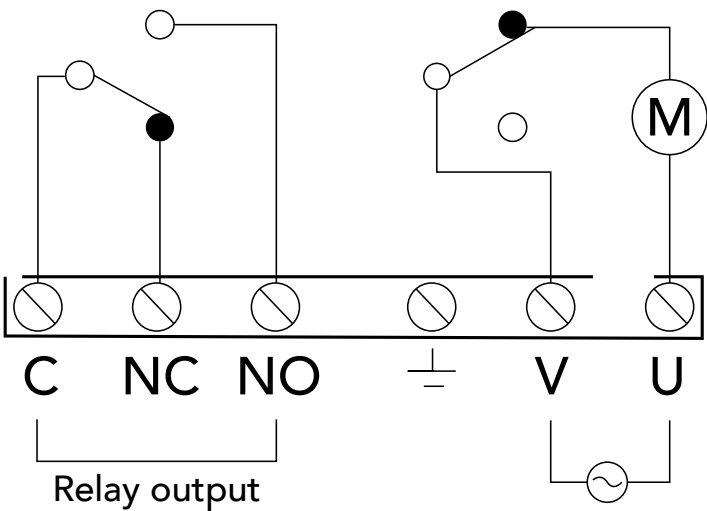
⚠ **CAUTION:** Make sure the supplying voltage and the wire color matches. The wrong voltage or miswiring may damage the sensor.

⚠ **WARNING:** To avoid personal injury, DO NOT remove the housing cover when power is applied.

PWS-X SERIES (PWS-, PWS-XL, & PWS-XT)

Wiring should be in accordance with all local codes. The PWS provides 5 cores 0.5 mm² PVC insulated cable. Install solderless terminals or sleeves to the end of the conductors.

Contact Capacity (Resistive)
250 V 3 A AC
30 V 4 A DC
Power Consumption 1.5 VA



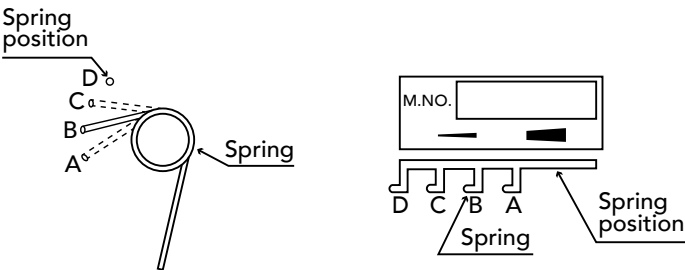
CAUTION: Make sure the supplying voltage and the wire color matches. The wrong voltage or miswiring may damage the sensor.

WARNING: To avoid personal injury, DO NOT remove the housing cover when power is applied.

START UP

The sensitivity can be adjusted to suit diverse level control installations and variations in material characteristics. By changing the spring position on the set plate, the amount of torque required to signal an output can be altered. The position may be changed by means of plier or by hand.

	PWS-X Series	PWS-Z Series	Features
A	630 g/cm (3.5 lb./in.)	500 g/cm (2.8 lb./in.)	For light or fine material
B	560 g/cm (3.1 lb./in.)	390 g/cm (2.2 lb./in.)	Standard (preadjusted)
C	470 g/cm (2.6 lb./in.)	315 g/cm (1.8 lb./in.)	For heavy and sticky materials or high vibration location
D	390 g/cm (2.2 lb./in.)	270 g/cm (1.5 lb./in.)	For heavy and sticky materials or high vibration location



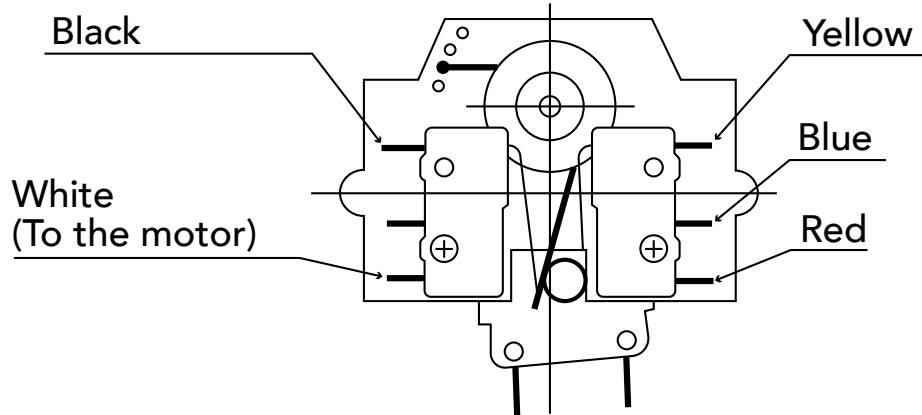
MAINTENANCE

When cleaning and checking the container, free the paddle and shaft from deposit. Units used for detecting the level of sticky materials or installed in a humid location must be cleaned at periodic intervals.

Tighten the housing cover and cable entry to protect the unit from rain, splashing water, etc.

To replace the micro switch of the PWS series, follow these procedures:

- Make sure that the power supply is turned off.
- Remove the housing cover (by turning it counterclockwise).
- Remove lead wires by melting the soldered area with a soldering iron.
- Remove the micro switch (loosen one screw).
- Install the replacement switch and tighten the screw.
- Re-solder lead wires. Refer to figure below.
- Check wiring and operation.
- Reinstall and tighten the housing cover.



TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSES	REMEDIES
Paddle is covered by materials Relay de-energized	Power supply not connected	Connect the power
	Insufficient power supplied	Repair power supply
	Miswiring	Wire correctly
	Wiring leading to control may be defective	Replace cable and wire correctly
	Material too light (less than 0.2 g/cm ³)	Calibrate sensitivity or replace paddle
	Material has bridge or angle of repose	Install sensor in better location
	Shaft and spindle are damaged	Replace unit
Paddle is not covered by materials Relay energized	Insufficient power supplied	Repair power supply
	Miswiring	Wire correctly
	Heavy deposit on shaft	Clean shaft
	Material has dead stock	Install sensor in better location or isolate dead stock
	Temperature too high	Replace unit or change the proper sensor
	Shaft is bent or damaged	Replace unit
Relay chatters	Insufficient power supplied	Repair power supply
	Loose cables	Tighten connections
	Material too fluid	Use a time-delay relay

SPARE PARTS

Model	Description	Part Number
PWS-X-ACC-C	PWS-X-PC Cover	22408
PWS-X-ACC ()	PWS-X Motor (specify voltage)	On Request
PWS-X-ACC ()	PWS-X Motor assembly w/microswitch (specify voltage)	On Request
PWS-X-ACC10	PWS-X Flange, SS304, JIS 5 K 65 A 2 mm thick	22905-0019
PWS-X-ACC2	Motor (110 VAC)	22293
PWS-X-ACC3	PWS-X 4 vane (PC) paddle (80 mm dia. x 30 mm)	22103
PWS-X-ACC4	PWS-X 1 vane (SS304) paddle (60 mm dia. x 30 mm)	22175
PWS-X-ACC6	PWS-X2 vane (SS304) paddle (150 mm dia. x 60 mm)	22905-0015
PWS-X-ACC7	PWS-X 2 vane (PC) paddle (150 mm dia. x 60 mm)	22905-0016
PWS-X-ACC8	PWS-X 2 vane (SS304) paddle (80 mm dia. x 35 mm)	22905-0017
PWS-X-ACC9	Motor Assembly (110 VAC) w/ microswitch	22905-0018



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