SEVEN
SENSOR SOLUTIONS

3S-SLS-RP

Rotary Paddle Silo Sensor

USER MANUAL

USER MANUAL CONTENTS

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Revizyon 0.0 / **Tarih** 08.11.2024

1. Intrdocution

The SEVEN Paddle Silo Level Sensor is used for level detection in silos, tanks, and bunkers containing solid materials like powder or granules.

Figure 1 – Rotary Paddle Silo Sensor

The motor shaft, along with the paddle at its end, rotates freely when there is no solid material at the paddle level inside the silo, tank, or bunker. As the solid material level increases during filling, it compresses the rotating paddle, causing the step motor to lose power, and the warning light turns on. This indicates that the solid material level has reached the designated point. When the solid material level decreases and no longer presses against the paddle, it begins to rotate again, and the warning light returns to a blinking mode.

The Warning Light operates in 3 different modes;

- **Flashing Mode:** The sensor is working. The pallet is turning.
- **Always On:** The sensor is working. The pallet isn't turning because the silo is full.
- **Always Off:** The sensor isn't working. There is no power connection.

The Palletized Silo Level Sensor is used with one power supply. It can be controlled by one automation system where it can transmit the information that the filling/unloading of the silo is completed.

The Palletized Silo Level Sensor must be powered from an external power supply. The power supply input is nominally rated for 24 V DC but can accept a voltage in the range 22 to 30 V DC. Inputs are reverse polarity and over voltage and over current protected.

Horizontal and vertical mounting is possible.

It has 2 power inputs to be used according to the field requirement. 24V+ or 24V- connection can be made to the dry contact circuit.

It has a shaft option with extended shaft length for vertical installation.
It has Thermal Protection Model option for use in silos with temperature problems.

Note: *SEVEN reserves the right to make changes in this entire document without prior notice.*

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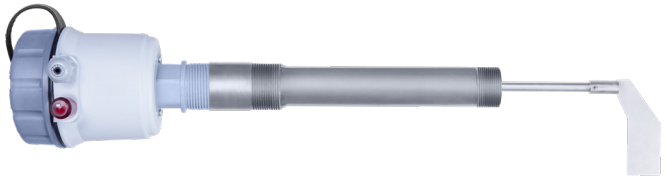
Accessories

Extension Shaft

Between the sensor box and the pallet via the Extension Shaftdistance can be increased. This increases the diving length from 15 cm to 100 cm. Used in vertical installations.

Thermal Protection Apparatus

Thermal Protection Apparatus is used to insulate the shaft between the pallet and the sensor box, which is in contact with the hot raw material in the silo, tank or bunker, with ceramic insulators. Thus, the heat of the hot raw material is prevented from damaging the sensor.



2. Rotary Paddle Silo Sensor Installation

It is suggested that the system be operated at ground level to make sure that all components are working properly prior to installation. A general diagram of the progress of the installation steps is given below.

The **"Relay"** output from the Seven Pallet Silo Level Sensor can be configured to be integrated into a system. The configuration step is necessary for this process.

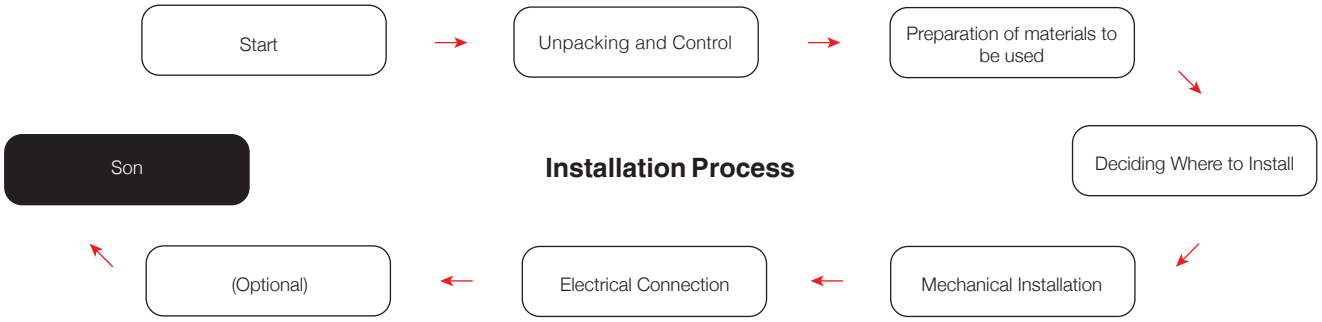


Figure 2 – Installation Process

2.1. Unpacking and Control

Upon receipt of the product, it must be carefully checked whether the package content is complete. Seven Sensor Solutions must be contacted if any of the components are missing, damaged or defective.

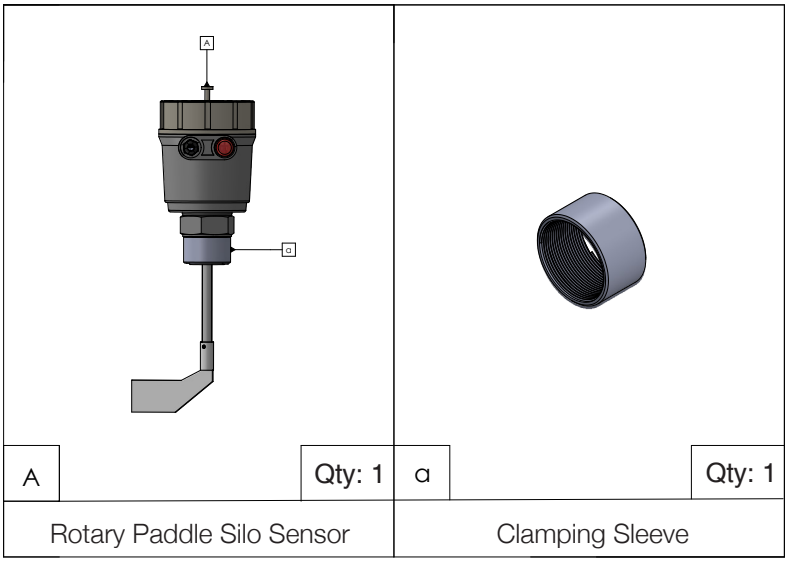


Figure 3 – Package List

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Note: *The quantity and content of the delivered material may vary according to the order confirmed by the customer.*

2.2. Preparation of Materials to be Used in Installation

The materials needed during installation are provided by SEVEN. The user should only prepare the following hand tools and personal protective equipment.

Materials	
	
Gloves	Flat Screwdriver

Figure 4 –Materials to be Used in Installation

2.3. Site Requirements and Considerations

Each site is different and has its own unique challenges. For this reason, the installation of the product may differ in each site. First of all, it should be decided where the product will be installed.

If the sensor is to be used as a lower level switch, the pallet must be covered. (Figure 5)

In horizontal installation, the gland and warning light must always face downwards. (Görsel 6)

The sensor pallet must not come into contact with areas where build-up may occur.

Water ingress on the sensor must be absolutely prevented. The gland should always face downwards in horizontal installation as it is the most suitable part for water ingress.

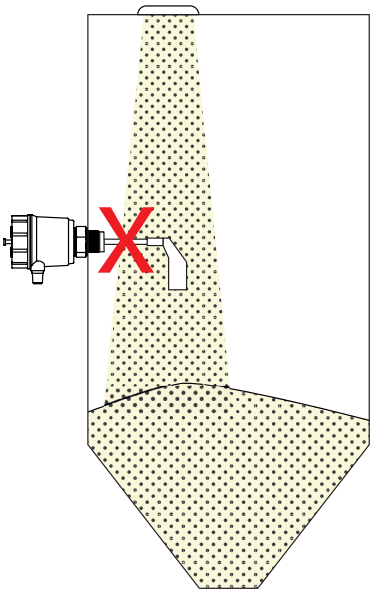

Figure 4- Wrong Mounting

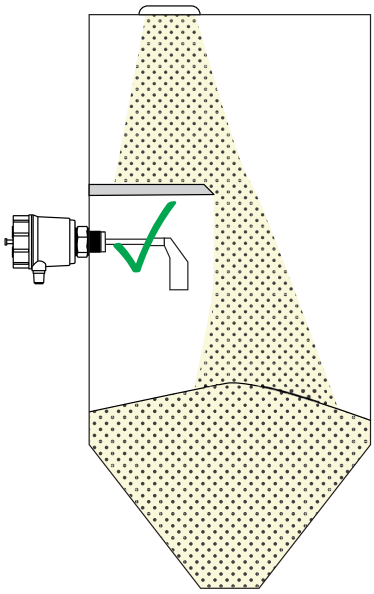

Figure 5- Correct Mounting

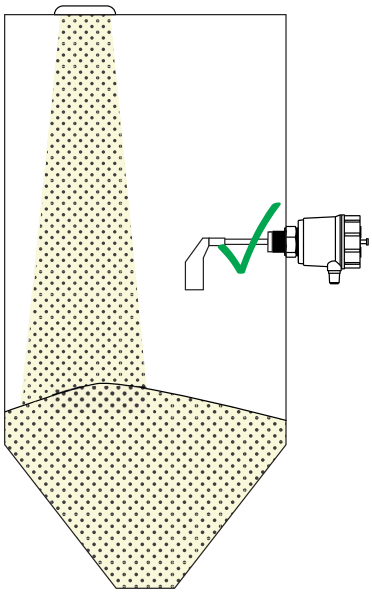

Figure 6- Correct Mounting

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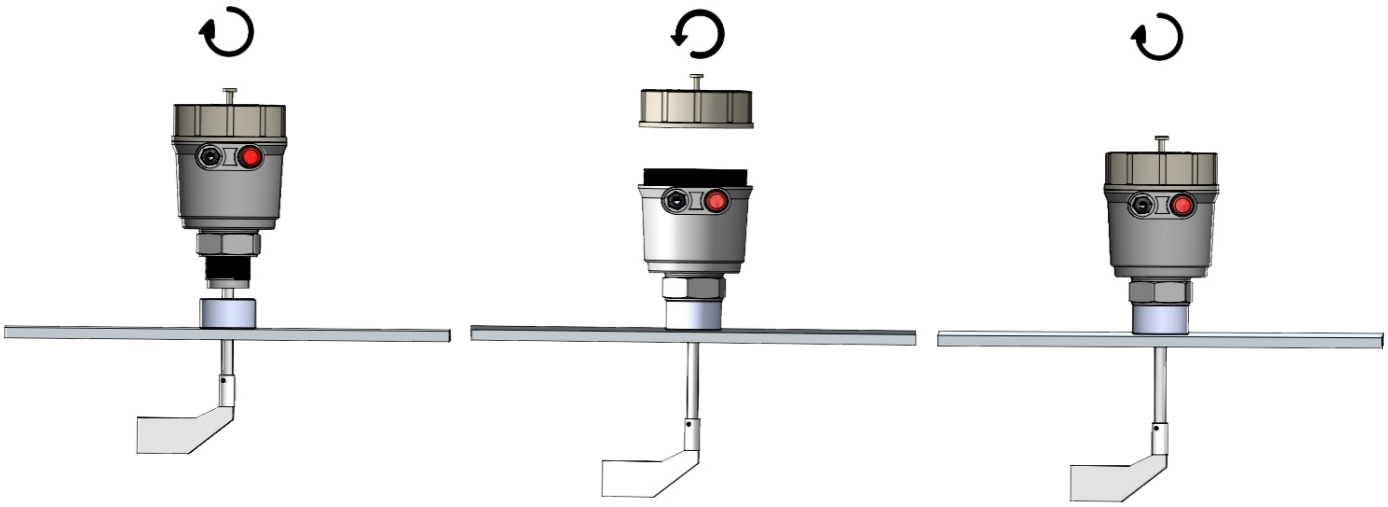
2.4. Installation

When the product is received, the contents of the package must be carefully checked for completeness. If any of the components are missing, damaged or defective, SEVEN Sensor Solutions should be contacted.



Step - 1

Mounted by turning in the direction of the arrow

Step - 2

The cover is opened by turning in the direction of the arrow and cable connections are made.

Step - 3

The cover is closed by turning in the direction of the arrow.

Note: *During installation, care must be taken to prevent dust from entering the sensor.*

3. Connections

The sensor junction box is waterproof and UV resistant. Supply voltage for the Palletized Silo Level Sensor is 22 - 30 V DC@1 Ampere. It is recommended that the supply voltage is 24 V.

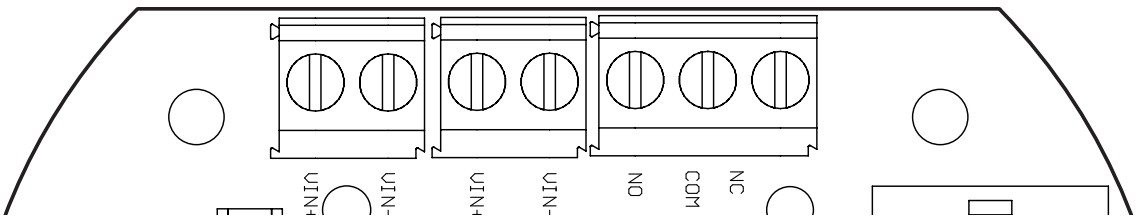


Figure 6- Circuit Board Connections Part

There are 2 power supply input on the Rotary Paddle Silo Sensor.

There is a connector for Relay Output Connection.

The cables used in these connections must be routed through the gland on the sensor.

Make sure that the sensor cover and the union are fully tightened.

Otherwise the sensor may pick up water and dust.

The communication and power cable of Silo Sensors should be always laid separated from AC/DC cables.

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Wire Assigment for Power & Communication	
Power (+)	VIN+
Power (-)	VIN-
Common Tip	COM
Normaly Open	NO
Normaly Close	NC

Note: *The installation and electrical connections of SEVEN sensors should be carried out by a qualified electrician*

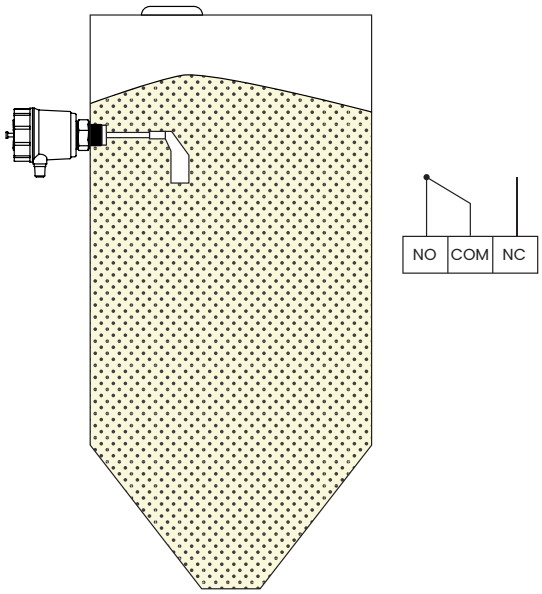

Figure 7- Full Silo ve Signal Output

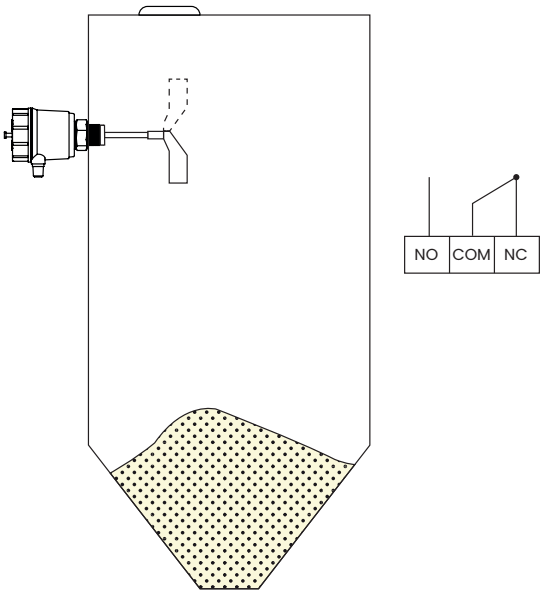

Figure 8- Empty Silo ve Signal Output

3.1. Çalışma Prensibi

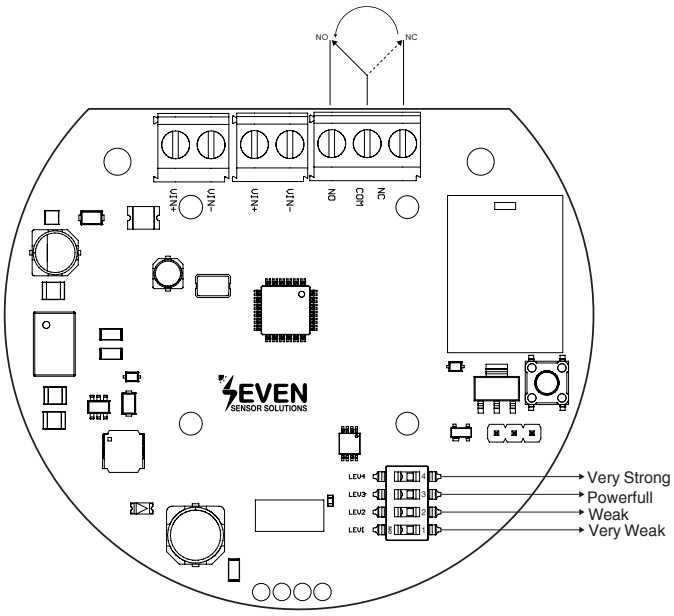

Figure 9- Circuit Board

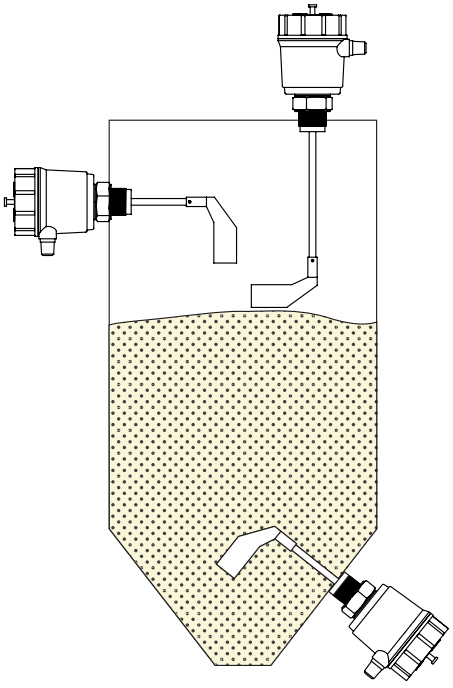

Figure 9- Sensor in 3 Different Mounting

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1-) There is no obstacle in front of the pallet when the motor is running. The COM-NC connection is active. The warning lamp flashes.
2-) When there is an obstacle in front of the pallet, the Hall Effect Sensor sensing principle detects the situation. In this case, the warning lamp on the sensor box lights up. COM-NO connection is active.
3-) When the obstacle in front of the pallet is removed, the motor is reactivated and the COM-NC connection is active again. The warning lamp returns to flashing mode.

3.1.1. Torque Selection

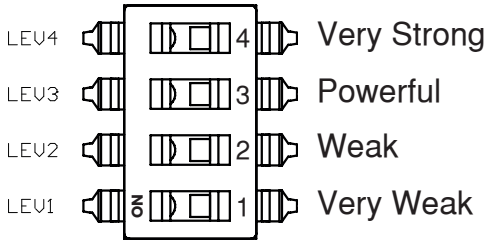

Figure 10- Torque Selection Component

The operating torque of the sensor is directly related to the mass of the material to be filled into the silo. Higher torques can be selected for high gravity materials, while lower torques can be used for low gravity materials.

Note: *If high torque is applied to low-density materials, the sensor may start sweeping, and the paddle may not stop*

When all buttons on the torque control IC are in the off position, or only the Lev1 button is on, the sensor operates automatically at the LEV1 torque level.

If Lev2 is switched on, the on/off status of the Lev1 button becomes irrelevant, and it operates in Lev2 mode.

If Lev3 is switched on, the on/off status of both Lev1 and Lev2 buttons becomes irrelevant, and it operates in Lev3 mode.

If Lev4 is switched on, the on/off status of Lev1, Lev2, and Lev3 buttons becomes irrelevant, and it operates in Lev4 mode.

4. Inspection and Maintenance

Fastener tightness and cable conditions, damage, deterioration or disconnection of sensors and electrical enclosures, evidence of moisture or vermin in enclosures, loose cable connections, brittle splices and other potential problems should be checked periodically.

If the sensor is used without a thermal protection apparatus, it may be affected by very high temperatures. The robustness of the external mechanical structure of the sensor should be checked.

Note: *We recommend to use thread-locking fluid for fasteners.*

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5. Additional Documents

The following documents and software can be downloaded from www.sevensensor.com or requested from SEVEN Sensor Solutions.

User Manual	This Document
Datasheet	3S-SLS-RP Datasheet

6. Contact Details

Please feel free to contact us if you face any difficulties during installation or configuration.

SEVEN Technical Service

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