

I N S T R U C T I O N M A N U A L

F O R



ROTATING-PADDLE LEVEL MEASUREMENT

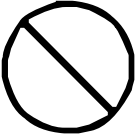
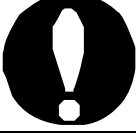
MODEL : R 7

Read and understand this manual for safely usage.

- This manual describes the product of standard specification. Read the other manual for the product of explosion-proof specification.
- This manual describes the handling, inspection and adjustment of the product which model is mentioned on cover page. Read and understand this manual before handling.
- Follow the additional document and/or direction, submitted by NOHKEN INC. and our distributor or agent, even if the terms are mentioned in this manual.
- Save this manual in proper place being available to refer immediately.
- The specification of product mentioned in this manual may not be satisfied by the condition of environment and usage. Check and consider carefully before using.
- Contact to sales office at NOHKEN INC. for any question or comment about this manual and product.

The followings are the description of the terms in this manual.

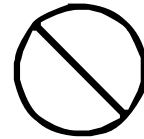
 WARNING	Indicates a potentially hazardous situation which, if not pay attention, could result in death, serious injury or serious disaster.
 CAUTION	Indicates a hazardous situation which, if not pay attention, may result in minor or moderate injury or damage to device.

	Indicates prohibited matter. The explanation with this mark shall be followed.
	Indicates instructed matter. The explanation with this mark shall be followed.

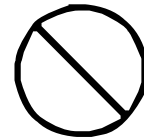


WARNING

This product is not explosion-proof construction. Do not install this product to the place where the flammable gas or vapor is occurred. If installed, the flammable gas or vapor may be ignited, and serious disaster may be occurred. Use the product of explosion-proof construction in this case.



Do not modify or disassemble the product. Otherwise, the product and connected device may be malfunctioned, damaged, fired, or miner injury and electric shock may be occurred. (Follow the additional document and/or direction, submitted by NOHKEN INC. and our distributor or agent.)



Turn off the power, before wiring and inspection. Otherwise, electric leakage, fire caused by short circuit, and electric shock may be occurred.



Ensure the wire is properly connected. The product and connected device may be malfunctioned, damaged, fired, or miner injury and electric shock may be occurred by improper wiring.



Turn off the power immediately, if the smoke, strange smell and sound are occurred.

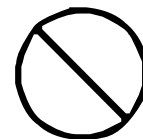


Do not use it until the problem is solved.



CAUTION

Avoid shock and rough handling to this product. The product may be damaged by shock as dropping, falling, throwing, knocking, lugging, and etc.



Follow the specification of operating temperature, operating pressure, switch rating, and etc. Otherwise, the product and connected device may be malfunctioned, damaged, fired, or miner injury and electric shock may be occurred. Check the manual or specification sheet.



Operation test shall be done before practical usage. If the serious accident is expected to occur by malfunction of product, the other operating principle of product shall be installed in parallel.



▲ CAUTION

Check and deeply consider the chemical compatibility for material of product in advance. The part especially float, which is very thin, may be malfunctioned by miner corrosion.



Check and deeply consider the chemical compatibility for material of product in advance.



Hold the stem very close to mounting point, when carrying, installing, and removing. If hold the terminal box, it may be taken off from the flange or plug, and the product may be damaged by dropping.



The product is 50cm or longer

The product shall be kept in horizontally. The product and other goods be damaged, and miner injury may be occurred by falling.



Earth terminal shall be grounded to JIS Class D ground (earth resistance less than 100 Ω). If not grounded, electric shock may occurred by any accident.



Provide arrester or surge absorber to avoid electrical impact such as lightning and static electricity. If not provide, the product and connected device May be malfunctioned, damaged, and fired, or miner injury and electric shock may be occurred.



In case of connecting inductive or lamp load to the product.

Provide protective circuit to the load to avoid over voltage and over current. If not provide, the contact may be damaged.



INTRODUCTION

- A) This manual specifies the specification of general product. If you order special product, some details of specification may be different with the manual.
- B) We are glad to suggest and advice for Model selection and chemical resistant of material, but final decision has to be made by the customer.
- C) This manual has prepared with close attention. Ask sales office at NOHKEN INC. for any question or comment about the contents of this manual.
- D) For replacement parts
The quality of product has frequently improved, so same spare part may not be supplied. In this case, replacement part or product may be supplied. Ask sales office at NOHKEN INC. for details.
- E) The contents of this manual are subject to change any time without notice due to the improvement of product.

WARRANTY & DISCLAIMER

- A) NOHKEN INC. warrants this product against defect in design, material and workmanship for a period of 1(one) year from the date of original factory shipment.
- B) The warranty only covers the damage of products. The secondary and third kind disasters are not covered by NOHKEN INC.
- C) NOHKEN INC. shall not be liable for the following.
 - C-a) Do not follow the description and direction in this manual.
 - C-b) Damage due to improper installation, wiring, usage, maintenance, inspection, storing, and etc.
 - C-c) Repair and modification are done by the person who is not employee of NOHKEN INC. and our distributor or agent.
 - C-d) Improper parts are used and replaced.
 - C-e) The damage is occurred by the device or machine except our products.
 - C-f) Improper usage. (See "Proper of usage" in chapter 1 in this manual)
 - C-g) Force Majeure including, but not limited to, fire, earthquake, tsunami, lightning, riots, revolution, war, radioactive pollution, acts of God, acts of government or governmental authorities, compliance with law, regulation, and order.

THE TERMS OF WARRANTY AND DISCLAIMER SHALL IN NO WAY LIMIT YOUR REGAL LIGHT.

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1. PURPOSE OF USE

The R7 series bin level sensors are manufactured specifically for solid level detection. They are designed for use in the plastics, chemical, food and other industries. They help prevent hopper overflow, empty holding tanks, plugged chutes and damaged equipment. Special features of the R7 series include its compact size and competitive price.

There are two versions of the R7 bin level sensor. One version, the R7-X series, is for indoor use while the other, the R7-Z series is designed for outdoor use.

2. PRINCIPLE OF OPERATION

A rotating paddle on a spindle is connected to a low-torque, slow-speed synchronous motor. The presence of powders and particles is detected as a result of the rotating paddle stalling. The output is an isolated SPDT (Single Pole, Double Throw) microswitch. A special wear-resistant magnetic slip system avoids damage to the motor, even if a significant accidental force is applied to the paddle.

3. SPECIFICATIONS

3. 1 MODEL NAME

Indoor use	Outdoor use	Feature
R 7 - X	R 7 - Z	Standard
R 7 - X L	R 7 - Z L	Extended Shaft: Max. 1000mm
R 7 - X T		For use in heat proof temperature: Max.120° C

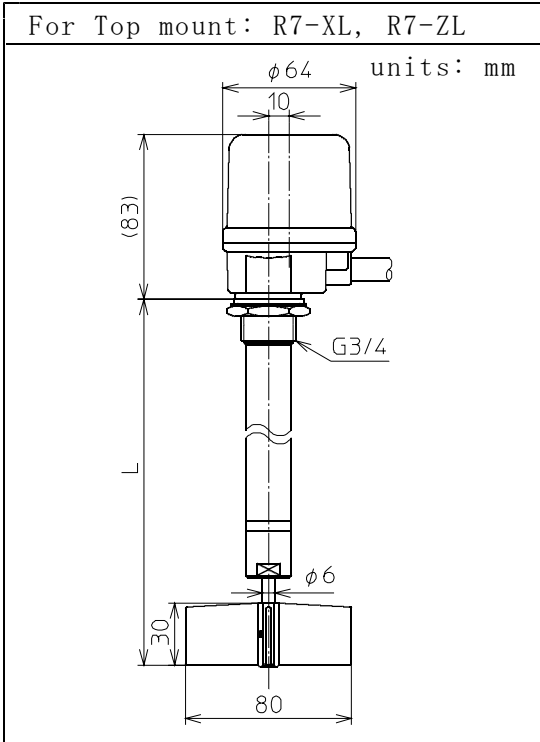
3. 2 STANDARD SPECIFICATIONS

Model	R7-X	R7-Z
Power supply	24, 100, 110, 120, 200, 220, 240V AC 50/60Hz (Choose one of these power supply)	
Power consumption	1.5VA	
Rotational frequency	50 Hz : 1 rpm($1.65 \times 10^{-2} \text{ s}^{-1}$) 60 Hz : 1.2 rpm($2 \times 10^{-2} \text{ s}^{-1}$)	
Relay contact	1 SPDT, 250V 3A AC / 30V 4A DC (Resistive load)	
Detection torque:Standard	55mN·m	38mN·m
:Adjustment range	38 to 62mN·m	26 to 50N·m

Model	R7-X	R7-Z
Protection	Housing: IP40 or equivalent Detection part: IP45 or equivalent	Housing: IP65 or equivalent Detection part: IP45 or equivalent
Materials : Housing	ADC12 and polycarbonate	ADC12 and ABS
Mounting section	Brass (C3604BD, Nickel plating)	
Spindle	304 Stainless steel	
Paddle	Polycarbonate or 304 Stainless steel	
Shaft seal	PTFE washer, NBR oil seal and Molybdenum grease	
Ambient temp.:in container Housing	-10 to +70°C -10 to +45°C	
Humidity	5 to 85% Rh	
Ambient pressure	0 to 30kPa	
Cable inlet	SPVV 5×0.5mm ² ø10.5×300mm	G1/2 or equivalent
Mounting size	G3/4	
Impact resistance	Max. 34m/s ²	
Max. Cable pull load	200N	
Max. Paddle pull load	600N	
Max. load (at paddle tip)	130N	
Housing color	Munsell 10B 4.5/5	Munsell 10B 5/6

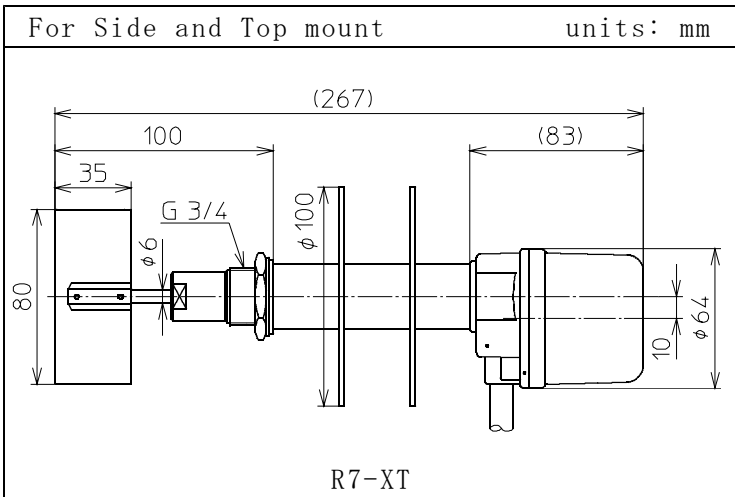
3. 3 COMPONENT NAMES AND DIMENSIONS

Side and Top Mount Models: R7-X and R7-Z	units: mm
<p>Technical drawing of the R7-X side mount model. The drawing shows a side view of the device with the following dimensions: total length 172 mm, distance from mounting face to paddle tip 89 mm, distance from mounting face to cable inlet 30 mm, distance from mounting face to spindle tip 83 mm, mounting diameter 30 mm, spindle diameter ø6 mm, housing diameter ø64 mm, and paddle height 10 mm. Labels include Paddle, Spindle, Housing, and Cable. The mounting size is G 3/4.</p>	<p>Technical drawing of the R7-Z side mount model. The drawing shows a side view of the device with the following dimensions: total length 234 mm, distance from mounting face to paddle tip 93 mm, distance from mounting face to cable inlet 30 mm, distance from mounting face to spindle tip 141 mm, distance from mounting face to paddle tip 57 mm, mounting diameter 30 mm, spindle diameter ø6 mm, and housing diameter ø82 mm. Labels include Paddle, Spindle, Housing, and Cable. The mounting size is G 3/4.</p>



- Extension length possible (side mounting)
- Polycarbonate four paddle..250 to 1000mm
- 304 Stainless steel two paddle
 - 260 to 1000mm
- 304 Stainless steel special two paddle
 - 300 to 1000mm

NOTE: This drawing shows model R7-XL only.



- Mass
- R7-X : Approx. 0.5 kg
- R7-Z : Approx. 0.7 kg
- R7-XL
 - L-500mm : Approx. 1.0 kg
 - L-1000mm : Approx. 1.6 kg
- R7-ZL
 - L-500mm : Approx. 1.2 kg
 - L-1000mm : Approx. 1.8 kg
- R7-XT : Approx. 1.5 kg

4. INSTALLATION

4. 1 UNPACKING

When unpacking, exercise caution to not subject the unit to mechanical shock. After unpacking, visually check the unit's exterior for damage.

4. 2 INSTALLATION LOCATION

4. 2. 1 GENERAL

The R7 should be installed in an area which meets the following conditions:

- (1) The ambient temperature range is -10°C to $+45^{\circ}\text{C}$.

NOTE

Install a sun shield over the housing if exposed to direct sunlight. Provide appropriate means to guard against moisture if temperature is low. Otherwise, the unit may be damaged.

- (2) There is a Free flow of material both to and away from the paddle and shaft.



CAUTION

Keep the paddle and shaft out of the direct flow.
Failure to do this may cause bending of the probe.

- (3) Humidity and vibration are low.
(4) Ample space is provided for maintenance/inspection.

4. 2. 2 HIGH LEVEL CONTROL

Top mounting is recommended. The shaft length of model R7-XL and R7-ZL are fixed so, prepare a suitable height mount in the field. If you extend a spindle with $\phi 6$ pipe, provide a guide tube for support.

NOTE : Determine the maximum angle of repose for the material and locate the R7 low enough to insure complete coverage of the paddle and shaft. See Fig. 1.

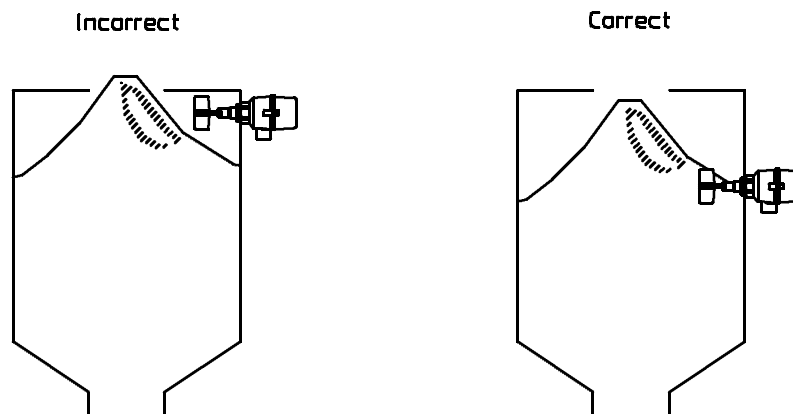


Fig. 1

4. 2. 3 LOW LEVEL CONTROL

Side mounting is customary but top mounting is sometimes easier in small size bins.

NOTE : If heavy material surges or excessive loads are anticipated, install a protective shield above the paddle. Also, mount the unit high enough to prevent it from being surrounded by dead stock. See Fig. 2.

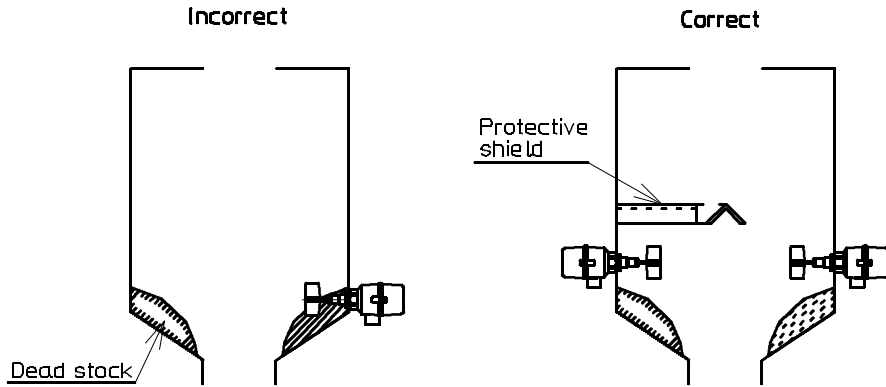


Fig. 2

4. 3 INSTALLATION METHOD

The R7 can be installed by one of the following methods:

- Bulkhead mounting
- Screw-in mounting
- Flange mounting

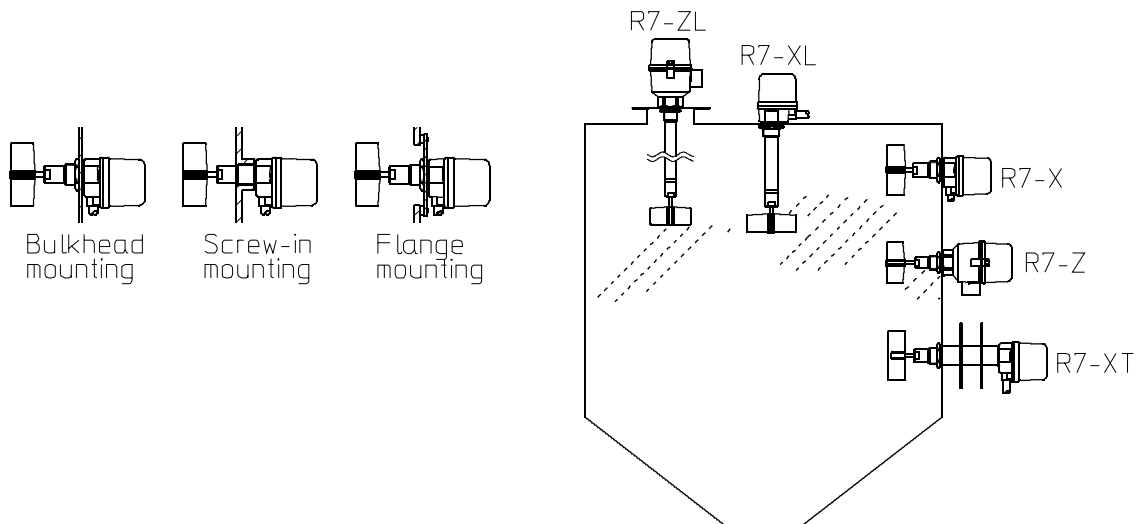


Fig. 3.

For Bulkhead mounting

First, drill a $\phi 28$ hole in the bin wall. Then, insert the shaft and tighten the (1)gasket , (2)washer and (3)nut in these order. After clamping the unit, install the paddle with pin. See Fig.3.

For Screw-in mounting

The R7 is provided with a G3/4 threaded mounting. It is screwed laterally into the container wall at the level where you wish to detect material. See Fig. 3.

For Flange mounting

The R7 is provided with a JIS5K65A flange for $\phi 80$ paddle. It is installed on a compatible mating flange on the container wall at the level where you wish to detect material. See Fig. 3.

4. 4 MOUNTING ATTITUDE

This unit may be mounted in any position or orientation. However we recommend that the cable and cable are point down in order to protect the unit from rain, splashing water, etc.

5. WIRING

5. 1 R 7 - X SERIES

Proceed as follows:

(1) Check the wiring color.

Electrical circuit	Power supply		Normally open	Normally closed	Common
Conductor sheath color	Black	White	Red	Blue	Yellow

NOTE : Normally open switch is open when the material is absent and closes as the material is present. Normally closed switch operates with the opposite action.

(2) This unit provides a 5-conductor vinyl-insulated flexible cord (VCTF) with a finished outside diameter of $\phi 10.5$, conductors are 0.5mm^2 . Install solderless terminals or sleeves to the end of conductors.

5. 2 R 7 - Z SERIES

Proceed as follows:

- (1) Prepare a 4- or 5-conductor vinyl-insulated vinyl-sheathed cable. The cable finished outside diameter should be between 8 to 11mm and conductors should be between 0.5 to 3.5mm^2 .
- (2) Remove approximately 100mm of cable sheath from the end of the cable and approximately 10mm of conductor sheath.
- (3) Check that the cable gland is pointing down.
- (4) Remove the housing cover (loosen the 2 screws).
- (5) Bring the cable into housing.
- (6) Connect cables to the terminals. See Fig. 4.

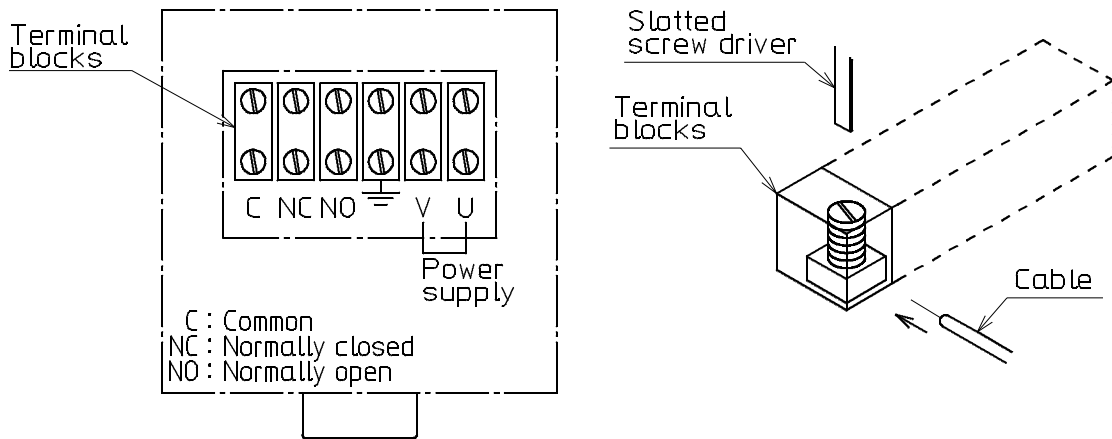


Fig. 4

NOTE : The cable gland must be properly fitted to preserve the protection category IP65, and to protect the unit from rain, splashing water, and so on.

(7) Double-check wiring connections.

(8) Replace and tighten the housing cover.

6. DETECTION TORQUE ADJUSTMENT

This 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 positions may be changed by means of pliers or by hand. See below table and Fig. 5 and 6.

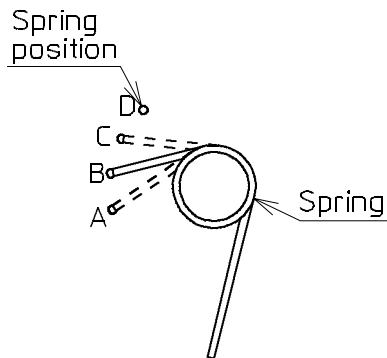


Fig. 5

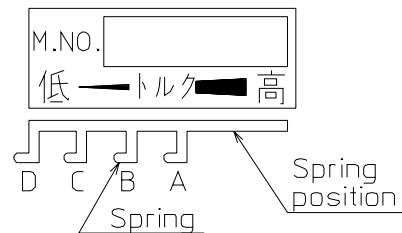


Fig. 6

	R7-X series	R7-Z series	Features
A	62N·m	50N·m	For light or fine materials
B	55N·m	38N·m	Standard(readjusted)
C	46N·m	30.9N·m	For heavy and sticky materials or high vibrated location
D	38N·m	26N·m	

7. MAINTENANCE

When cleaning and checking the container, free the paddle and shaft from material deposits. A unit which detects the level of sticky materials or is installed in a humid location must be cleaned at periodic intervals.

Check that the housing cover and cable entry is tightened to protect the unit from rain, splashing water, and so on.

To replace the micro switch of R7-X series, use the following procedure:

- (1) Make sure that the power supply is turned off.
- (2) Remove the housing cover (by turning it counterclockwise).
- (3) Remove lead wires by melting the soldered area with a soldering iron.
- (4) Remove the microswitch (loosen one screw).
- (5) Install the replacement switch and tighten the screw.
- (6) Re-solder lead wires. Refer to Fig. 7.
- (7) Check wiring and operation.
- (8) Replace and tighten the housing cover.

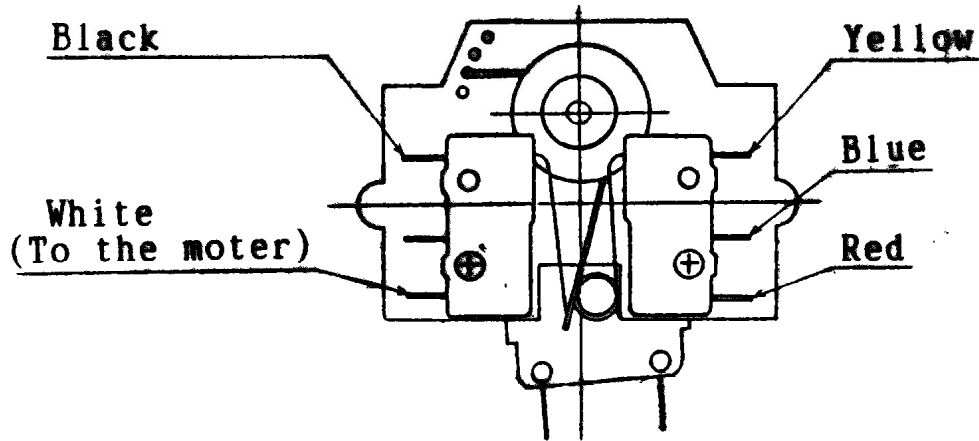


Fig. 7

8. TROUBLESHOOTING



CAUTION

Use the following chart to troubleshoot the malfunctioning sensor.
If your remedies are unsuccessful, ask Nohken for repair and replacement.

Problems	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

Problems	Possible causes	Remedies
Relay chatters	Insufficient power supplied	Repair power supply
	Loose cables	Tighten connections
	Material too fluid	Use a time-delay relay

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