NSD OPTICAL SWITCH QUICKSTART MANUAL

PRINCIPLE OF OPERATION

The optical switch operates by the principle of Snell's law: When light moves from a medium of a given refractive index (n1) into a second medium with refractive index (n2), both reflection and refraction of the light may occur. An incident light ray strikes at a point on the interface between two media of refractive indices n1 and n2. Total internal reflection is an optical phenomenon that occurs when a ray of light strikes a medium boundary at an angle larger than a particular critical angle with respect to the normal to the surface. If the refractive index is lower on the other side of the boundary, no light can pass through, and all of the light is reflected. When light crosses a boundary between materials with different refractive indices, the light beam will be partially refracted at the boundary surface and partially reflected.

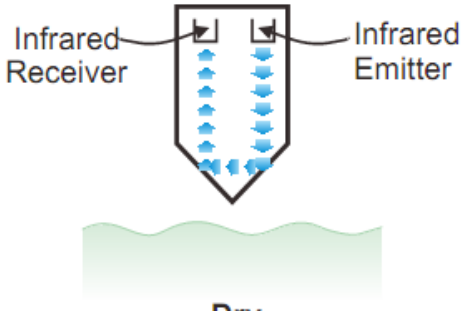

Fig.1

Optical switches operate by sensing the difference in the refraction index between various mediums, causing different degrees of refraction and penetration. When the liquid is not in contact with the sensor, all transmitted light is reflected back to the receiver. When the liquid contacts the sensor, part of the transmitted light is reflected back to the receiver and part is emitted into the liquid. The receiver senses this difference in signal loss and switches accordingly.

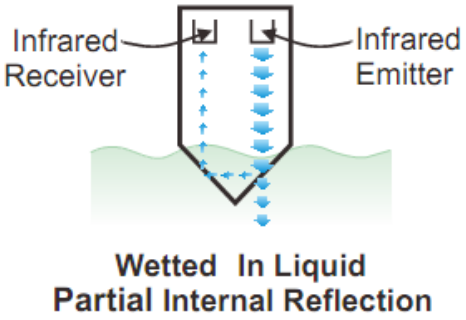

Fig.2

FEATURES

1. PNP Open-Collector Output
2. Housing Material: 316SS
3. Over-current & Reverse Polarity Protection
4. LED status indication

SPECIFICATIONS

1. Housing Material: 316SS
   Sensing Tip Material: Polyethersulfone
2. Protection Rating : IP67
3 Process Temperature: 14-250 °F
4. Ambient Temperature: 14-176 °F
5. Max. Operating Pressure: 560 PSIG
6. Input Power: 10-28 V_{DC}
7. Load Current: 100 mA Max.
8. Overload Current Protection: 100mA
9. Process Connection: 3/8" NPT
10. Cable: 2 m PVC Jacket, 24 AWG, 3-conductor

DIMENSIONS

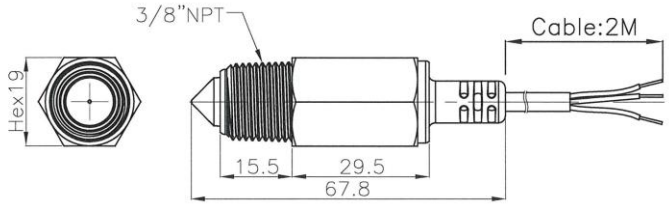

Fig.3

PNP output

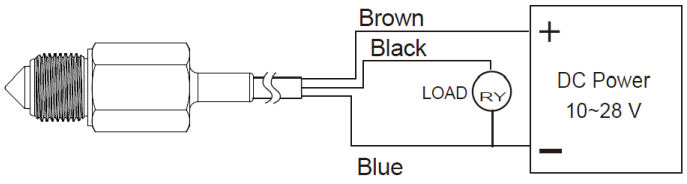

Fig.4

KOBOLD Instruments, Inc.
1801 Parkway View Drive Pittsburgh, PA 15205
phone: 412.788.2830 fax: 412.788.4890
e-mail: info@koboldusa.com website: www.koboldusa.com

APPLICATION EXAMPLE

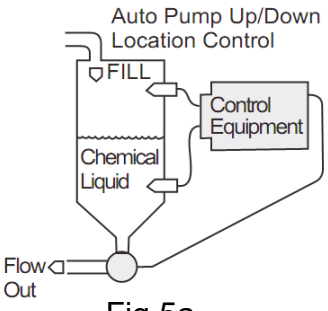

Fig.5a

Liquid Level Control:
In Fig5(a), two optical switches are installed individually at the desired upper and lower levels of the tank. When the level in the tank drops and the lower optical switch is no longer covered by liquid, it will change state and signal the controller to begin the filling process. Upon reaching the upper optical switch, the switch will change state and signal the controller to stop the filling process, thus maintaining the liquid level between the upper and lower optical switches.

Motor Protection:
In Fig.5(b), the optical switch is installed in the lower level of the tank to prevent pump burnout caused by the lack of water/liquid. Avoid installation within a corner.

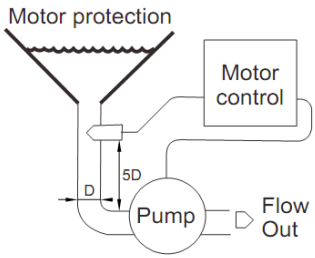

Fig.5b

INSTALLATION

- Always apply an appropriate sealing compound around the sensor threads (PTFE Liquid or Tape is suggested) before installation
- Maximum Installation Torque: 316SS = 7.2 lb.-ft
- The optical switch is not recommended for use in emulsions or phase-change liquids
- Do not install sensor close to other infrared sources
- The tip of the optical sensor must remain at least 1.2” from any reflective surface or physical interferences, like the tank wall (Fig.6)
- Install in the horizontal plane parallel to the 0° - 45° for optimal installation angle (Fig.7)
- The tip of the optical switch must break the plane of the installation casing (Fig.8)
- This product is not recommended for use with organic solvents or highly viscous or coating type liquids which can remain on the lens surface
- Clean the lens periodically using appropriate methods and compatible products
- Do not use organic solvents or scrub while cleaning to avoid scratches on the lens surface

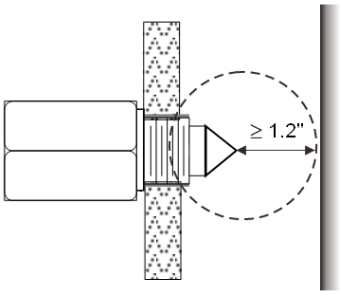

Fig.6

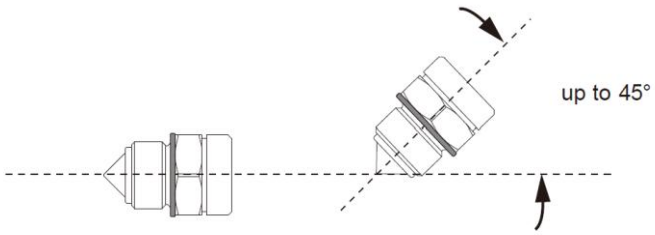

Fig.7

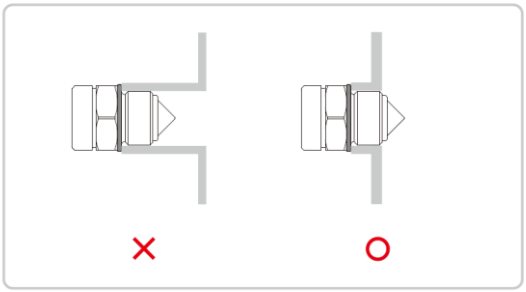
Fig.8

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phone: 412.788.2830 fax: 412.788.4890
e-mail: info@koboldusa.com website: www.koboldusa.com