

AUTOMATION

PRODUCTS
GROUP, INC.

Operator's Manual

PWS Series

Rotating Paddle Level Sensor

Rev. A1, 4/07



Automation Products Group, Inc.

APG...Providing tailored solutions for measurement applications

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• **Warranty and Warranty Restrictions**

APG warrants its products to be free from defects of material and workmanship and will, without charge, replace or repair any equipment found defective upon inspection at its factory, provided the equipment has been returned, transportation prepaid, within 24 months from date of shipment from factory.

THE FOREGOING WARRANTY IS IN LIEU OF AND EXCLUDES ALL OTHER WARRANTIES NOT EXPRESSLY SET FORTH HEREIN, WHETHER EXPRESSED OR IMPLIED BY OPERATION OF LAW OR OTHERWISE INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

No representation or warranty, express or implied, made by any sales representative, distributor, or other agent or representative of APG which is not specifically set forth herein shall be binding upon APG. APG shall not be liable for any incidental or consequential damages, losses or expenses directly or indirectly arising from the sale, handling, improper application or use of the goods or from any other cause relating thereto and APG's liability hereunder, in any case, is expressly limited to the repair or replacement (at APG's option) of goods.

Warranty is specifically at the factory. Any on site service will be provided at the sole expense of the Purchaser at standard field service rates.

All associated equipment must be protected by properly rated electronic/electrical protection devices. APG shall not be liable for any damage due to improper engineering or installation by the purchaser or third parties. Proper installation, operation and maintenance of the product becomes the responsibility of the user upon receipt of the product.

Returns and allowances must be authorized by APG in advance. APG will assign a Return Material Authorization (RMA) number which must appear on all related papers and the outside of the shipping carton. All returns are subject to the final review by APG. Returns are subject to restocking charges as determined by APG's "Credit Return Policy".

• Introduction

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).

• Specifications

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)
Material:	
Housing:	ADC and polycarbonate (PWS-X) ADC and ABS (PWS-Z)
Mounting:	Galvanized Brass
Spindle:	SS304
Paddle:	Polycarbonate or SS304 or SS316
Shaft Seal:	PTFE washer, NBR oil seal and molybdenum grease
Mounting:	G 3/4

• 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.

Installation

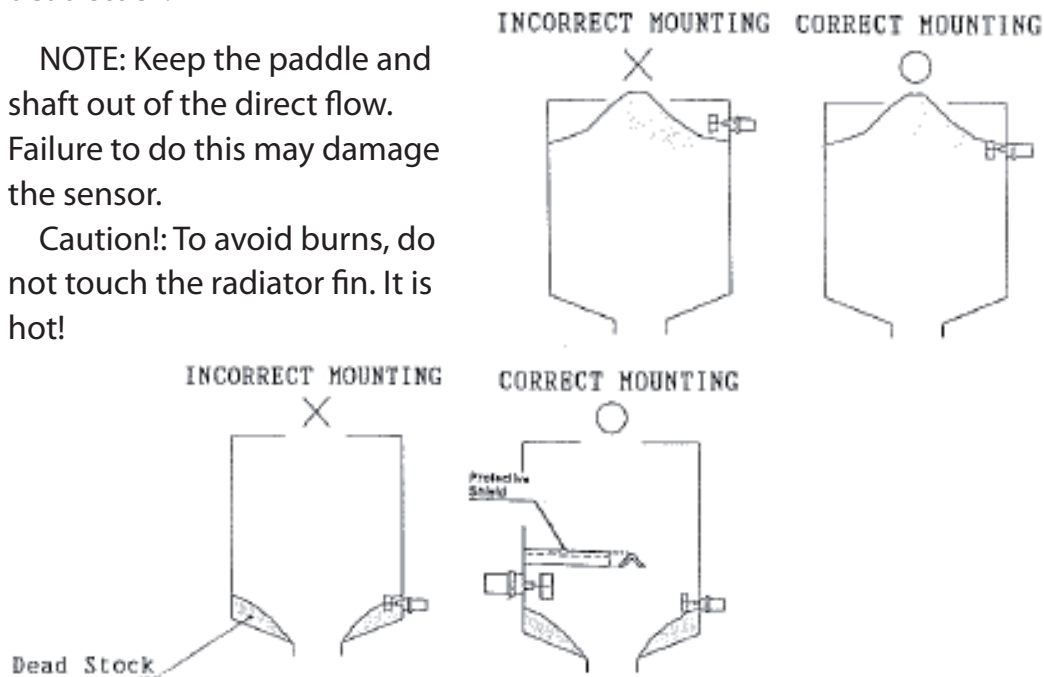
Install the sensor in an area which meets the following conditions:

- 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.

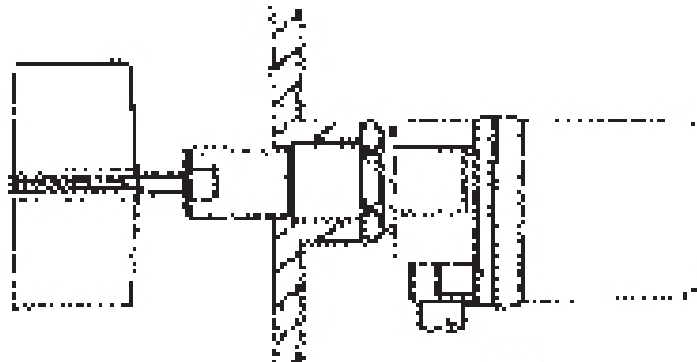
NOTE: Keep the paddle and shaft out of the direct flow. Failure to do this may damage the sensor.

Caution!: To avoid burns, do not touch the radiator fin. It is hot!

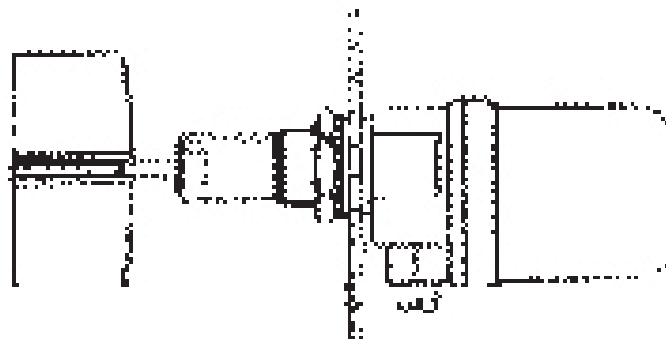


The PWS can be install using one of the following methods:

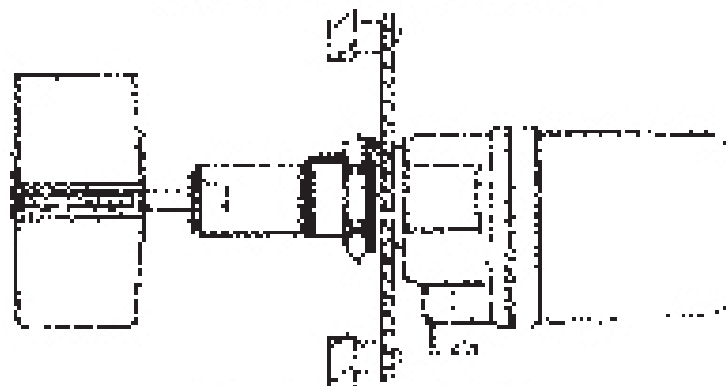
- Screw-in Mounting: Provide G 3/4" female thread.
- Bulkhead Mounting: Drill a 28 mm (1.1 in. dia.) hole. Insert and tighten the nut, washer, and gasket.
- Flange Mounting: Use the optional JIS 5K65A sized flange.



Screw in mounting



Bulkhead mounting



Flange mounting

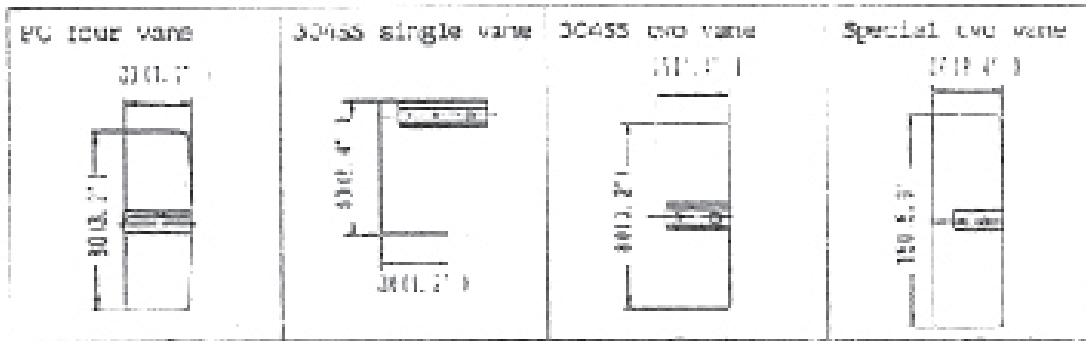
- **Paddle Variety and Dimensions**

The polycarbonate four vane is designed for general use on bulk density as low as 0.3 g/cm^3 (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/cm^3 (12.5 lb./cu. ft.). Especially suitable for use in high operating temperature, model PWS-T.

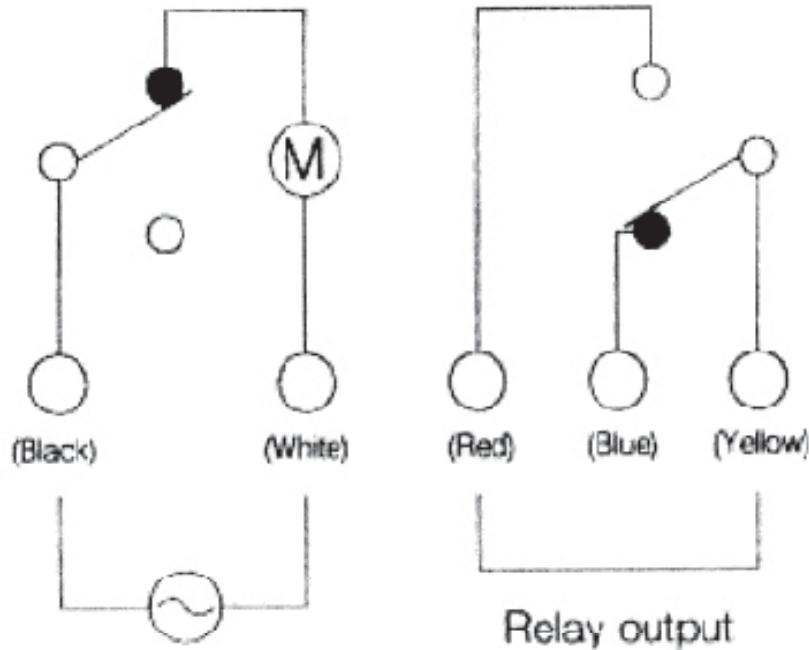
Special two vane is designed for use at top or side mounting on very light materials less than 0.02 g/cm^3 (1.25 lb./cu. ft.).



PWS-Z Series (PWS-Z and PWS7-ZL)

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

NOTES:

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

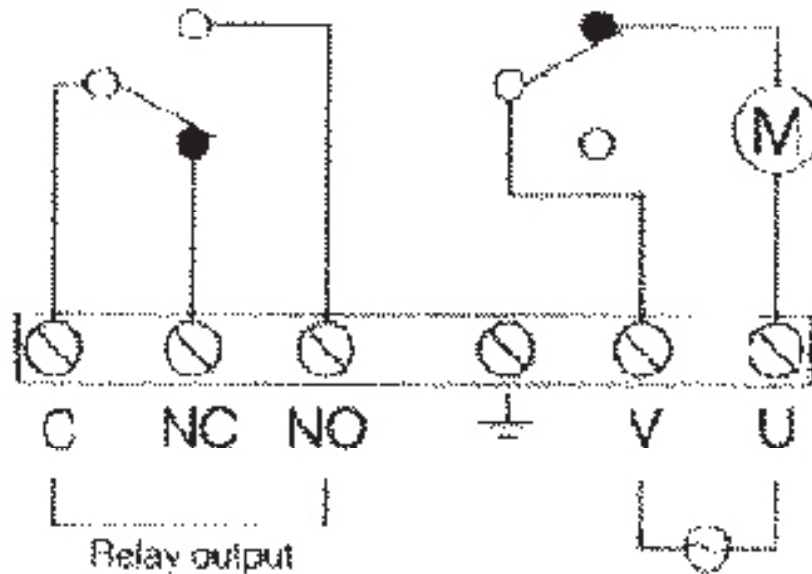
CAUTION: Make sure the supplying voltage and the wire color matches. The wrong voltage or miswiring may damage the sensor.

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

- **Wiring**

PWS-X Series (PWS-X, PWS-XL, and 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

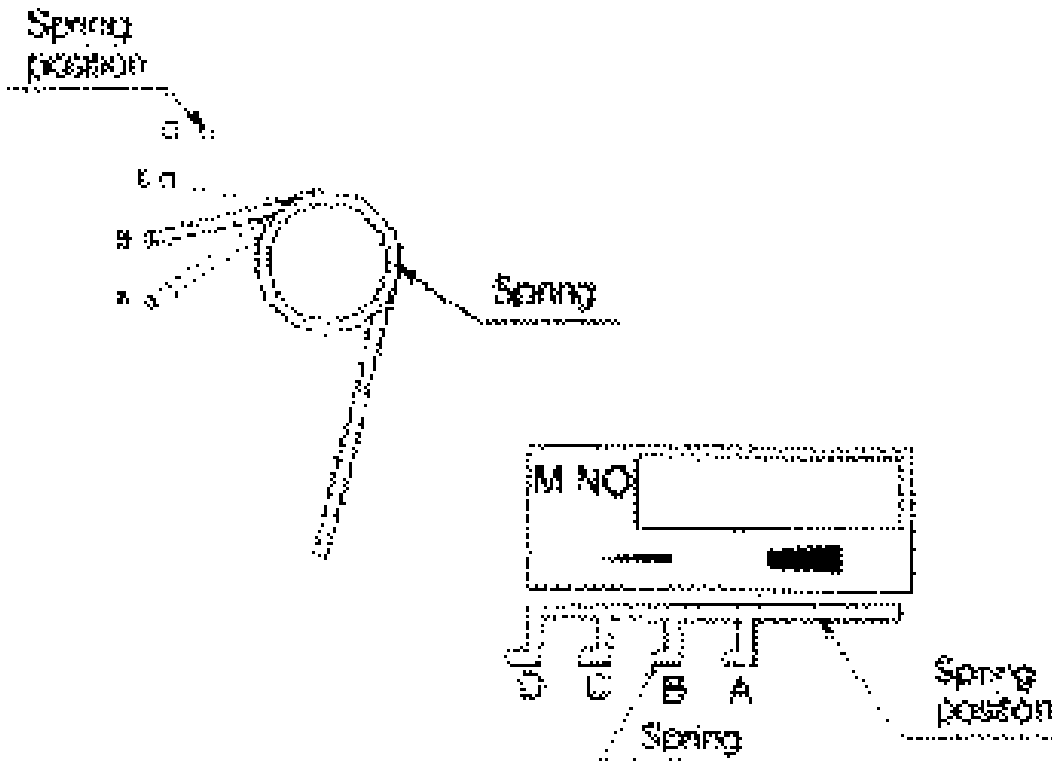
CAUTION: Make sure the supplying voltage and the wire color matches. The wrong voltage or miswiring may damage the sensor.

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.

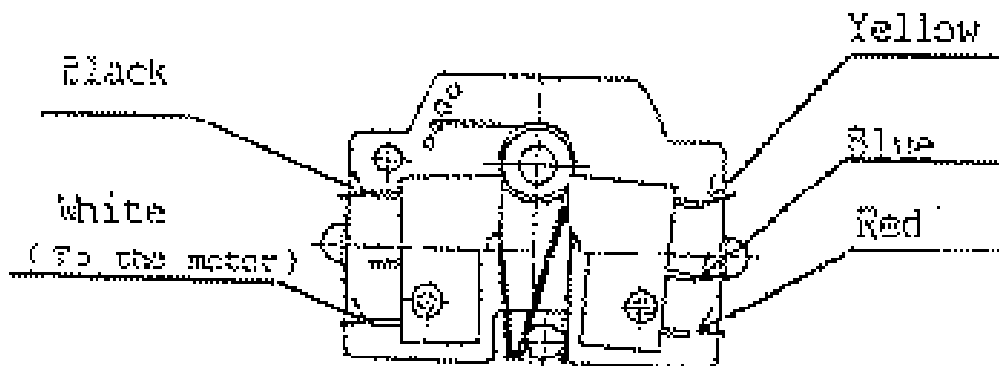


• Maintenance

When cleaning and checking the container, free the paddle and shaft from deposit. The unit which detects the level of sticky materials or is 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.

- 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.



- Shaft and spindle is damaged.

Remedies

- Connect the power.
- Repair power supply
- Wire correctly
- Calibrate sensitivity or replace paddle
- Install sensor in good location
- Replace unit.

Symptom

Paddle is not covered by materials. Relay energized.

Possible Causes

- Insufficient power supplied.
- Miswiring
- Heavy deposit on shaft
- Material has dead stock
- Temperature too high
- Shaft is bent or damaged.

Remedies

- Connect the power.
- Repair power supply
- Wire correctly
- Calibrate sensitivity or replace paddle
- Install sensor in good location
- Replace unit.

Symptom

Relay chatters

Possible Causes

- Insufficient power supplied
- Loose cables
- Material too fluid

Remedies

- Repair power supply
- Tighten connections
- Use a time delay relay.

• Troubleshooting

Symptom

Paddle is covered by material. Relay de-energized.

Possible Causes

- Power Supply not connected.
- Insufficient power supplied.
- Miswiring
- Material too light.
- Material has bridge or angle of repose.

• 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 assy 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 Assy (110 VAC) w/ microswitch	22905-0018

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