

# AUTOMATION

PRODUCTS  
GROUP, INC.

**Operator's Manual**

## **NLS Series**

### **Pneumatic Level Sensors**

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".

## • Specifications

### Operational Versions

NLS-1A:	Standard media
NLS-1S:	Corrosive media
NLS-3:	Economic, light duty

### Characteristics

Detection Range:	8-200 in. (200- 5000 mm)
Operating Point <sup>1</sup> :	80 ± 10 mm (NLS-1A) (SG = 1.0) 70 ± 10 mm (NLS-1S) (SG = 1.0) 65 ± 10 mm (NLS-3) (SG = 1.0)
Release Point <sup>2</sup> :	60 ± 15 mm (NLS-1A) (SG = 1.0) 50 ± 15 mm (NLS-1S) (SG = 1.0) 50 ± 15 mm (NLS-3) (SG = 1.0)
Max. Viscosity:	10 P (1/2 in. pipe); 30 P (1 in. pipe); 100 P (2 in. pipe); 250 P (5 in. pipe).
Switch Rating: (Resistive Load)	250 V 10 A AC; 115 V 0.5 A DC; 230 V 0.05 A DC

### Physical Attributes

Enclosure Protection:	IP23 (NLS-1A); IP20 (NLS-1S; NLS-3)
Material:	
Housing Cover:	ADC (NLS-1A; NLS-1S); SS41 (NLS-3)
Housing:	ADC (NLS-1A; NLS-1S); phenolic (NLS-3)
Chamber:	ADC (NLS-1A); SCS13 (NLS3); phenolic (NLS-3)
Diaphragm;	Neoprene (NLS-1A); NLS-3); Viton (NLS-1S)
Cable Entry:	G 3/4 (NLS-1A); rubber bushing: (6 mm dia. hole)
Mounting:	G1 male
Pipe Coupling:	R 1/2 female

#### Notes:

- 1 Operating point means the position whereat the switch assumes ON as a result of rise of level, such position being represented by dimensions from the pipe end.
- 2 Returning point means the position whereat the switch assumes OFF as a result of fall of level, such position being represented by dimensions from the pipe end.

## • 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

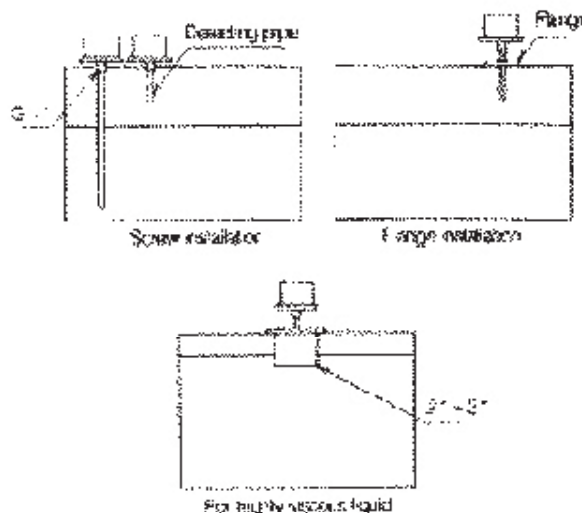
Install the sensor in an area which meets the following conditions:

- The ambient temperature range is 0 to +70°C (32 to 160°F).
- Humidity and vibration are low.

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

- The ambient temperature range: 32 to 160°F (0 to 70°C).
- Located away from splashing liquid.
- No corrosive gases (such as  $\text{NH}_3$ ,  $\text{SO}_2$ ,  $\text{Cl}_2$ , etc.) present.
- Low humidity and vibration.
- Open container in nonhazardous area.
- Ample space for maintenance and inspection.

Install the NLS vertically from the container top. Provide a G 1 in. female boss on the container top. Be sure to use a suitable gasket, O-ring, or thread tape.



## Notes:

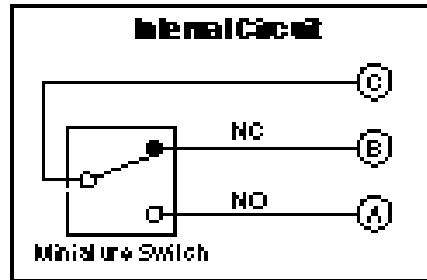
- When the liquid is not SG = 1.0, divide the switch operating position or switch release position with the actual SG.  
Example: NLS-1A for SG = 0.8  
Switch operating position:  $80/0.8 = 100$  mm  
Switch release position:  $60/0.8 = 75$  mm
- When the detecting pipe is wider than 1/2 in., the switch operating position drops.

To ensure proper operation, the following steps should be followed:

- Determine switch operation:
  - High level operation
  - Low level operation
- Determine where the actuation level should be:
  - Distances are measured from the inner surfaces of the mounting plug to the end (inlet) of the detecting pipe.
  - For high level operation:  
[actuation level] = [switch operating position] + 20 mm (screw length)
  - For low level operation:  
[actuation level] = [switch release position] + 20 mm (screw length)
  - For example, consider a type NLS-1A needing 200 mm actuation levels (low and high):
    - The pipe must be 300 mm for high level operations.  
 $200 \text{ mm} + 80 \text{ mm} + 20 \text{ mm} = 300 \text{ mm}$
    - The pipe must be 280 mm for low level operation.  
 $200 \text{ mm} + 60 \text{ mm} + 20 \text{ mm} = 280 \text{ mm}$
- Select the proper material which is compatible with the liquid.
- Install the detecting pipe into the R 1/2 in. coupling of the NLS. This is coupling must be airtight to insure reliable operation. Use a paste form sealing compound on the coupling.
- Make sure the diaphragm is mounted in horizontal alignment.

• **Wiring**

Wiring should be in accordance with all local codes. The control cable should be 0.75 mm<sup>2</sup> minimum. The terminal screw is M3.0. The cable gland is JIS F 20a.



**Switch rating (resistive)**  
**250 V 10 A AC**

• **Adjustment Procedure**

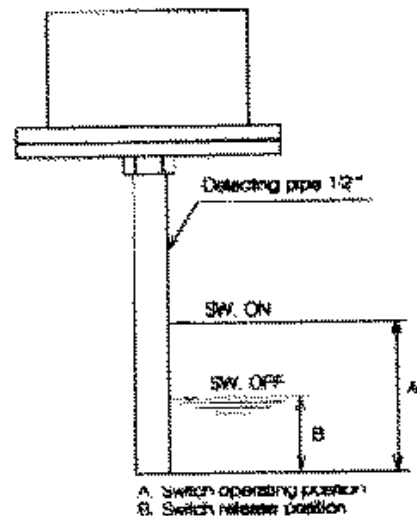
The microswitch position should be adjusted if the switch operating position is changed or the microswitch does not release.

- If the switch operating position is higher than the desired level, lower the microswitch a little.
- If the switch operating position is lower than the desired level, raise the microswitch a little.

The NLS is designed to use a connecting pipe.

Switch operating position and release position in water (SG = 1.0) with 1/2 in., 300 mm length pipe are shown below.

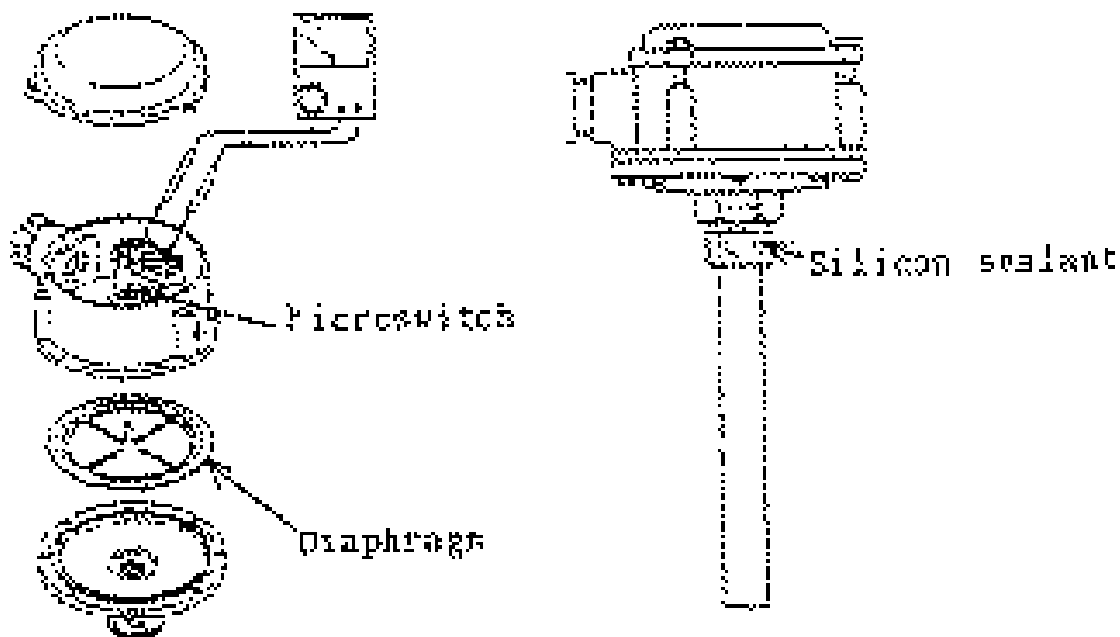
Model	NLS-1A	NLS-1S	NLS-3
Switch operating position (mm)	80±10	70±10	65±10
Switch release position (mm)	60±15	50±15	50±15



- **Maintenance**

As a rule, there is no need to inspect periodically. However, pay attention to the following points.

- In case of low level detection, if the detecting pipe soaks long in liquid, pressurized air in the detecting pipe is dissolved into liquid. Consequently, actuating level may raise. To prevent it, the NLS must be pulled out and purged at adequate intervals.
- Replace the diaphragm about once every three year period. Except damaged by corrosive vapor, the diaphragm degradation cannot be checked vertically.
- Check the microswitch operation. Life of the microswitch is 50,000 actuations or more.
- Check that the silicon sealant is applied onto the connecting part between the NLS and the detecting pipe. If the seal tape is used, compressed air will leak and switch will not operate properly.





- **Life Expectancy**

Life expectancy of the NLS varies with applications such as corrosive vapor, temperature, microswitch's load, etc.

Since the NLS is not in contact with the liquid, it can be used for a long time. Replace expendable diaphragms and microswitches.

- **Spare Parts**

Model	Description	Part Number
NLS-ACC1	Neoprene diaphragm for NLS-1A	22907-0022
NLS-ACC2	Viton diaphragm for NLS-1S	22907-0023
NLS-ACC3	Neoprene diaphragm for NLS-3	22907-0024
NLS-ACC4	Microswitch assy for NLS-1A	22907-0085
NLS-ACC5	Microswitch assy for NLS-1S	22907-0086
NLS-ACC6	Microswitch assy for NLS-3	22907-0087

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