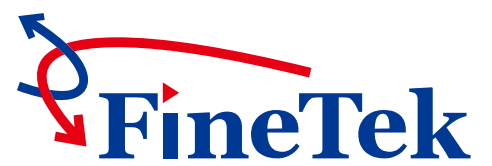




## SD Optical Level Switch



[www.fine-tek.com](http://www.fine-tek.com)

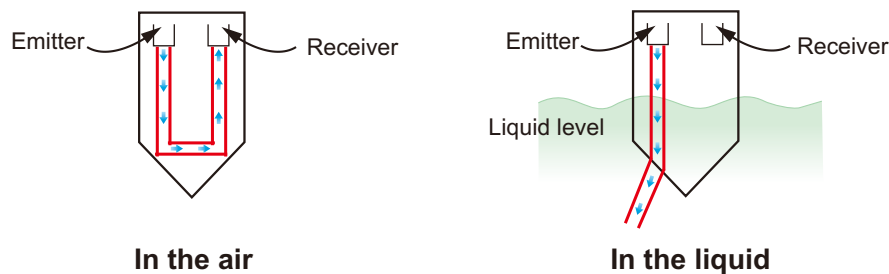


# INTRODUCTION

## WORKING PRINCIPLE

The optical liquid level switch uses the principle of total reflection in a prism. Reflection or penetration, is the basis of the level alarm output. When the sensor is surrounded by air, the angle of incidence is greater than the critical angle and thus total reflection occurs.

Totally reflected light will be transmitted to the receiver. Conversely, when the sensor is surrounded by liquid, due to the refractive index of the liquid and the sensor tip material, almost all light will penetrate the front of the sensor. Using this principle, the optical liquid level switch design is based on light. The receiver can detect and determine a light reflected or penetrated state, and determines the circuit output.



## FEATURES

- Simple, compact, and robust
- No moving parts
- Built-in, solid-state electronics
- Easily removed, cleaned, and reinstalled
- LED switch indication

## APPLICATIONS

- Pharmaceutical systems
- Air conditioning systems
- Industrial compressors
- Food and beverage systems
- Hydraulic reservoirs
- Machine tools
- Liquid holding tanks
- Processing and packaging equipment
- Heavy duty automotive
- Sumps

# SD20 SPECIFICATION



<b>Housing material</b>	PC / PES	
<b>Tip material</b>	PC / PES	
<b>Supply voltage</b>	10~28 Vdc	
<b>Load current</b>	≤100 mA	
<b>Current consumption</b>	<15 mA	
<b>Output mode</b>	NPN / PNP	
<b>Output function</b>	NO / NC	
<b>Electrical protection</b>	reverse polarity protection, short circuit protection	
<b>Ambient temp.</b>	-10~80 °C	
<b>Operation temp.</b>	-10~125 °C	
<b>Process pressure</b>	<10 kg / cm <sup>2</sup>	
<b>IP rating</b>	IP 67	
<b>Indicator light</b>	Red LED	
<b>Cable specifications</b>	PVC, 24 AWG, L=2 m, 3C (blue, green, black, and brown)	
<b>Installation torque</b>	50 kgf-cm	
<b>Thread options</b>	PT / PF / NPT	
<b>Connection size</b>	M12x1.0	3/8"
<b>UL File Number</b>	SA44153	
<b>Dimension</b> (Unit:mm)		

※PES(polyethersulfone) is similar PSU(polysulfone), but its heat resistance, strength, and stiffness is better.

# SD20 SPECIFICATION



<b>Housing material</b>	SUS304 / SUS316	
<b>Tip material</b>	PES	
<b>Supply voltage</b>	10~28 Vdc	
<b>Load current</b>	≤ 100 mA	
<b>Current consumption</b>	< 15 mA	
<b>Output mode</b>	NPN / P NP	
<b>Output function</b>	NO / NC	
<b>Electrical protection</b>	reverse polarity protection, short circuit protection	
<b>Ambient temp.</b>	-10~80 °C	
<b>Operation temp.</b>	-10~125 °C	
<b>Process pressure</b>	< 40 kg / cm <sup>2</sup>	
<b>IP rating</b>	IP 67	
<b>Indicator light</b>	Red LED	N/A
<b>Cable specifications</b>	PVC, 24 AWG, L=2 m, 3C (blue, green, black, and brown)	N/A
<b>Installation torque</b>	100 kgf-cm	
<b>Thread options</b>	PT / PF / NPT	PF
<b>Connection size</b>	3/8"	1/2"
<b>UL File Number</b>	SA44153	
<b>Dimension</b> (Unit:mm)		

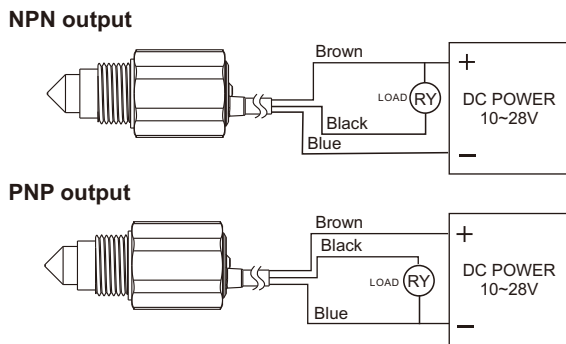
# SD20 SERIES

## FEATURE

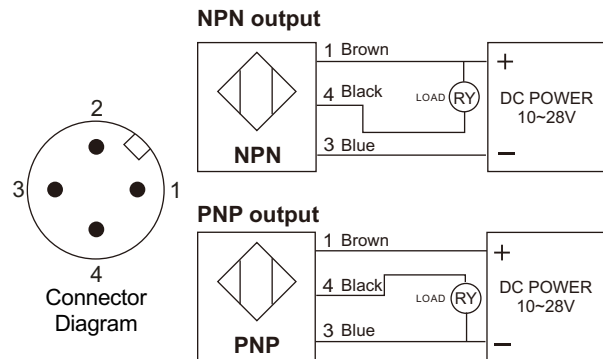
- NPN, PNP open collector output to energize relay or PLC
- Housing material of PC, PES, SUS304, SUS316 for applicable in water, oil, liquid solution, liquor, alcohol, organic solvent...etc.
- PC, PES for acidity and alkaline
- Over-current and reverse polarity protected
- LED status indication

## WIRING

### ● Lead wire



### ● M12x1 connection



## ORDER INFORMATION

		<b>SD 20</b> □ □ □ □ - <b>A</b>
<b>Housing material</b> _____		
P: PC	4: SUS304	
G: PES	6: SUS316	
<b>Connection thread</b> _____		
M2: M12x1.0 (PC, PES only)	AU: 3/8"NPT	
AR: 3/8" PF	BR: 1/2"G (SD204BR□□-A)	
AQ: 3/8"PT (SUS304, 316 only)		
<b>Output</b> _____		
P0: PNP NC	P1: PNP NO	
N0: NPN NC	N1: NPN NO	
※NO: In Liquid	NC: Out of liquid	
<b>Connection</b> _____		
A: M12x1 (SD204BR□□-A only, not include M12x1 cable)		
※If you need M12x1 cable, please select the cables in the appendix.(P.12)		

# SD21 SPECIFICATION



<b>Model</b>	Cable type	M12 connection type
<b>Tip material</b>	Glass	
<b>Body material</b>	SUS304 / SUS316	
<b>Supply voltage</b>	10 ~ 28 Vdc	
<b>Load current</b>	$\leq 200$ mA	
<b>Current consumption</b>	< 25 mA	
<b>Output mode</b>	NPN / PNP	
<b>Output function</b>	NO + NC	
<b>Electrical protection</b>	reverse polarity protection, short circuit protection	
<b>Delay time</b>	5 sec $\pm$ 1 sec (optional)	
<b>Ambient temp.</b>	-20~80 °C	
<b>Operating temp.</b>	-20~100 °C	
<b>Working pressure</b>	< 60 bar	
<b>Anti-ambient light interference</b>	< 500 lux	
<b>IP rating</b>	IP 67	
<b>Indicator light</b>	Red LED	N/A
<b>Cable specifications</b>	Silicone rubber jacket, 24 AWG, L=2 m, 4C (blue, green, black, and brown)	N/A
<b>Installation torque</b>	75 kgf-cm	
<b>Thread options</b>	PT / PF / NPT	
<b>Connection size</b>	3/8" / 1/2"	
<b>UL File Number</b>	SA44153	
<b>Dimension</b> (Unit: mm)		

# SD21 SERIES

## FEATURES

- NPN / PNP output selection can be connected to the relay or PLC.
- This product provides both NO and NC output for selection.
- Products made of glass and SUS 304/316, diesel fuel, waste water, aqueous solution, alcoholic solution.
- Includes power polarity and over current protection.
- LED indicates contact status.
- There are general cloudy and turbidity for option.
- You can measure turbid solutions.
- Also output a delayed-type output can be selected.

## WIRING

Type	High position delay		Low position delay		Standard type		Output function	Wire color	Wiring
Position							NO	Green	
LED							NC	Black	
Green wire									
Black wire									

## ORDER INFORMATION

**SD 21**

**Body material** \_\_\_\_\_

5: SUS304 + glass  
7: SUS316 + glass

**Connection thread** \_\_\_\_\_

AQ: 3/8"PT BQ: 1/2"PT  
AR: 3/8"PF BR: 1/2"PF  
AU: 3/8"NPT BU: 1/2"NPT

**Output type** \_\_\_\_\_

N: NPN            P: PNP

**Output** \_\_\_\_\_

2: Standard type  
3: Turbid type  
4: Standard type, high position delay 5s  
5: Standard type, low position delay 5s  
6: Turbid type, high position delay 5s  
7: Turbid type, low position delay 5s

**Signal connection** \_\_\_\_\_

A: M12\*1 (not include M12 cable)            C: Cable(2m)

※If you need M12x1 cable, please select the cables in the appendix.(P.12)

# SD22 SPECIFICATION



Model	Typical	Motor power detection
Tip material	Glass Zinc-plated steel / SUS304 / SUS316	
Body material	PA66 glass fiber reinforced	
Supply voltage	AC 50/60 Hz 115 V ±20% AC 50/60 Hz 230 V ±20%	
Relay specifications	AC 240 V, 2.5 A, C300	
Switch life time	10 <sup>5</sup> switching cycles	
Ambient temp.	-40 ~ 85 °C	
Operating temp.	-40 ~ 100 °C or 120°C (<1h)	
Delay time (customization)	-Relay ON after applying the supply voltage (3s ± 1s) -Relay OFF after level continue missing (5s ± 1s)	-Relay ON after applying the supply voltage (3s ± 1s) -Level monitoring after relay ON (30s ± 1s) -Relay OFF after level continue missing (5s ± 1s)
Self-test function	Yes	
process pressure	65 bar	
Anti-ambient light interference	< 500 lux	
IP rating	IP 65	
Cable specifications	PVC, 18 AWG, L=1m, 5C color coded	PVC, 18 AWG, L=1m, 6C color coded
Installation torque	75 Nm	
Connecting screw	1/2" (PT, PF, NPT) / M20X1.5 mm	
Tip part weight	around 51 g	
Body part weight	around 167 g	
UL File Number	SA44153	
Dimension (Unit: mm)		

# SD22 SERIES

## APPLICATION

- SD22 uses optical technology to achieve level monitoring and is durable to shocks in the environment.
- Uniquely different design (2 separate parts) compared to the traditional optical switch model.
- SD 22's switch body can be removed while the tip remains installed on tank. No tank drainage or leakage required when removing switch.
- Intelligent process control for not only do liquid level detection, but also with other sensors connected in series so that the full system has protection.
- According to customer demand, adjustable delay time length.
- Self-test function.
- The device is able to detect whether sensor body and tip are installed incorrectly.
- The LED indicator is readily apparent users to see.
- Quick coupling provide faster installation and reliable fix.

	Color	Status	LED lights
<b>Power</b>	Green	Supply in	ON
<b>Status</b>	Red	High level	OFF
		Low level	ON
		Error	Blinking

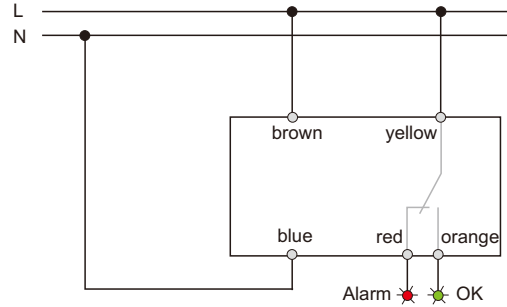
## WORKING FLOW

### ◆ SDB-B0□T□ (5 wire, typical)

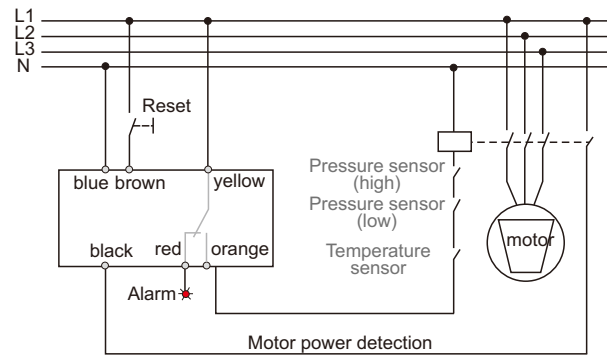
1. Three seconds after the power is turned on, the relay is on.
2. Liquid level detection, level required sustained low 5 seconds, the relay OFF and status light turns on.
3. Liquid level detection, level requires continuous contact for five seconds, the relay turns on, the status light turns off.

## WIRING DIAGRAM

### ◆ SDB-B0□T□ (5 wire, typical)

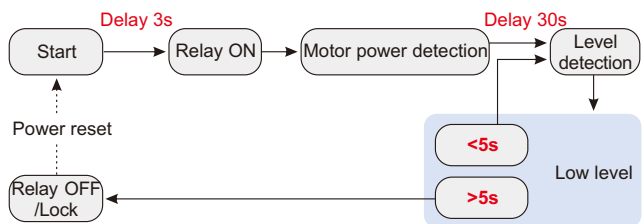
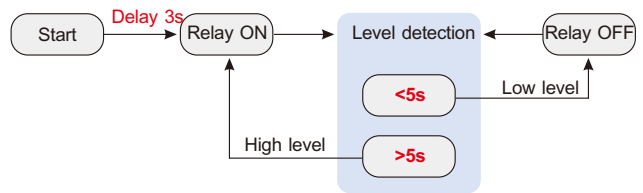


### ◆ SDB-B0□M□ (6 wire, motor power detection)

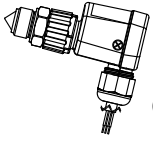


### ◆ SDB-B0□M□ (6 wire, motor power detection)

1. Three seconds after the power is turned on, the relay turns ON.
2. Detects the motor power supply is normal after a delay of 30 seconds to enter the liquid level detection state.
3. Liquid level detection, level required sustained low for 5 seconds, the relay turns off and status light is turned on lit, enters the Locked state.
4. Need to restart the power to cancel the alarm state and re-start the process.



# SD22 ORDER INFORMATION



## Complete Sensor

**SD 220**

Connector of tip and body \_\_\_\_\_

- 0 : Screw joint
- 1 : Quick coupling

Function \_\_\_\_\_

- T : Typical (5 wire)
- M : Motor power detection (6 wire)

Supply voltage \_\_\_\_\_

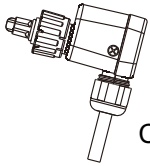
- 2: AC 50/60Hz 115V ±20%
- 4: AC 50/60Hz 230V ±20%

Thread connection \_\_\_\_\_

- BQ: 1/2" PT
- BR: 1/2" PF
- BU: 1/2" NPT
- M2: M20X1.5

Tip material \_\_\_\_\_

- 0: SUS 304
- 6: SUS 316
- Z: Zinc-plated steel



## Body Part

**SDB-B0**

Connector of tip and body \_\_\_\_\_

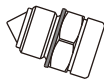
- 0 : Screw joint (F)
- 1 : Quick coupling (F)

Function \_\_\_\_\_

- T : Typical (5 wire)
- M : Motor power detection (6 wire)

Supply voltage \_\_\_\_\_

- 2: AC 50/60Hz 115V ±20%
- 4: AC 50/60Hz 230V ±20%



## Tip Part

**SDB-T**

Connector of tip and body \_\_\_\_\_

- 0 : Screw joint
- 1 : Quick coupling

Thread connection \_\_\_\_\_

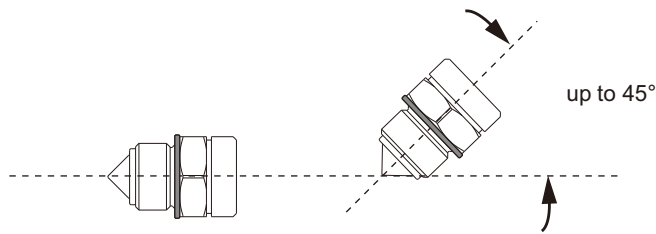
- BQ: 1/2" PT
- BR: 1/2" PF
- BU: 1/2" NPT
- M2: M20X1.5

Tip material \_\_\_\_\_

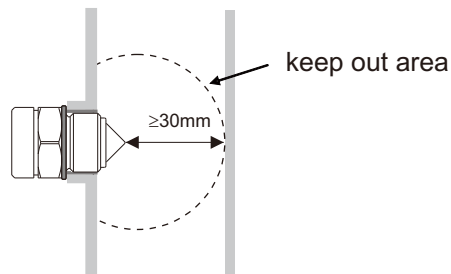
- 0: SUS 304
- 6: SUS 316
- Z: Zinc-plated steel

# CAUTION

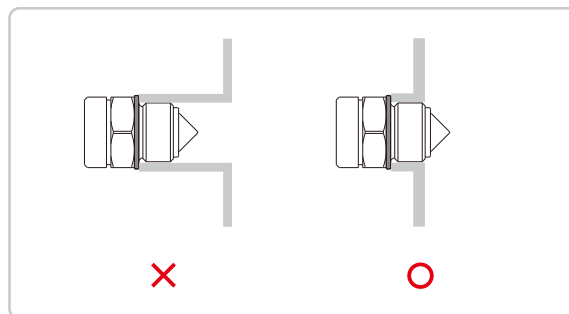
- Cable wiring to be done in accordance with the operating manual connection.
- SD22's parts and body part manually tightened (torque about 10Kgf-cm).
- During installation note that the cable outlet direction is downward.
- This product is not for solids in solution, solids containing adhesion of suspended or viscous liquids.
- Do not scratch the tip of sensor.
- SD21 turbid type and SD22 can measure 4000NTU standard turbidity solution.
- This product can not be used in the environment with an infrared light source.
- We recommend the following installation below. The horizontal plane parallel to the  $0^{\circ} \sim 45^{\circ}$  for optimal installation angle.



- This product can not be installed in the liquid at the flow entry point.
- Don't have any reflective surface or other interference at the front cone radius 30mm, as shown.
- The tip of optical level switches front of the sensor and the tank wall must be at least distance 30mm, as shown.

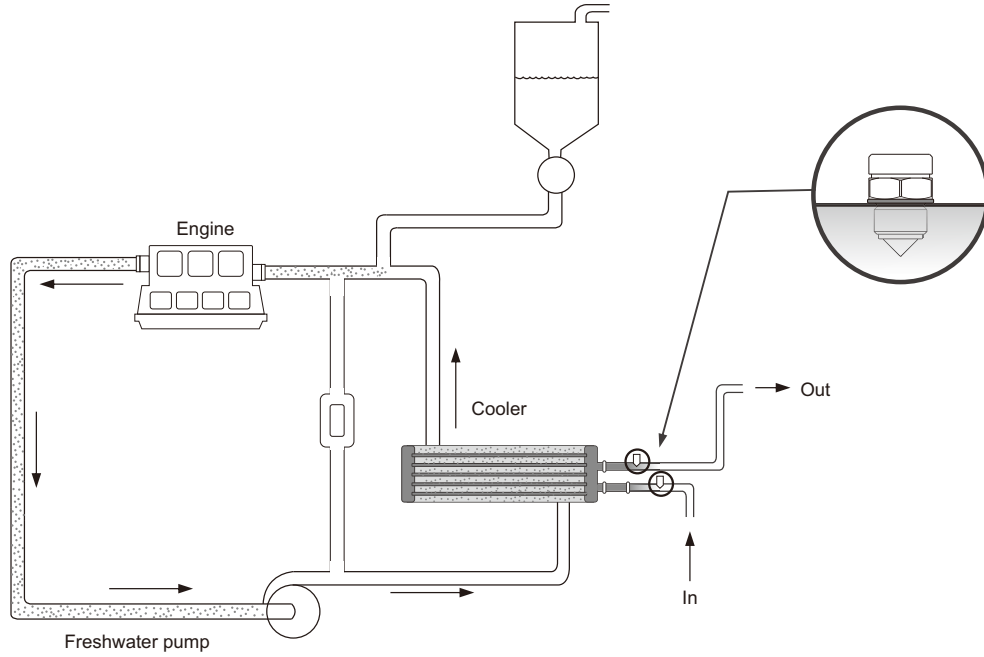


- Install the threaded sleeve photoelectric switch, the tip of switch must break the casing.

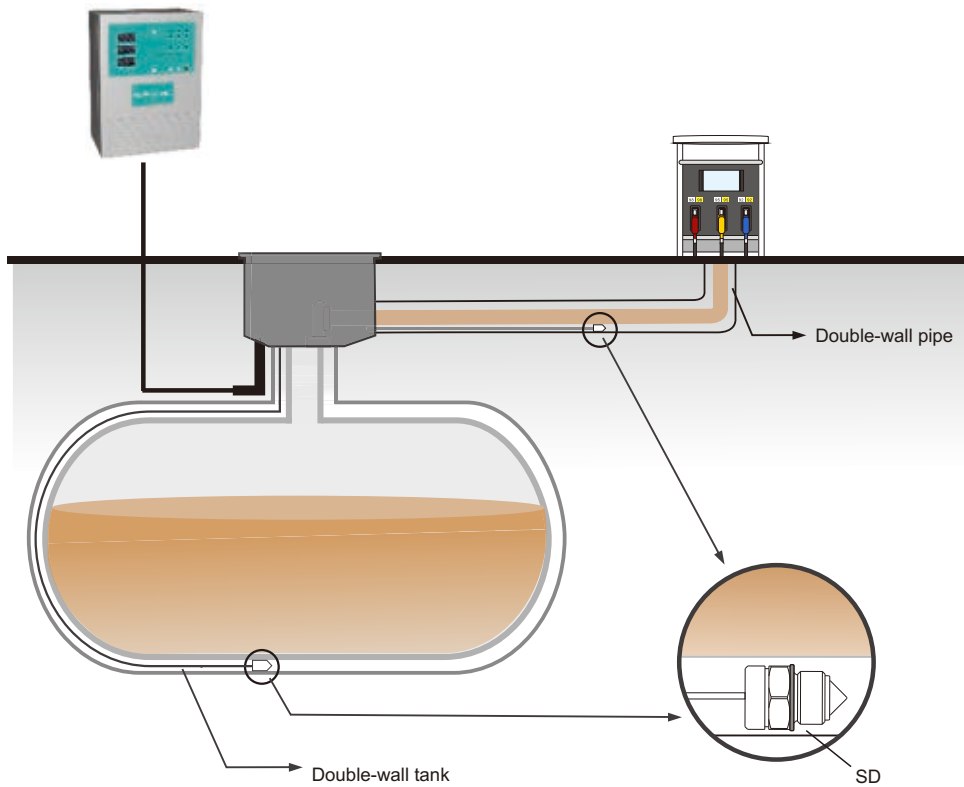


# APPLICATIONS

## Sea water cooling system



## Double-wall pipe and double-wall tank leakage detection



# APPENDIX

## M12 Cable list

Item	Part number	Connector type	Length	Temperature	IP rating	SD20	SD21
1	26-0522-5M	Right Angle	5m	-25 ~ +100°C	IP 67 IP 68 IP 69K	V	
2	26-0520-05M	Right Angle	5m	-25 ~ +85°C	IP 68	V	
3	26-0521	Straight	5m	-25 ~ +85°C	IP 68	V	
4	26-0523-5M	Right Angle	5m	-25 ~ +90°C	IP 67	V	V
5	26-0524-5M	Straight	5m	-25 ~ +90°C	IP 67	V	V
6	26-0514-2M	Right Angle	2m	-25 ~ +80°C	IP 67	V	V
7	26-0504-2M	Straight	2m	-25 ~ +80°C	IP 67	V	V
8	26-0504-5M	Straight	5m	-25 ~ +80°C	IP 67	V	V
9	26-0504-10M	Straight	10m	-25 ~ +80°C	IP 67	V	V