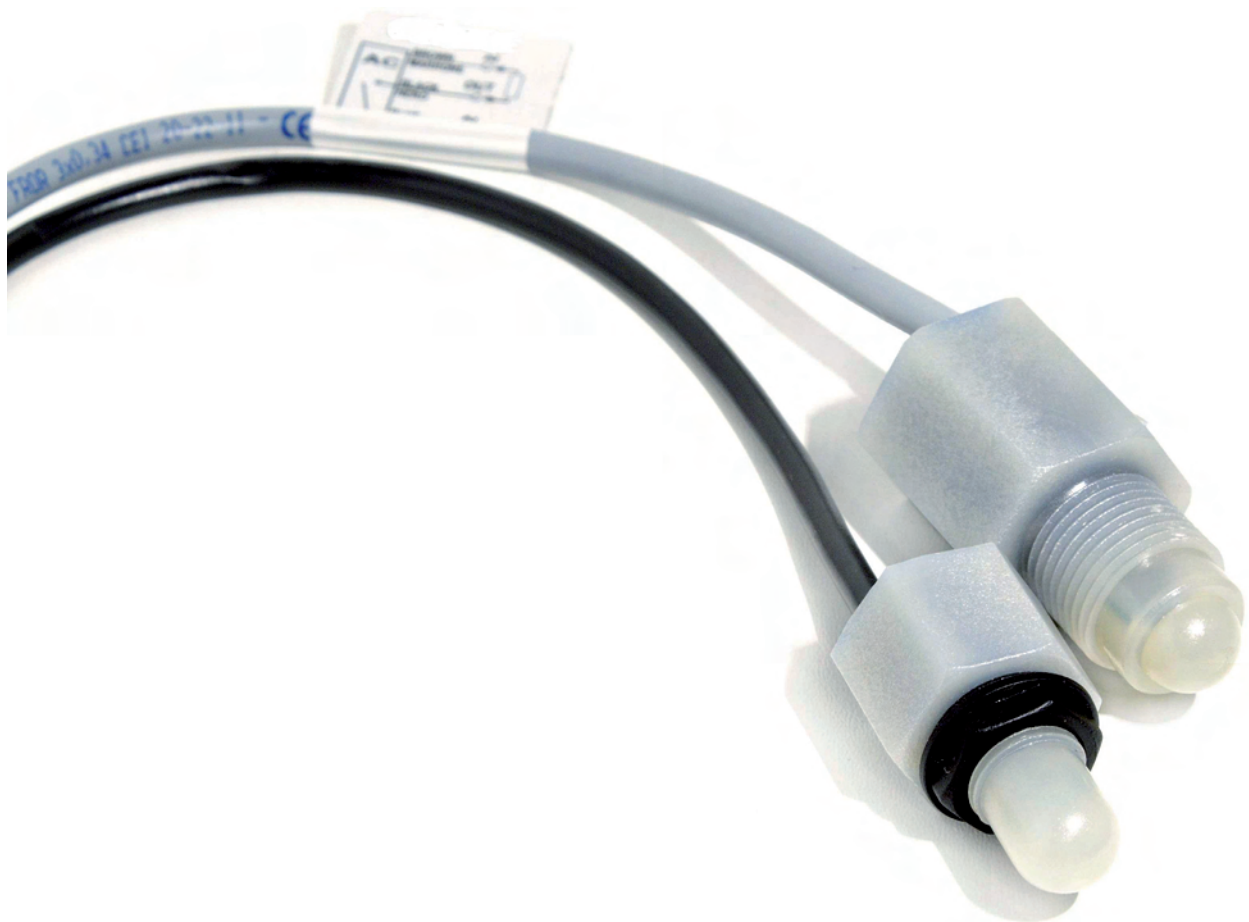




Optical Sensors

Rays of hope in the level measurement



JACOB - THE SPECIALIST FOR CABLE GLANDS AND MEASURING TECHNOLOGY

The success story begins in 1922. Wilhelm Jacob founds a small family business in Stuttgart, which turns into a successful industrial company in the south of Germany. Since those days, the main focus has always been on the production of high quality products for industrial customers and electro wholesalers. Over the years Jacob developed from the original small business to a branch leader.

Our products are being used worldwide – in the electro technical industry, for panel building, machine building or at your nearby electro wholesaler. Jacob is not only one of the leading manufacturers of cable glands but also a specialist in measuring technology and individual solutions for specific applications.

Jacob is your competent partner offering extensive customer service and support with a background of more than 85 years experience in product development and production. Together with our partners and customers we develop high quality solutions for their applications.

Flexibility and velocity is important for the satisfaction of our customers. We take care that our orders are being delivered quickly and punctually. Our new logistic and production centre in Kernen – built in the year 2009 – enables us to give the best delivery service to our customers. This is important to us.

Investment in modern production technology is a must at Jacob – for the development of our company and for continuous innovation. Our products are part of complex machinery and plant equipment and though small nevertheless important for the function of the equipment. Therefore our goal is 100% customer satisfaction.



Optical Sensors Jacob Typ LO

THE APPLICATIONS

The optical sensors are suitable to use in high pressure applications for level detection of liquids in Tanks, containers, vessels, Heating- climate- and cooling Installations, Refrigeration compressors and Engines.

IMPORTANT CHARACTERISTICS

- Available in plastics and stainless steel
- Setting of sensitivity by factory adjustment
- Application with high pressure ranges max. 10...40 bar (plastic), max. 40...60 bar (stainless steel)
- The body material is glass-fiber reinforced polysulfone (PSU) or stainless steel with sensor dome of glass
- Transistor exit for the direct connection to a SPC
- Time delay can be adjusted over a SPC or optionally over the integrated timer ex factory
- LED displays for operating and switching status (Type LO 142 + LO 144)
- Simple operational principle for a large application scope
- No moving parts
- Small installation dimensions, installation position arbitrary
- The PSU type is FDA conformal, applicable in the food industry
- Available with an 4-20 mA temperature output signal

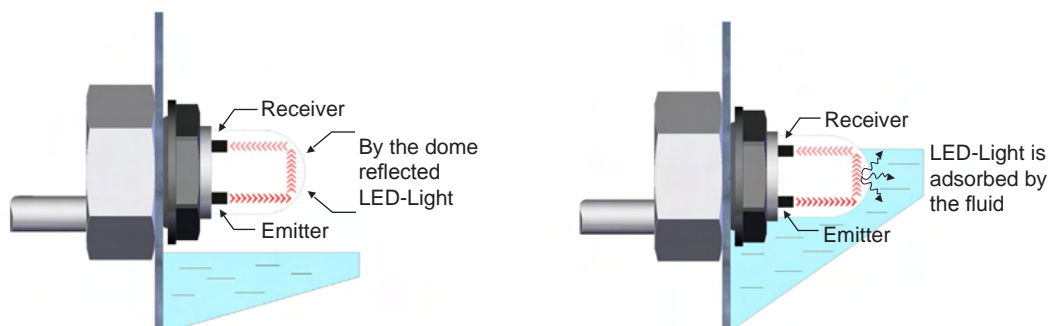


FIELD OF APPLICATIONS

- Mechanical Engineering
- Chemical industry
- Pharmaceutical industry
- Energy industry
- Food and beverage industry
- Water economy

THE MEASURING PRINCIPLE

The optical sensors work with infrared ray emitter and an optical receiver. In air (liquid not present), all the light is reflected - internally - by the dome and then redirected to the receiver. When the liquid reaches the sensor dome, a big amount of the light emitted is lost in the liquid and the sensor senses its presence. The switching function is alternatively selectable as NC or NO contacts with liquid contact. The delay time for the switching signal can be adjusted over a SPC, or optionally by an integrated timer, ex works preset.



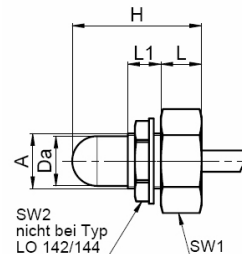
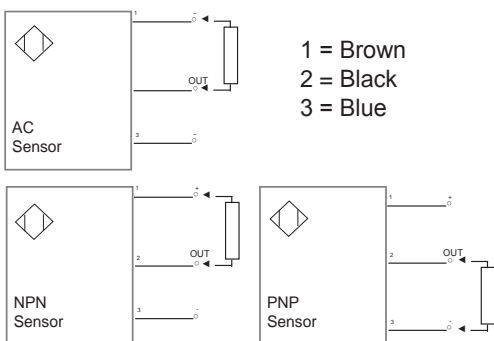
Optical infrared sensors from Jacob Type LO 1xx



	LO 112, LO 114	LO 142, LO 144
Body	polysulfone glas-fiber reinforced	polysulfone glas-fiber reinforced
Cable	PVC	PVC
Nut	Nylon 6.6	----
LED	----	Green / Red
Torque Tighten	5 Nm	5 Nm
Weight g	40	50
Protection grade	IP54	
Repeatability	± 2mm	
Output Type	NPN open collector, PNP at 12-28 VDC Version	
Special design	24 VAC, AC-Output or NPN	
Electronic Protections	reverse polarity, output short circuits	
Scope of supply	1 meter PVC-cable, special lengths are possible on request	

Type	Process-connection	Function	Output	Power supply	Output current (depending on Temperature range)	PN max.	Temperature range
LO 112	M12x1	NO in air	NPN open collector	12-28 VDC	max. 100mA	10 bar	0°C to +60°C
LO 114	M12x1	NC in air	PNP	12-28 VDC	max. 100mA	10 bar	0°C to +60°C
LO 142	G 3/8"	NO in air	NPN open collector	12-28 VDC	max. 100mA	40 bar	-40°C to +85°C*
LO 144	G 3/8"	NC in air	PNP	12-28 VDC	max. 100mA	40 bar	-40°C to +85°C*

* Temperature range by using in water is 0°C to 60°C.



Type	A	L	L1	SW1	SW2	H	Da
LO 112 /114	M12x1	16,5	7,30	19	15	36	10,5
LO 142/144	G 3/8"	25	10	22	--	47,25	14

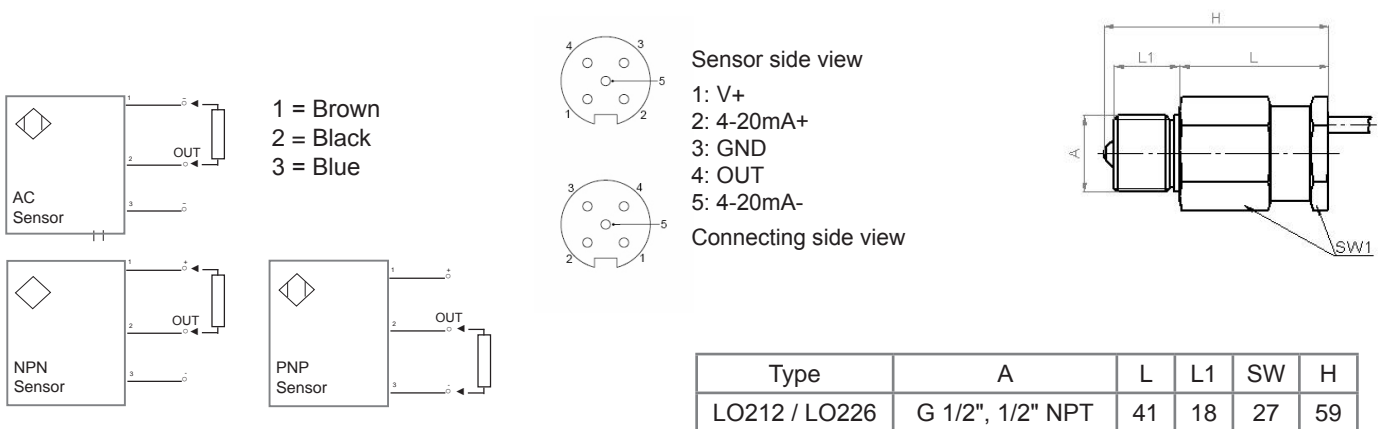
Optical infrared sensors from Jacob Type LO 2xx



Body	1.4305 (AISI 303)
Dome	Glass
Cable	PVC
Torque Tighten	15 Nm
Weight g	200
Protection grade	IP54
Repeatability	± 2mm
Output Type	NPN open collector, PNP at 12-28 VDC Version
Special design	24 VAC, AC-Output or NPN
Electronic Protections	reverse polarity, output short-circuits
Scope of supply	1 meter PVC-cable, special lengths are possible on request or with M12, 5-pole Industrial Plug (IP67)

Type	Process-connection*	Function	Output	Power supply	Output current (depending on Temperature range)	PN max.	Temperature range	Electrical-connection
LO 212	G 1/2"	NO in air	NPN open collector	12-28 VDC	max. 100mA	60 bar	-40°C to +125°C	Cable PVC
LO 214	1/2" NPT							
LO 216	G 1/2"	NC in air	PNP	12-28 VDC	max. 100mA	60 bar	-40°C to +125°C	Cable PVC
LO 218	1/2" NPT							
LO 222	G 1/2"	NO in air	NPN open collector	12-28 VDC	max. 100mA	60 bar	-40°C to +125°C	Connector M12
LO 226	G 1/2"	NC in air	PNP	12-28 VDC	max. 100mA	60 bar	-40°C to +125°C	Connector M12

* metric threads on request



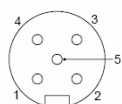
Optical infrared sensors from Jacob Type LO 3xx with analogue 4-20mA Temperature output signal



Body	1.4571 (AISI 316L)
Dome	Glass
Torque Tighten	15 Nm
Weight g	200
Protection grade	IP67
Repeatability	± 2mm
Electronic Protections	reverse polarity, output short-circuits
Scope of supply	M12, 5-pole Industrial plug

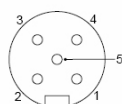
Type	Process-connection	Function	Output	Temperature output*	Power supply	Output current (depending on Temperature range)	PN max.	Temperature range
LO 312	G 1/2"	NO in air	NPN open collector	4-20mA	12-28 VDC	max. 100mA	40 bar	-40°C to +125°C
LO 314	G 1/2"	NC in air	PNP	4-20mA	12-28 VDC	max. 100mA	40 bar	-40°C to +125°C

* according to the fixed Temperature range from -40°C (4mA) to 120°C (20mA)

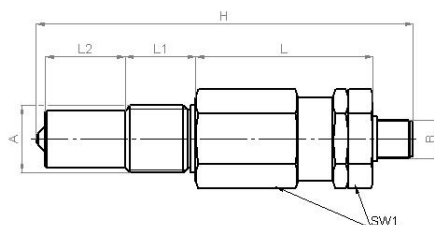


Sensor side view

- 1: V+
- 2: 4-20mA+
- 3: GND
- 4: OUT
- 5: 4-20mA-



Connector side view



Type	A	B	L	L1	L2	SW	H
LO312 / LO314	G 1/2"	M12x1	56	22	25	27	118,5

PSU-Resistivity vs Chemicals

The polysulphone is a tough rigid, amorphous thermoplastic material.

It is hydrolytically stable and has demonstrated long-term resistance to steam. Electrical properties are maintained over a wide temperature (-40°C + 160°C) and after immersion in water. The polysulphone is highly resistant to mineral acids, alkali, salt solutions, detergents, hydrocarbon oils.

The polysulphone has FDA, USP, 3-A and NSF approvals, which allow food contact use and medical equipment use.

Chemical Resistance			
+ = resistant; 0 = partially resistant; - = not resistant; II = soluble			
Substance (concentration)	Resistance	Substance (concentration)	Resistance
Acetic Acid (80-10%)	+	Hydrogen Peroxide (0.5%)	+
Acetone (100%)	-	Hydrogen Peroxide (1%)	+
Alcoholic Calcium Chloride (20%)	0	Hydrogen Peroxide (3%)	+
Alkaline Solution 0.1% CL Active	-	Hydrogen Peroxide (10%)	+
Aluminium Chloride (10%)	+	Hydrogen Peroxide (30%)	+
Aluminium Sulphur (10%)	+	Iodine and Potassium Solution	-
Ammonia (10%)	+	Iodine Tincture (-)	-
Ammonium Chloride (10%)	+	Lactic Acid (10%)	+
Benzene (100%)	-	Liquid Freon 12 (100%)	+
Boric Acid (10%)	+	Magnesium Chloride (10%)	+
Butanol (100%)	0	Manganese Sulphur (10%)	+
Butyl acetat (100%)	-	Mercury (100%)	+
Calzium Hypochlorite (10%)	+	Mercury (5%)	+
Calzium Sulphur (100%)	-	Methanol (98%)	0
Carbon Tetrachloride (100%)	-	Methyl Chloride (100%)	0
Caustic Potash (10%)	+	Mineral Oil (100%)	+
Caustic Potash (50%)	+	Nitric Acid (10%)	+
Caustic Soda (10%)	+	Nitric Acid Conc. (65%)	-
Caustic Soda (50%)	+	Oleic Acid Conc. (40%)	+
Chloride Gas (100%)	+	Ozone (-)	-
Chorine Water (-)	+	Petroleum (100%)	+
Cholorbenzene (100%)	II	Phenol (10%)	-
Chloroform (100%)	II	Phosphoric Acid (10%)	+
Chorme Alum	+	Phosphoric Acid Conc.	+
Citric Acid (10%)	+	Potassium Bichromate (5%)	+
Cold Water (100%)	+	Potassium Nitrate (10%)	+
Cromic Acid (10%)	-	Potassium Permanganate (1%)	+
Cyclohexane (100%)	0	Pyridine (100%)	-
Dibutylphthalate (100%)	+	Sea Water (100%)	+
Diesel (100%)	+	Soap Solution	+
Diocetylphthalate (100%)	+	Soda (10%)	+
Ethanol (96%)	+	Sodium bisulphite (10%)	+
Ethyl Acetate (100%)	+	Sodium Chloride (10%)	+
Ethyl Ether (100%)	+	Sodium Solfur (10%)	+
Ethylene Chloride (100%)	II	Sulphuric Acid (10%)	+
Formaldehyde (20%)	+	Sulphuric Acid (98%)	-
Formic Acid (85%)	+	Tallow (100%)	+
Fuel (100%)	0	Transformers Oil (100%)	+
Furfural (100)	+	Urea (10%)	+
Glycerine (90%)	+	Wax (100%)	+
Heptane (100%)	+	Xilene (100%)	-
Hexane (100%)	+	Zinc Choride (10%)	0
Hydrochloric Acid (2-10%)	+		
Hydrofluoric Acid (40%)	-		

The approximate values with 20°C, specified here, are not transferable to all operation conditions. The chemical stability of plastics is dependently of the temperature, concentration, radiation effect, mechanical/dynamic stress and not least of the careful production of the work piece (shatter crack danger). Therefore warranty and requirements for compensation cannot be recognized. For specific applications it is essential to make for the operating conditions appropriate attempts.

Further information about our representatives abroad is available at

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