

Warranty Service and Repair

If for some reason your product must be returned for factory service, contact your Kobold distributor to receive a material return authorization number first, and provide them with the following information:

1. Part number, serial number
2. Name and telephone number of a person who can answer questions related to the product and its application
3. Return shipping address
4. Brief description of the symptom
5. Brief description of the application

Once you have received a return authorization form, ship the product prepaid in its original packing to:

KOBOLD Instruments Inc.
1801 Parkway View Drive
Pittsburgh, PA 15205

Please include any related symptom and application information with your product. This information enables our service technicians to process your repair order as quickly as possible.

KOBOLD

Tuning Fork Sensor NWP-1405 Series Owner's Manual



Version 2.1
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Part # NWP_1405_Manual

SAFETY PRECAUTIONS

Step One

⚠ About this Manual:

PLEASE READ THE ENTIRE MANUAL PRIOR TO INSTALLING different models of Tuning Fork sensors from Kobold, all in the NWP series. Please refer to the part number located on the sensor label to verify the exact model which you have purchased.

⚠ User's Responsibility for Safety:

Kobold manufactures a wide range of liquid level sensors and technologies. While each of these sensors is designed to operate in a wide variety of applications, it is the user's responsibility to select a sensor model that is appropriate for the application, install it properly, perform tests of the installed system, and maintain all components. The failure to do so could result in property damage or serious injury.

⚠ Proper Installation and Handling:

Use a proper sealant with all installations. Never overtighten the sensor within the fitting, beyond a maximum of 80 inch-pounds torque. Always check for leaks prior to system start-up.

⚠ Material Compatibility:

The NWP series sensor is available in one wetted material version. The body of the model NWP-1405 is made of PP (Polypropylene) with the forks made of PPS (40% glass filled). Make sure that the model which you have selected is compatible with the application liquids. To determine the chemical compatibility between the sensor and its application liquids, refer to the Compass Corrosion Guide, available from Compass Publications (619-589-9636).

⚠ Temperature and Pressure:

The NWP series sensor is designed for use in application temperatures up to 90 °C, and for use at pressures up to 150 psi @ 25 °C, derated @ 1.667 psi per °C, above 25 °C.

⚠ Wiring and Electrical:

The supply voltage used to power the NWP series sensor should never exceed a maximum of 36 volts DC. Electrical wiring of the sensor should be performed in accordance with all applicable national, state, and local codes.

⚠ Flammable, Explosive and Hazardous Applications:

The NWP series sensor should not be used within flammable or explosive applications. In hazardous applications, use redundant measurement and control points, each having a different sensing technology.

⚠ WARNING

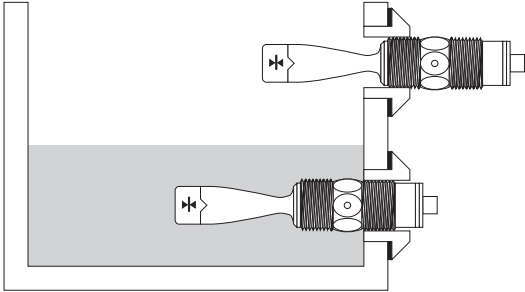
Do not squeeze the forks together. Doing so could damage or break the sensor and void the warranty.

INSTALLATION

Step Two

Through Wall Installation:

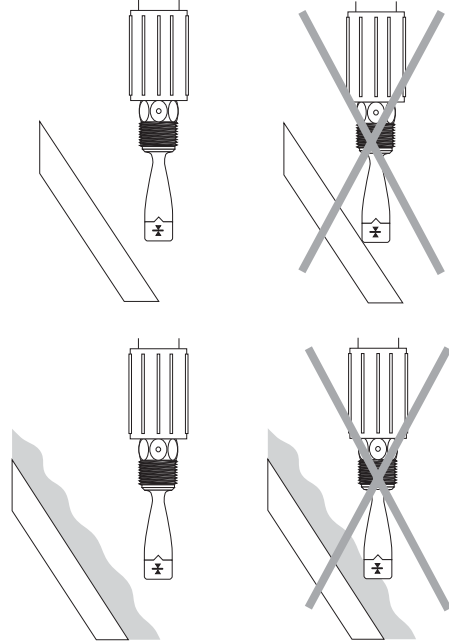
Kobold's NWP series sensors may be installed through the top, side or bottom of a tank wall. The sensor has male 3/4" NPT threads on either side of a 15/16" wrench flat. This enables the user to select the sensor's mounting orientation, installed outside of the tank in, or inside of the tank out.



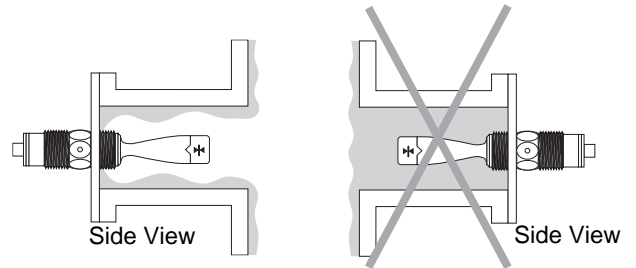
ORIENTATION

Step Three

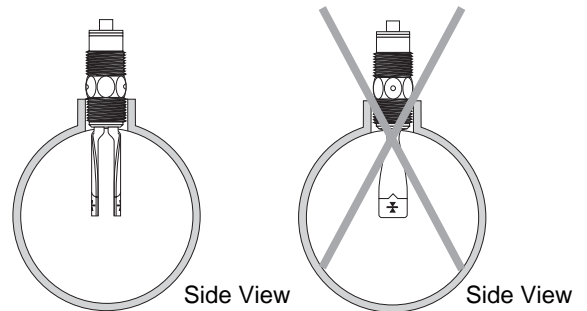
When installing the NWP, make sure that the forks do not touch the walls of the tank. Consider possible build up along the inner tank wall.



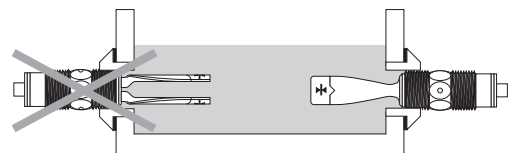
Higher viscosity liquids may build up inside of a flange and cause the NWP to fail wet.



If installing the tuning fork within a pipe, make sure the forks allow the liquid to flow between them and not around them.



When installing the NWP horizontally, make sure that the forks orientation is vertical and not horizontal.



WIRING

Step Four

Supply Voltage:

The supply voltage to the NWP-1405 level switch should never exceed a maximum of 36 VDC.

Alternative controllers and power supplies, with a minimum output of 12 VDC up to a maximum output of 36 VDC, may also be used with the NWP-1405 level switch.

Required Cable Length:

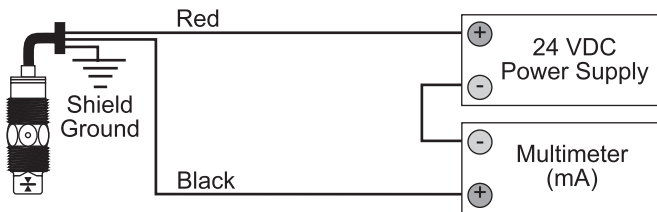
Determine the length of cable required between the NWP-1405 level switch and its point of termination. Allow enough slack to ensure the easy installation, removal and/or maintenance of the sensor. The cable length may be extended up to a maximum of 1000 feet, using a well-insulated, 14 to 20 gauge shielded four conductor cable.

Wire Stripping:

Using a 10 gauge wire stripper, carefully remove the outer layer of insulation from the last 1-1/4" of the sensor's cable. Unwrap and discard the exposed foil shield from around the signal wires, leaving the drain wire attached if desired. With a 20 gauge wire stripper, remove the last 1/4" of the colored insulation from the signal wires.

Signal Outputs (Current sensing):

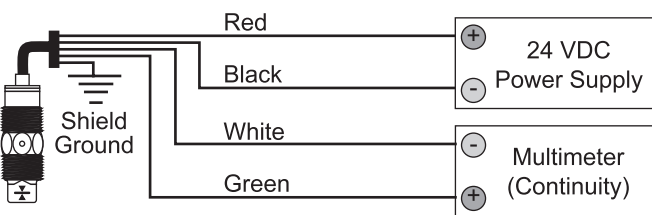
This method, when used with an appropriate controller, uses only two wires (Red and Black). The sensor draws 5 mA when it is dry, and 19 mA when wet. NC/NO status must be set by the controller. The White and Green wires are not used.



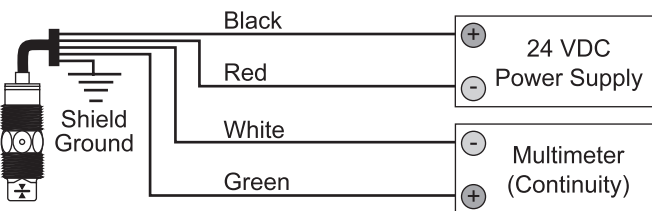
Signal Output (Relay switching):

Allows the sensor to switch a small load on or off directly, using an internal 1A relay (60 VAC/60 VDC). The NWP-1405 level switch relay utilizes 4 wires (red, black, white and green) and a bare shield wire. The NO/NC status is set by the polarity of the voltage feeding the red and black wires. The green wire is the common for the relay and the white wire is the NO or NC, depending on the polarity of red and black.

Normally Open Wiring:



Normally Closed Wiring:



WIRING

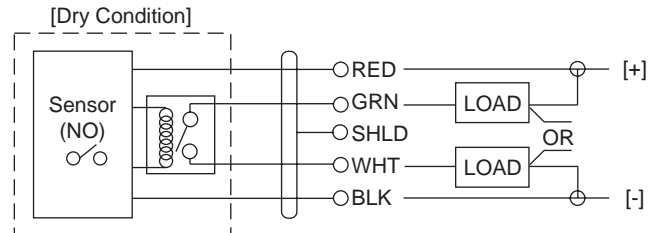
Step Five

Wiring the Relay Output:

The NWP-1405 relay output can be wired as a dry contact to a VDC or VAC power source. The NWP-1405 does not require 12 - 36 VDC power to operate the sensor and switch the relay. All illustrations below identify a dry switch state as the normal position of the relay.

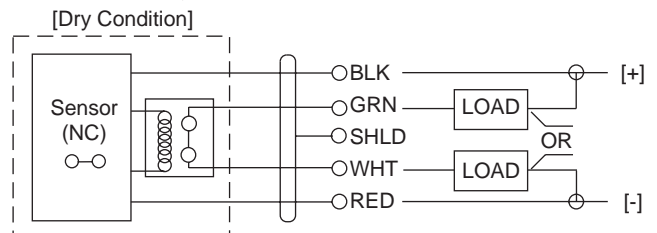
Switching a Normally Open DC Load:

The Red wire connects to Positive (+) of the power supply and the Black wire connects to Negative (-). The LOAD can be attached to either the Green or White wires. Complete the circuit by either connecting the Green to (+) VDC power or White to (-) VDC power (see illustration below).



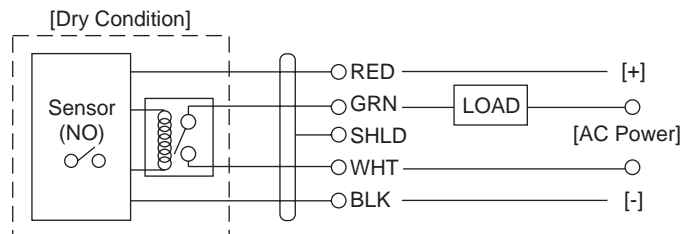
Switching a Normally Closed DC Load:

The Black wire connects to Positive (+) of the power supply and the Red wire connects to Negative (-). The LOAD can be attached to either the Green or White wires. Complete the circuit by either connecting the Green to (+) VDC power or White to (-) VDC power (see illustration below).



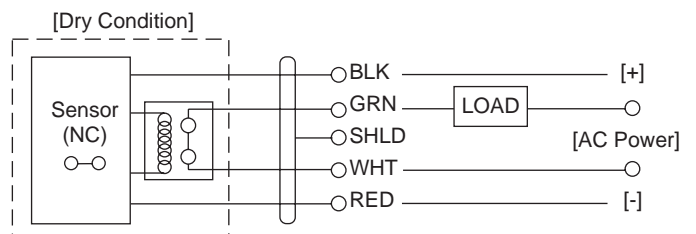
Switching a Normally Open AC Load:

The Red wire connects to Positive (+) of the DC power supply and the Black wire connects to Negative (-). The LOAD can be attached to the Green wire and the Hot of the VAC power. Connect the White to the Neutral of the VAC power (see illustration below).



Switching a Normally Closed AC Load:

The Black wire connects to Positive (+) of the DC power supply and the Red wire connects to Negative (-). The LOAD can be attached to the Green wire and the Hot of the VAC power. Connect the White to the Neutral of the VAC power (see illustration below).



WIRING

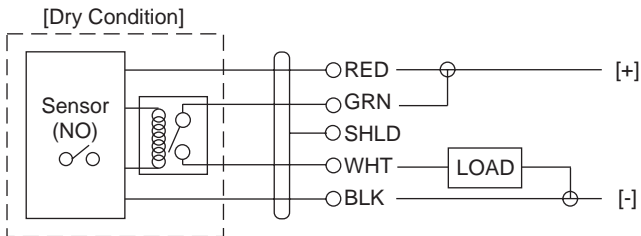
Step Six

Wiring as a P-Channel or N-Channel output:

The NWP-1405 can be substituted for either a P-Channel (PNP, sourcing) output or a N-Channel (NPN, sinking) output.

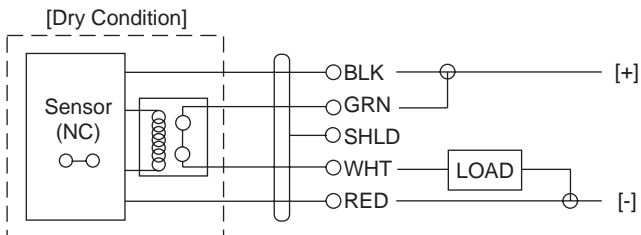
Normally Open DC Load as a P-Channel Output:

To wire as a N/O P-Channel output, follow the directions below. The Red wire connects to Positive (+) of the power supply and the Black wire connects to Negative (-). The Green wire is jumpered to the Red wire while the White wire is connected to the LOAD. Jumper the LOAD back to the Negative (-) to complete the circuit.



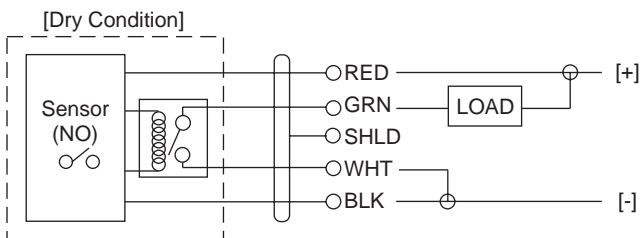
Normally Closed DC Load as a P-Channel Output:

To wire as a NC P-Channel output, follow the directions below. The Black wire connects to Positive (+) of the power supply and the Red wire connects to Negative (-). The Green wire is jumpered to the Black wire while the White wire is connected to the LOAD. Jumper the LOAD back to the Negative (-) to complete the circuit.



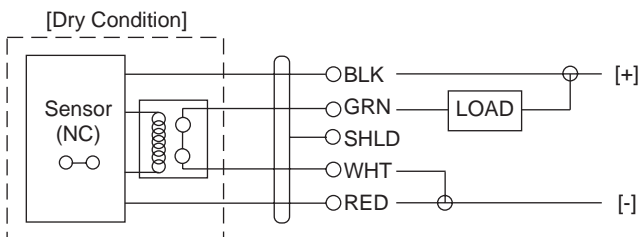
Normally Open DC Load as a N-Channel Output:

To wire as a NO N-Channel output, follow the directions below. The Red wire connects to Positive (+) of the power supply and the Black wire connects to Negative (-). The White wire is jumpered to the Black wire while the Green wire is connected to the LOAD. Jumper the LOAD back to the Positive (+) to complete the circuit.



Normally Closed DC Load as a N-Channel Output:

To wire as a NC N-Channel output, follow the directions below. The Black wire connects to Positive (+) of the power supply and the Red wire connects to Negative (-). The White wire is jumpered to the Red wire while the White wire is connected to the LOAD. Jumper the LOAD back to the Positive (+) to complete the circuit.



MAINTENANCE

Step Seven

General:

The NWP-1405 level switch requires no periodic maintenance except cleaning as required. It is the responsibility of the user to determine the appropriate maintenance schedule, based on the specific characteristics of the application liquids.

Cleaning Procedure:

- 1. Power:** Make Sure that all power to the sensor, controller and/or power supply is completely disconnected.
- 2. Sensor Removal:** In all through-wall installations, make sure that the tank is drained well below the sensor prior to removal. Carefully, remove the sensor from the installation.
- 3. Cleaning the Sensor:** Use a soft bristle brush and mild detergent, carefully wash the NWP-1405 level switch. Do not use harsh abrasives such as steel wool or sandpaper, which might damage the surface sensor. Do not use incompatible solvents which may damage the sensor's PP, PFA, PVDF or PPS plastic body.
- 4. Sensor Installation:** Follow the appropriate steps of installation as outlined in the installation section of this manual.

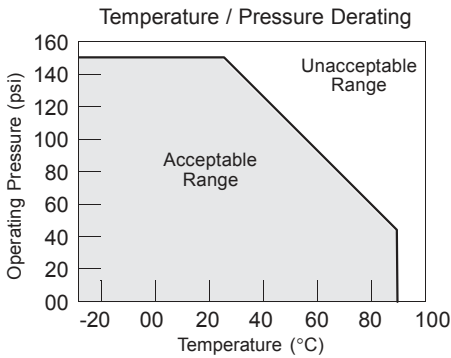
Testing the installation:

- 1. Power:** Turn on power to the controller and/or power supply.
- 2. Immersing the switch:** Immerse the sensing tip in its application liquid, by filling the tank up to the switches point of actuation. An alternate method of immersing the switch during preliminary testing is to hold a cup filled with application liquid up to the switch's tip.
- 3. Test:** With the switch being fluctuated between wet and dry states, the switch indicator light in the controller should turn on and off. If the controller doesn't have an input indicator, use a voltmeter or ammeter to ensure that the switch produces the correct signal.
- 4. Point of actuation:** Observe the point at which the rising or falling fluid level causes the switch to change state, and adjust the installation of the switch if necessary.

SPECIFICATIONS

Step Eight

Accuracy:	± 2 mm in water
Repeatability:	± 1 mm in water
Frequency:	400 Hz (dry)
Supply voltage:	12-36 VDC
Consumption:	Dry: 8 mA nominal Wet: 19 mA nominal
Contact type:	(1) SPST relay
Contact rating:	60 VAC/VDC @ 1A max.
Contact output:	Selectable NO/NC states
Temperature range:	F: -40° to 194 ° C: -40° to 90°
Pressure range:	150 psi @ 25°C., derated @ 1.667 psi per °C. above 25° C.
Probe material:	PP/PPS® (40% glass filled)
Probe rating:	NEMA 6 / IP68
Mounting threads:	3/4" NPT
Cable type:	8 ft., 5-wire, 22 gauge with shield ground & PP jacket

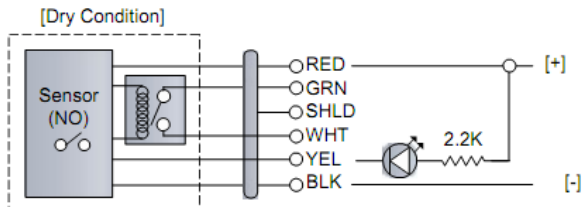


Maintenance Alarm

For optimum performance and proactive maintenance, the sensor automatically adjusts for coating, and if necessary, outputs a preventative maintenance alarm. The Yellow wire is a NPN transistor designed to switch when a build-up of material prevents the vibration switch from operating at its operational frequency. Use the Yellow wire to identify when the Vibration switch requires cleaning.

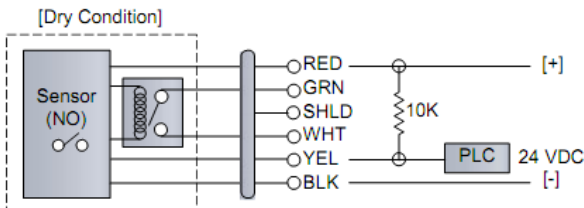
Maintenance Output to LED (Yellow Wire Connection):

To wire the maintenance output wire to an LED, follow the wiring diagram below. The Yellow wire is connected to the LED and a 2.2kΩ resistor in series and referenced back to the (+) of the power supply.

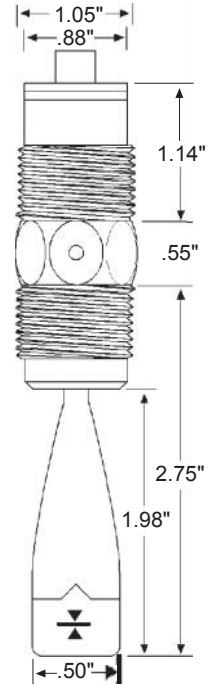
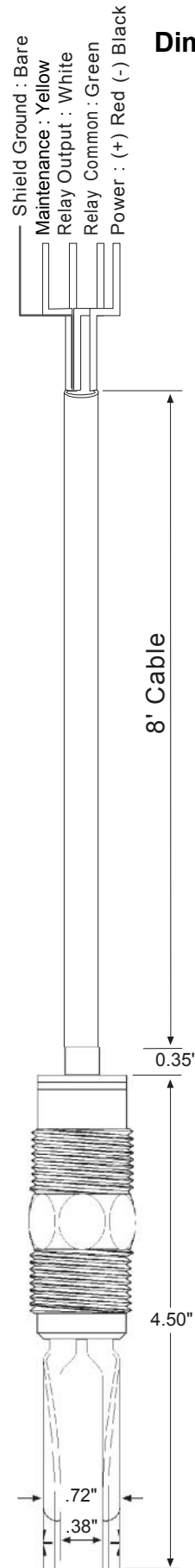


Maintenance Output to PLC (Yellow Wire Connection):

To wire the maintenance output wire to an PLC, follow the wiring diagram below. The Yellow wire is connected to the PLC input with a 10 kΩ resistor parallel to the PLC input and the (+) of the power supply.



Dimensions



Technology

The Tuning Fork switch vibrates at a nominal frequency of 400 Hz. As the switch becomes immersed in a liquid or slurry, a corresponding frequency shift occurs. When the measured frequency shift reaches an appropriate value, the switch changes state indicating the presence of a liquid or slurry medium.

