I N S T R U C T I O N M A N U A L

F O R

OIL LEAK DETECTOR

MODEL: L Z 1 0
L Z 1 1 0 0

Issued 2014-02-12

Read and understand this manual for safe usage.

- This manual describes the product of standard specification. Read the other manual for the product of explosion-proof specification.
- This manual describes the handling, inspection and adjustment of the product whose model is mentioned on the cover page. Read and understand this manual before handling.
- Follow the additional document and/or direction, submitted by NOHKEN INC. and our distributor or agent, even if the terms are mentioned in this manual.
- Save this manual in a proper place being available to refer to immediately.
- The specification of product mentioned in this manual may not be satisfied by the condition of environment and usage. Check and consider carefully before using.
- Contact to sales office at NOHKEN INC. for any question or comment about this manual and product.

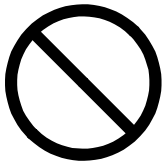
The following are the description of the terms in this manual.

⚠ WARNING	Indicates a potentially hazardous situation which, if not paid attention to, could result in death, serious injury or serious disaster.
⚠ CAUTION	Indicates a hazardous situation which, if not paid attention to, may result in minor or moderate injury or damage to the device.

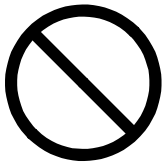
	Indicates a prohibited matter. The explanation with this mark shall be followed.
	Indicates an instructed matter. The explanation with this mark shall be followed.

⚠ WARNING

This product is not explosion-proof construction. Do not install this product to the place where the flammable gas or vapor occurs. If installed, the flammable gas or vapor may be ignited, and serious disaster may occur. Use the product of explosion-proof construction in this case.



Do not modify or disassemble the product. Otherwise, the product and connected device may be malfunctioned, damaged, fired, or minor injury and electric shock may occur.
(Follow the additional document and/or direction, submitted by NOHKEN INC. and our distributor or agent.)



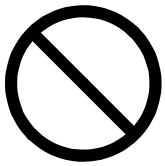
Turn off the power, before wiring and inspection.
Otherwise, electric leakage, fire caused by short circuit, and electric shock may occur.

Ensure the wire is properly connected. The product and connected device may be malfunctioned, damaged, fired, or minor injury and electric shock may occur by improper wiring.

Turn off the power immediately, if the smoke, strange smell and sound occur. Do not use it until the problem is solved.

⚠ CAUTION

Avoid strong shock and rough handling to this product. The product may be damaged by strong shock such as dropping, falling, throwing, knocking, lugging, etc.



Follow the specification of operating temperature, operating pressure, switch rating, etc. Otherwise, the product and connected device may be malfunctioned, damaged, fired, or minor injury and electric shock may occur. Check the manual or specification sheet.

Operation test shall be done before practical usage. If the serious accident is expected to occur by malfunction of the product, the other operating principle of product shall be installed in parallel.

⚠ CAUTION

Check and deeply consider the chemical compatibility for the material of product in advance.

The product is 50cm or longer

The product shall be kept horizontally. The product and other goods could be damaged, and minor injury may occur by falling.

In case of connecting inductive or lamp load to the product.

Provide protective circuit to the load to avoid over voltage and over current. If not provided, the contact may be damaged.

Provide arrester or surge absorber to avoid electrical impact such as lightning and static electricity. If not provided, the product and connected device may be malfunctioned, damaged, and fired, or minor injury and electric shock may occur.

INTRODUCTION

A) This manual specifies the specification of a general product.
   If you order a special product, some details of specification may be different with the manual.
B) We are glad to suggest and advise for Model selection and chemical resistance of material, but final decision has to be made by the customer.
C) This manual has been prepared with close attention. Ask sales office at NOHKEN INC. for any question or comment about the contents of this manual.
D) For replacement parts
   The quality of product has frequently improved, so same spare parts may not be supplied. In this case, replacement parts or products may be supplied. Ask sales office at NOHKEN INC. for details.
E) The contents of this manual are subject to change any time without notice due to the improvement of the product.

WARRANTY & DISCLAIMER

A) NOHKEN INC. warrants this product against defect in design, material and workmanship for a period of 1(one) year from the date of original factory shipment.
B) The warranty only covers the damage of products. The secondary and third kind disasters are not covered by NOHKEN INC.
C) NOHKEN INC. shall not be liable for the following.
   C-a) Do not follow the description and direction in this manual.
   C-b) Damage due to improper installation, wiring, usage, maintenance, inspection, storing, etc.
   C-c) Repair and modification are done by the person who is not an employee of NOHKEN INC. and our distributor or agent.
   C-d) Improper parts are used and replaced.
   C-e) The damage is occurred by the device or machine except our products.
   C-f) Improper usage. (See "Purpose of use" in chapter 1 in this manual)
   C-g) Force Majeure including, but not limited to, fire, earthquake, tsunami, lightning, riots, revolution, war, radioactive pollution, acts of God, acts of government or governmental authorities, compliance with law, regulation, and order.

THE TERMS OF WARRANTY AND DISCLAIMER SHALL IN NO WAY LIMIT YOUR LEGAL RIGHTS.

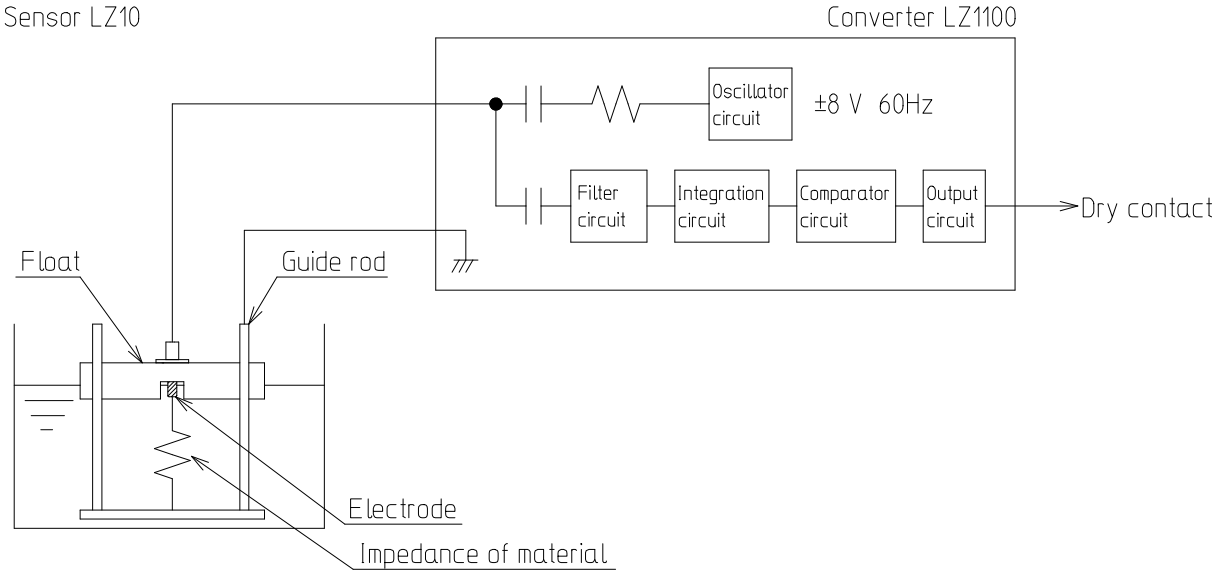
Table of Contents

1. PURPOSE OF USE

Oil Leak Detector LZ sensor detects leak of oil such as petroleum and vegetable oil, and gives signals. The sensor is used in a pit inside a tank dike or a drainage pit near a plant or a pump station, and the signals are used to control alarms and electromagnetic switches. Do not use the sensor for any other purpose.

2. DESCRIPTION

LZ sensor detects oil leak by measuring impedance* between the electrode and the guide rods. When the electrode is not in contact with oil but water, the impedance is low. When the oil film grows to around 7mm and touches the electrode, the impedance rises. The sensor detects the risen impedance and gives a signal output.



* Refer to 11. GLOSSARY.

3. SPECIFICATIONS

3.1 Specifications

	Sensor	Converter
1. Product	Oil Leak Detector	
2. Model	LZ10	LZ1100
3. Measured material	Oil (petroleum, vegetable oil, etc.)	
4. Operating Characteristics		
(1) Sensitivity	Oil film: 7mm ± 3mm (with water) Oil film: 21mm ± 5mm (without water, measured from bottom of empty pit attachment)	
5. Electric Characteristics		
(1) Power supply	---	100 to 120V AC ±10%, 50/60Hz 200 to 240V AC ±10%, 50/60Hz
(2) Power consumption	Approx. 3VA (at 100V AC)	
(3) Signal for sensor	±8V, approx. 60Hz	
(4) Alarm output	---	Dry contact (SPDT)
(5) Contact ratings		250V 3A AC (resistive load) 30V 3A DC (resistive load)
(6) Contact operation	---	See Table 1
(7) Delay time	---	3 to 10 seconds (for detection. Programmable.)
(8) Separation	2000m Max.	
6. Mechanical Characteristics		
(1) Withstand pressure (static pressure)	Atmosphere	---
7. Environmental		
(1) Working temperature	-20 to +50℃ (no freezing)	-20 to +60℃ (no dew condensation)
(2) Working humidity	85%RH Max.	
8. Protection Class	IP67 or equivalent	IP20 or equivalent

9. Others

(1) Material

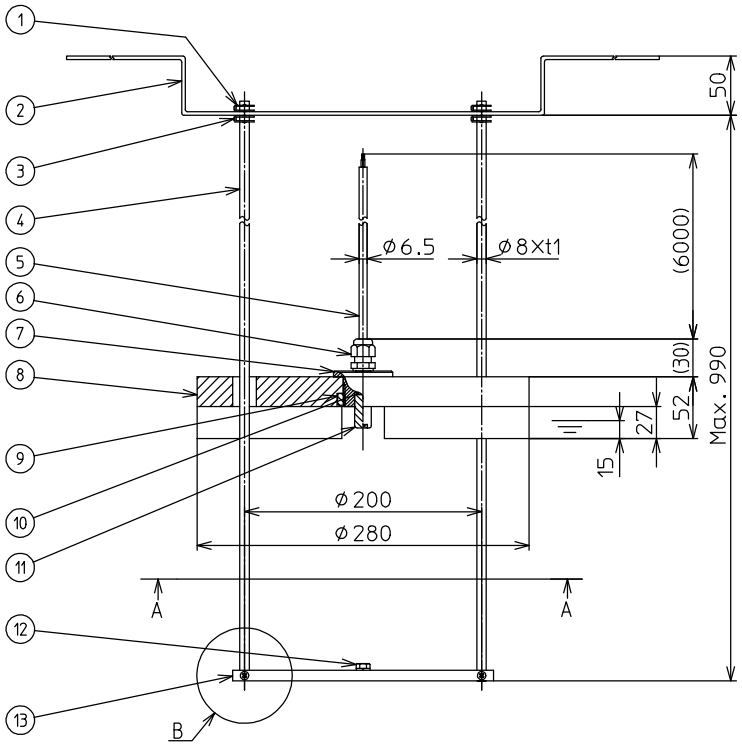
Body	Polystyrene foam, urethane coated	ABS
Electrode	304 Stainless steel	---
Gasket	NBR	---
Mounting nut	304 Stainless steel	---
Cable gland	Nylon 66	---
Cable	Soft PVC sheath	---
Guide rod	304 Stainless steel	---
Empty pit attachment	304 Stainless steel	---
Mounting board	304 Stainless steel	---
Other wetted parts	316 Stainless steel, 316L Stainless steel, (Spring washer: 304 Stainless steel)	---
(2) Cable	ϕ6.5×6m (VCTF 2×0.5mm^2)	
(3) Mounting	Guide rod (ϕ8) × 2	11P plug-in socket: Optional, 11PFA from OMRON or equivalent
(4) Mass	Approx. 950g (including 6m cable)	Approx. 320g

Table 1

	Contact operation	ALARM LED
No detection	Energized	OFF
Oil detection	De-energized	ON
Power OFF	De-energized	OFF

3.2 Outline drawing

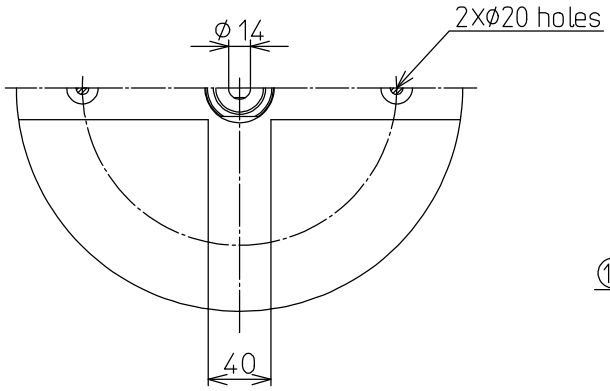
3.2.1 Sensor



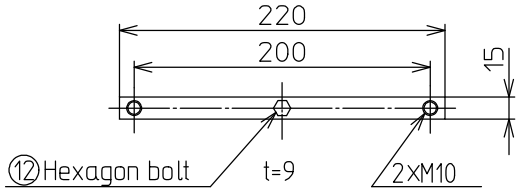
P.No.	Name	Qty.	Material
1	Stopper	4	316 Stainless steel
2	Mounting board	1	304 Stainless steel
3	Stopper screws(1)	4	304 Stainless steel
4	Guide rod *	2	304 Stainless steel
5	Cable	6m	Soft PVC (VCTF 2×0.5mm²)
6	Cable gland	1	Nylon 66
7	Electrode support	1	PVC
8	Float	1	Polystyrene foam (urethane coated)
9	Mounting nut	1	304 Stainless steel
10	Gasket	1	NBR
11	Electrode	1	304 Stainless steel
12	Hexagon bolt	1	304 Stainless steel
13	Empty pit attachment *	1	304 Stainless steel
14	Hexagon nut	2	304 Stainless steel
15	Spring washer	2	304 Stainless steel
16	Fixing screw	2	316L Stainless steel

(1) Hexagonal socket(2.0A/F) on head.

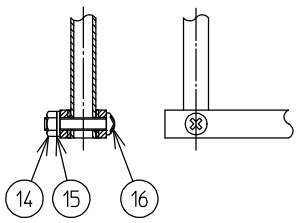
☆ Parts number 1, 2, 3, 4, 14, 15, and 16 are optional.



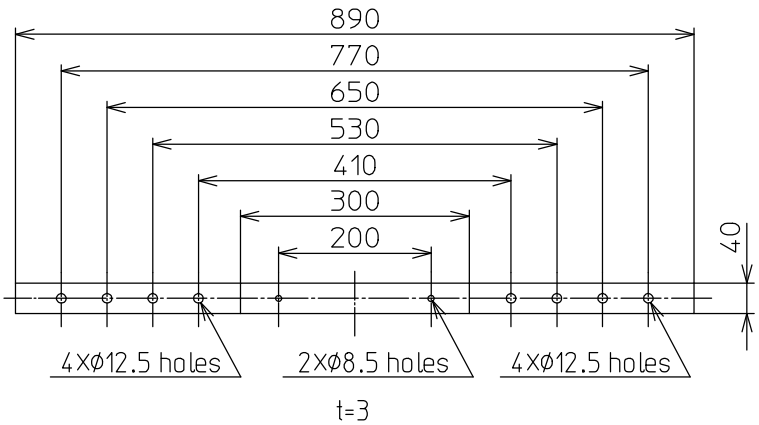
A–A



⑬Empty pit attachment dimensions



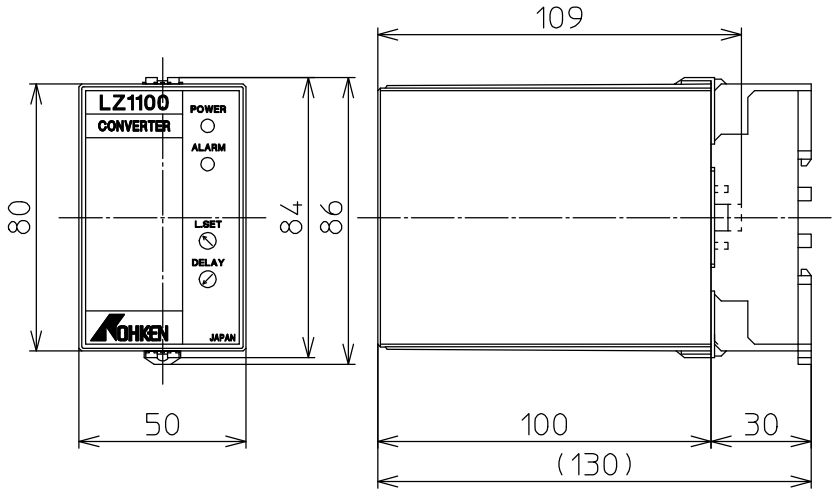
Detail B



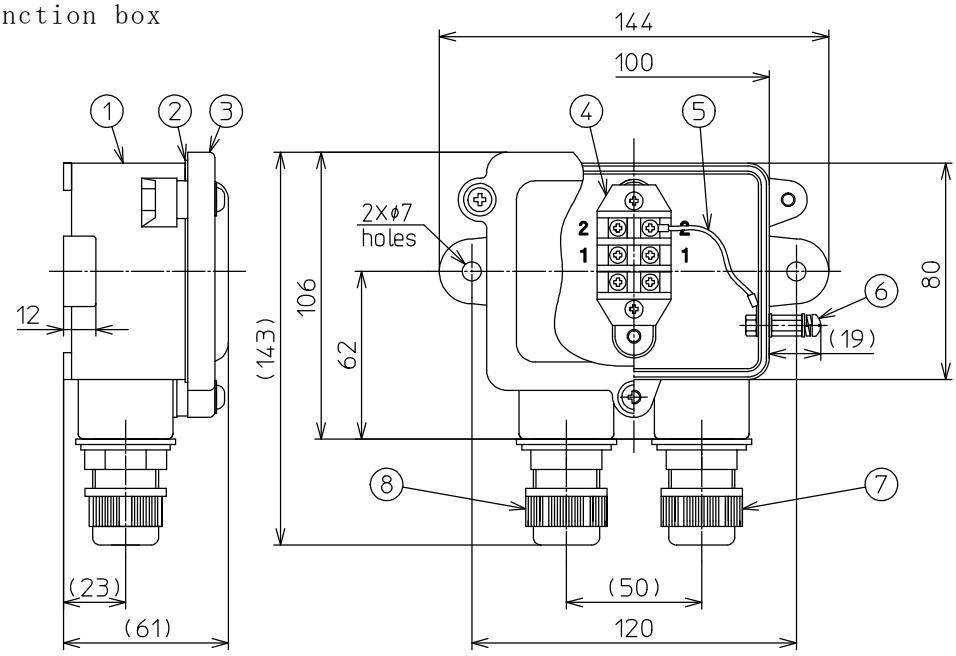
②Mounting board dimensions

* Refer to 11. GLOSSARY.

3.2.2 Converter



3.2.3 Junction box



P.No.	Name	Qty.	Material
1	Body	1	PBT
2	Gasket	1	CR
3	Cover	1	PBT
4	Terminal box	1	PBT (M4 screw)
5	Lead wire	1	PVC sheath
6	External terminal	1	304 Stainless steel (M4 screw) Brass (C3604BD)
7	Cable gland (for sensor cable)	1	Nylon66 (Applicable cable dia. 6 to 11)
8	Cable gland (for converter)	1	Nylon66 (Applicable cable dia. 6 to 11)

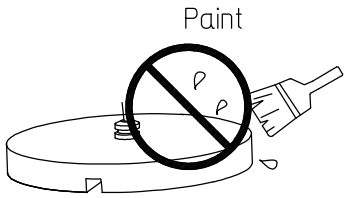
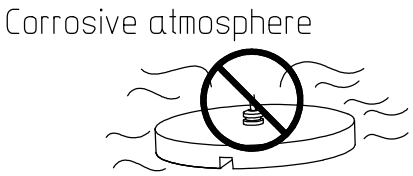
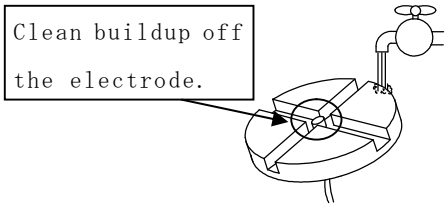
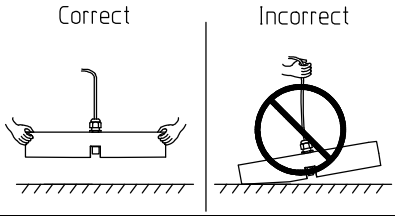
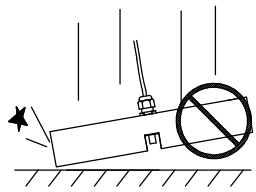
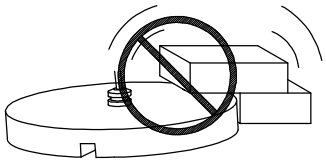
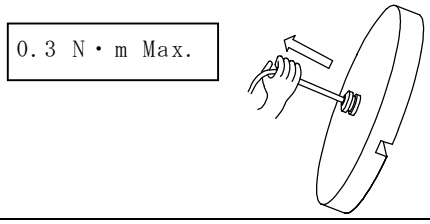
Protection class: IP56

Mass: Approx. 0.5kg

Compact junction box for shipping, TYPE-1MO (3T) from Senpaku Shoji

4. HANDLING NOTES

Observe instructions below when handling the sensor, or operation failure or user injury may result.

4.1 Do not paint the sensor. Paint on the float or the electrode changes buoyancy or conductivity, and erratic operation may result.	
4.2 Avoid using or storing the sensor in corrosive atmosphere (NH_3, SO_2, Cl_2), or the float may deteriorate or be damaged.	
4.3 Clean the electrode periodically. Buildup may cause operation failure. Do not use metal tools when cleaning to avoid damaging the sensor.	
4.4 Hold the sensor by the float. Holding it by the cable or the cable gland may break the cable.	
4.5 Do not drop, throw, crush, drag or give a strong shock to the sensor to avoid damaging it.	
4.6 Do not place anything on the sensor or the cable to avoid damage to them.	
4.7 Do not pull the cable with force exceeding 0.3N・m to avoid damage.	

5. INSTALLATION

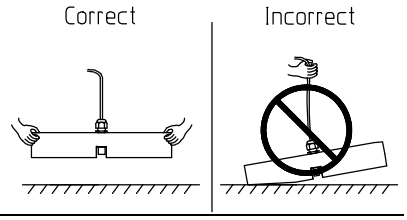
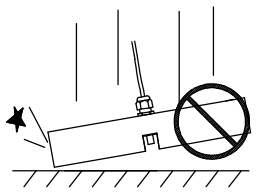
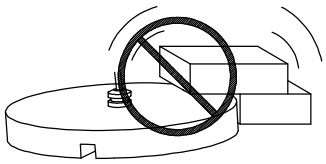
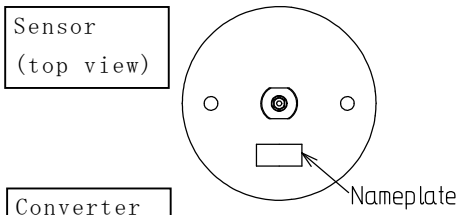
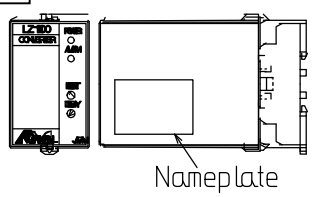
⚠ WARNING

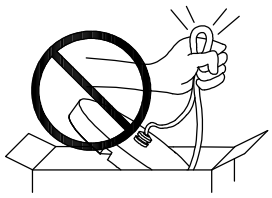
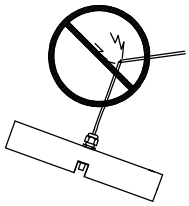
LZ is not of the explosion proof model. Never use it in areas where flammable or explosive gases or vapors are generated. If used, the sensor may ignite such gases or vapors and cause a disaster. Use explosion proof products in hazardous areas.

⚠ CAUTION

Do not hold the sensor by the cable or the cable gland to avoid breaking the cable.

5.1 Unpacking

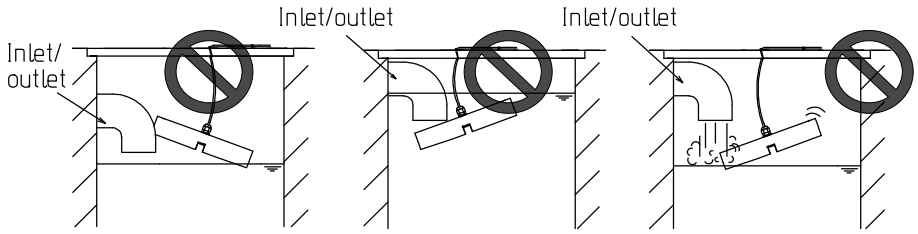
5.1.1 Unpack and take out the sensor. Hold the sensor by the float when moving it.	
5.1.2 Do not drop, throw, crush, drag or give a strong shock to the sensor to avoid damaging it.	
5.1.3 Do not place anything on the sensor or the cable to avoid damaging them.	
5.1.4 Check against nameplates that the products are as ordered. If not, please contact our sales office.	
5.1.5 Check the products for damage. If any, it may have been caused during transportation. Please contact our sales office.	

5.1.6 Do not bend the cable too tightly to avoid damage to the core.	
5.1.7 Be careful not to damage the cable.	

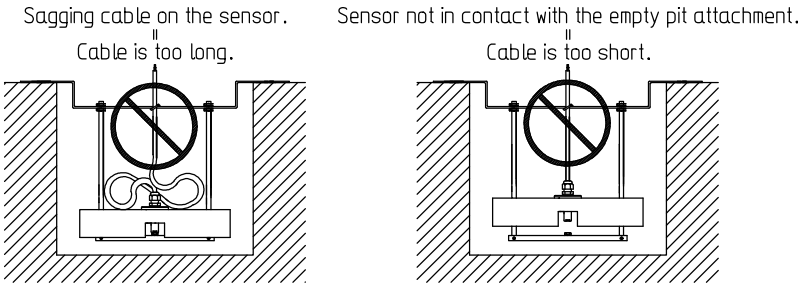
5.2 Mounting the sensor

⚠ CAUTION

- To avoid faulty operation, avoid proximity to inlet or outlet where liquid flow or turbulence is excessive, or to obstruction such as piping that can limit the float movement.



- Fix the cable so that the electrode is in contact with the empty pit attachment* without sagging cable. Too long cable may cause faulty operation at high levels due to sagging cable. Too short cable may cause erratic output at low levels due to the electrode not coming into contact with the empty pit attachment.

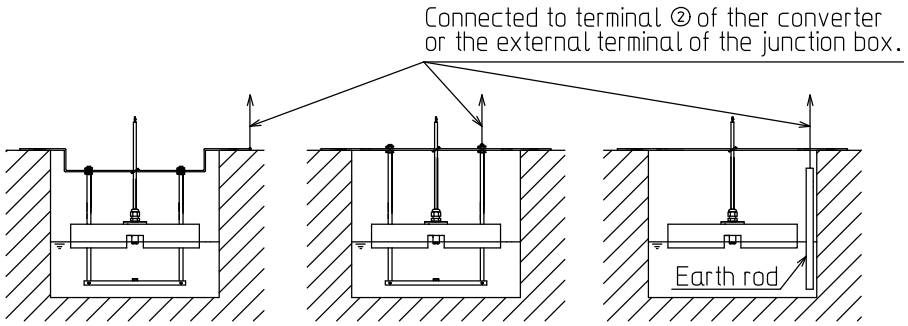


- When mounting the sensor, be careful not to drop it or give a shock to the empty pit attachment. This may damage the sensor, or move the guide rod away from its fixed position.

* Refer to 11. GLOSSARY.

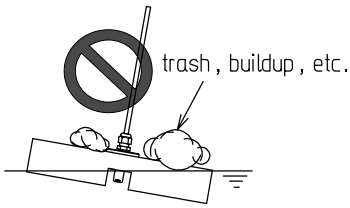
⚠ CAUTION

- Connect the empty pit attachment, the guide rods, and the earth rod placed in the pit, to terminal ② of the converter or the external terminal of the junction box. If not, the sensor will not operate correctly.



- If multiple units are installed in the same pit, ensure the sensors are not in contact with each other and the cabling is separate. Sensors touching each other can cause faulty operation.

- Ensure no trash or buildup on the float. Otherwise the sensor draft may change and faulty operation may result.



Tools to be used

- Philips screwdriver (#2 to 3)
- Hex key (2 A/F)
- Socket wrench (7 A/F)
- Cable tie (fixes cable)
- Tape measure (measures pit depth)

5.2.1 Mounting

There are 3 options to install the sensor.

Select one suitable to your application.

A. Using optional mounting board and guide rods … p.10

B. Using customer guide rods, or existing guide rods … p.13

C. Without using guide rods … p.16

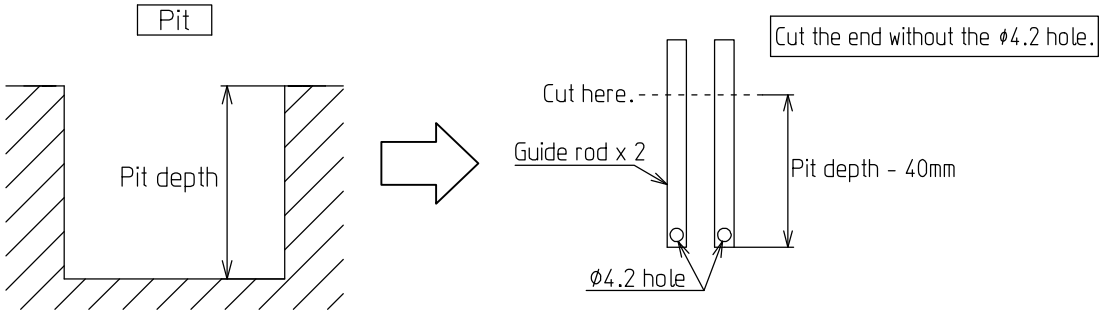
【A. Using optional mounting board and guide rods】

(1) Ensure no accessories are missing. (Qty. for one sensor shown)

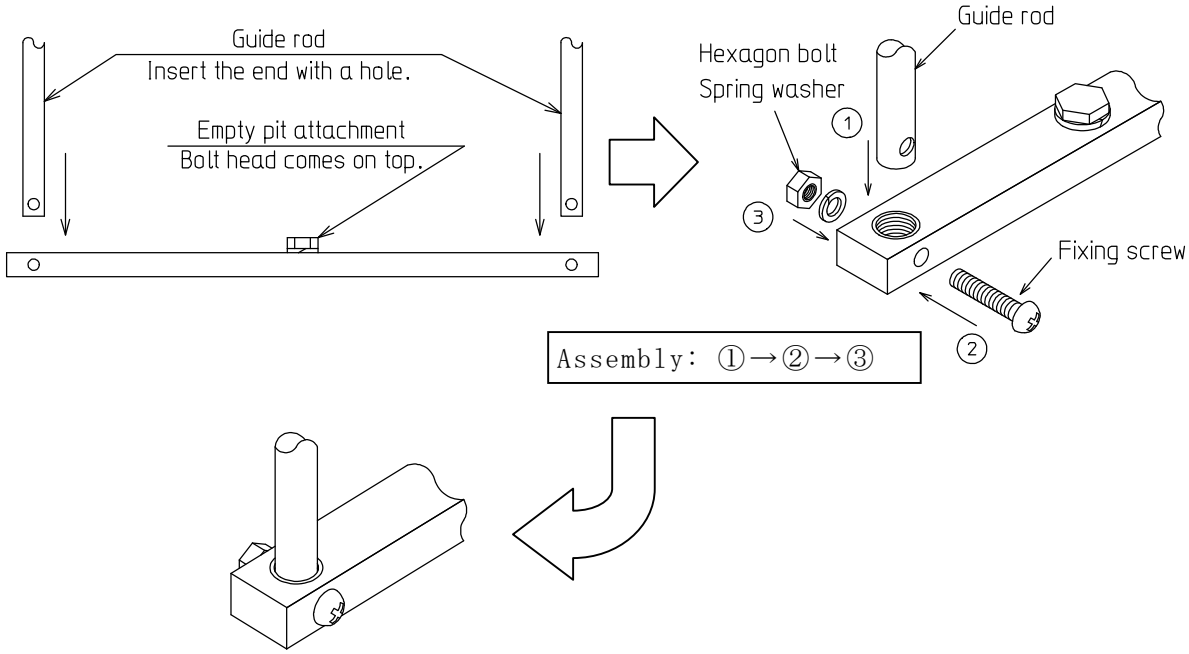
- Empty pit attachment (L=220mm, t=9mm) x 1 pc.
- Mounting board (L=890mm, pressed board) x 1 pc.
- Guide rod (φ8 pipe) x 2 pc.
- Stopper x 4 pc.
- Fixing screw (M4×20) x 2 pc.
- Hexagon nut, spring washer (M4) x 2 sets

(2) Measure with a tape measure the depth of the pit on which the sensor is mounted. Cut off the end without the φ4.2 hole of the guide rods, to make them suitable for the pit depth

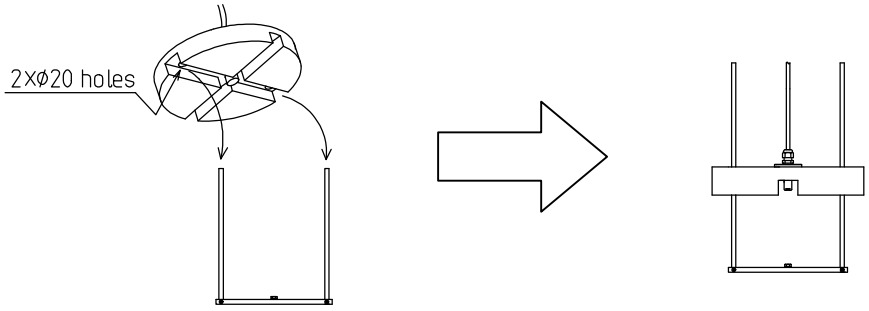
- Guide rod length = Pit depth – 40mm



(3) Insert the end with the φ4.2 hole of the guide rods into the holes on the empty pit attachment, from the surface on which bolt head is seen.
Fix the rods using the screws, hexagon nuts (7 A/F) and spring washers.

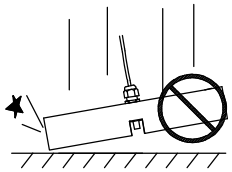


(4) Slide the sensor down on the guide rods.

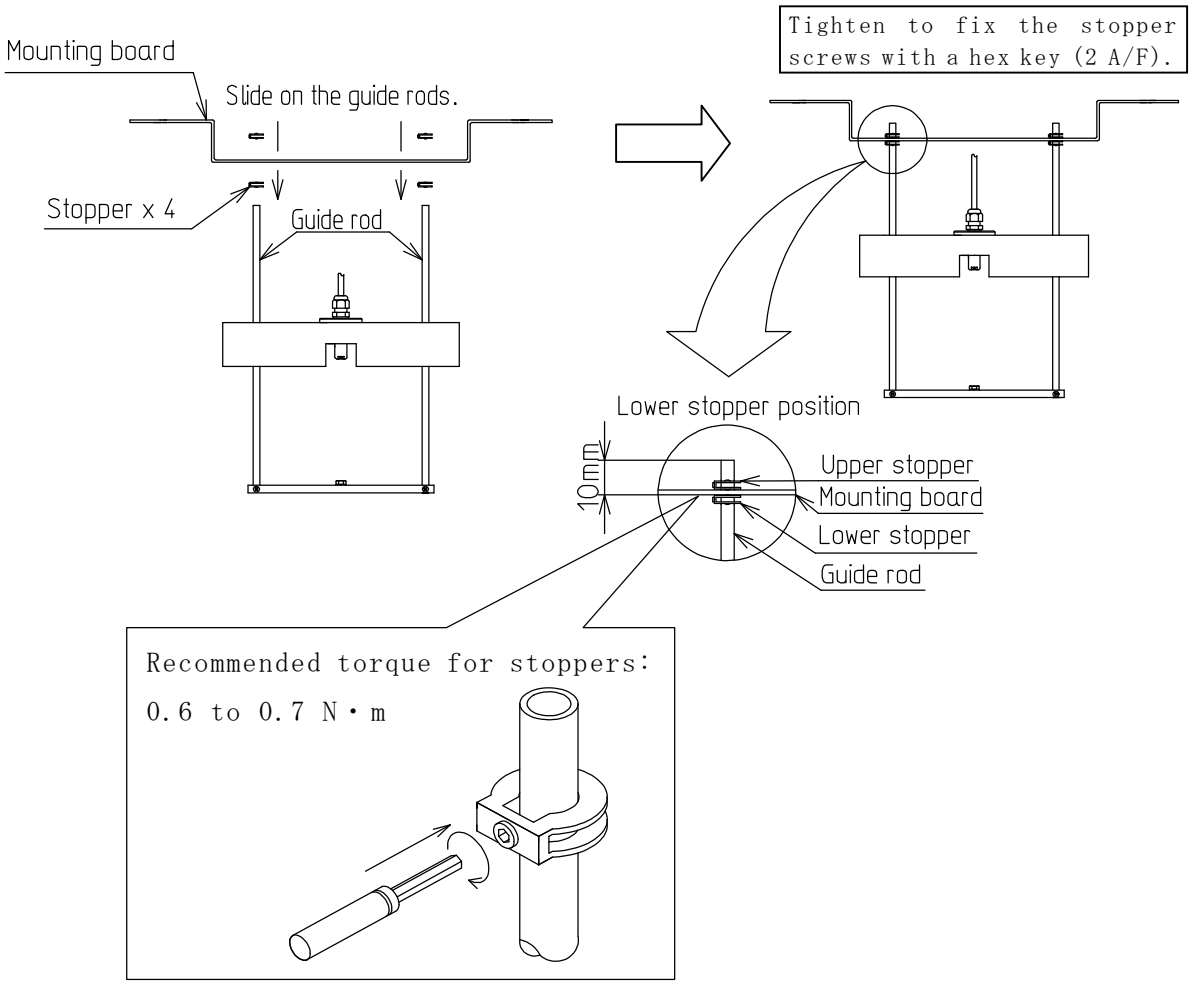


CAUTION

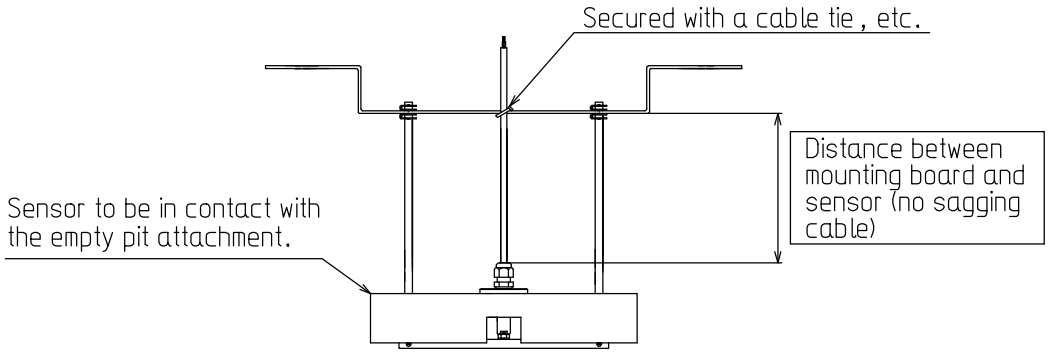
Do not drop, throw, crush, drag or give a strong shock to the sensor to avoid damaging it.



(5) Place the stopper, and then the mounting board, and the stopper again on the guide rod. Fix the stoppers with a hex key (2 A/F).
Place the lower stoppers at a position 10 mm from the rod end.
Recommended torque: 0.6 to 0.7 N・m

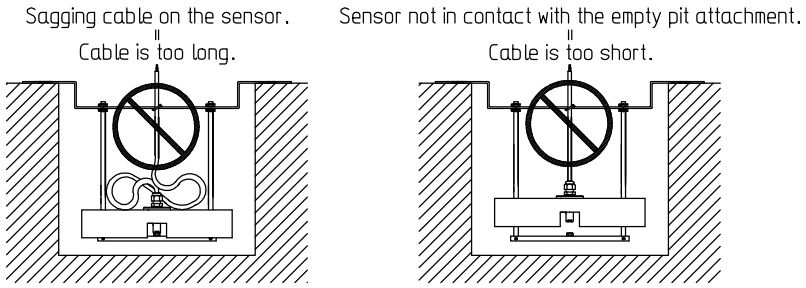


(6) Secure the sensor cable with a cable tie* to the mounting board so that the electrode is in contact with the empty pit attachment without sagging cable.

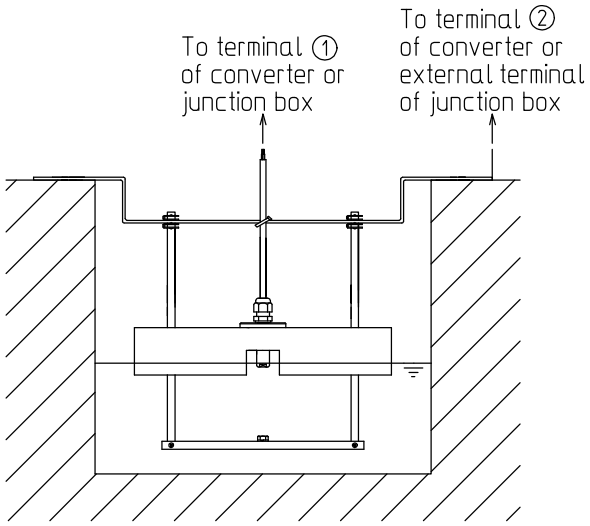


⚠ CAUTION

Secure the cable in a way that it does not restrict the sensor movement. If the portion below the fixing point is too long, faulty operation may result at high levels due to sagging cable. If too short, erratic output may result at low levels due to the electrode not coming into contact with the empty pit attachment.



(7) Mount the mounting board on the pit.
After that, connect the sensor cable to the terminal ① of the converter or the junction box, and the mounting board or the electrode to terminal ② of the converter or the external terminal of the junction box. See 6. Wiring.



* Refer to 11. GLOSSARY.

⚠ CAUTION

Connect the mounting board to terminal ② of the converter or the external terminal of the junction box. If not, the sensor will not operate correctly.

When mounting the sensor on a pit, be careful not to give a shock to the empty pit attachment by dropping the sensor from the guide rod top, for example. This may damage the sensor, or move the guide rod away from its fixed position.

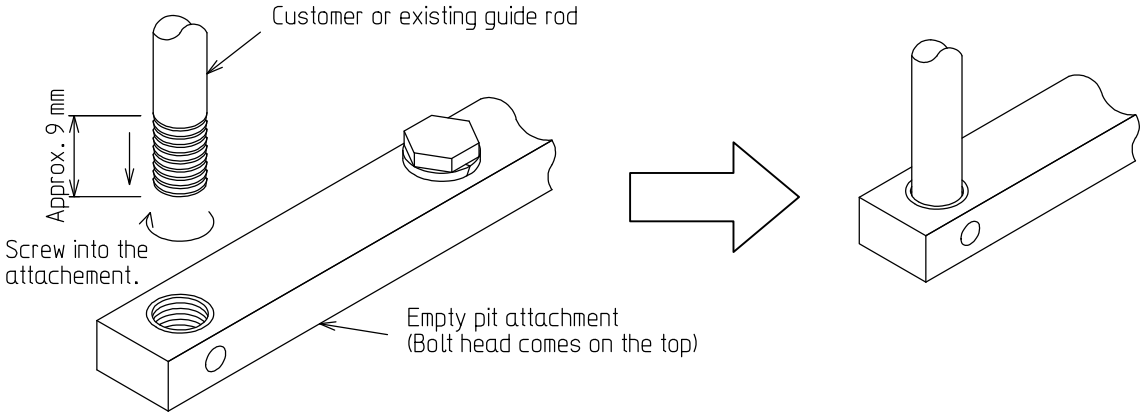
【B. Using customer guide rods, or existing guide rods】

(1) The sensor can accommodate two guide rods (2 x ϕ20 holes, 200mm interval). The empty pit attachment has M10 threaded holes for the guide rods. Use the guide rods suitable for the sensor specifications and your application.

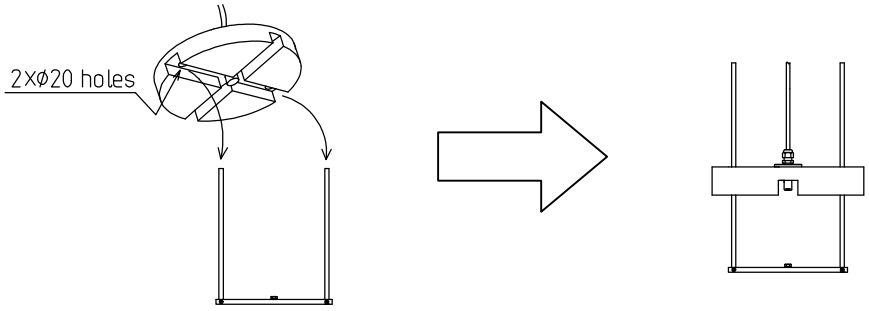
(2) Insert the guide rods to the holes in the empty pit attachment, ensuring the bolt head on the attachment comes on the top.

⚠ CAUTION

The empty pit attachment has female threaded holes of M10. Thread the guide rods for approximately 9mm from one end, and screw them into the empty pit attachment.



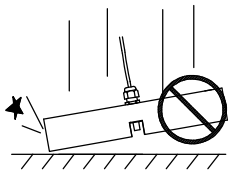
(3) Slide the sensor down on the guide rods.



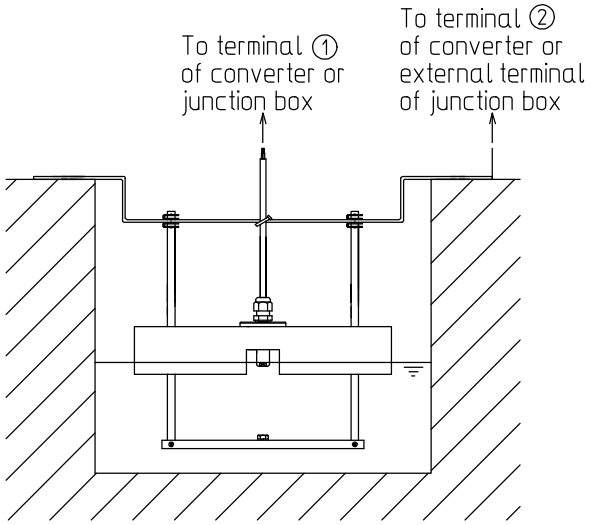
(4) Mount the guide rods with the empty pit attachment on the pit. The guide rods are separated by 200mm.

⚠ CAUTION

Do not drop, throw, crush, drag or give a strong shock to the sensor to avoid damaging it.



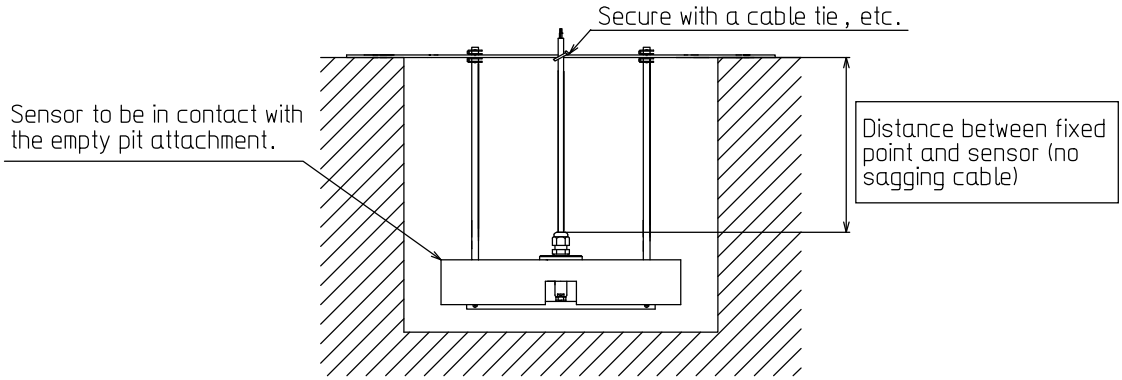
(5) Mount the mounting board on the pit.
After that, connect the sensor cable to terminal ① of the converter or the junction box, and the mounting board or the electrode to terminal ② of the converter or the external terminal of the junction box. See 6. Wiring.



⚠ CAUTION

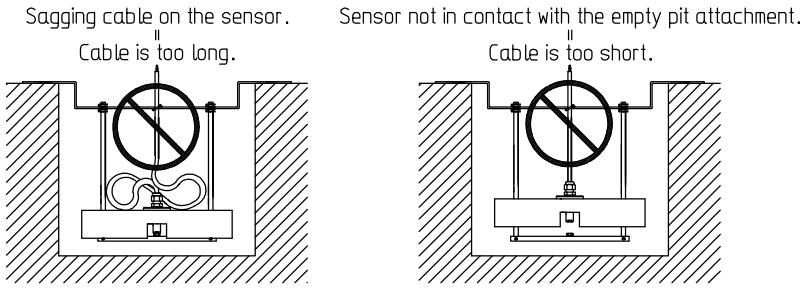
When mounting the sensor on the pit, be careful not to give a shock to the empty pit attachment, by dropping the sensor from the guide rod top for example. This may damage the sensor, or move the guide rod away from its fixed position.

(6) Secure the sensor cable to the mounting board with a cable tie* so that the electrode is in contact with the empty pit attachment without sagging cable.



⚠ CAUTION

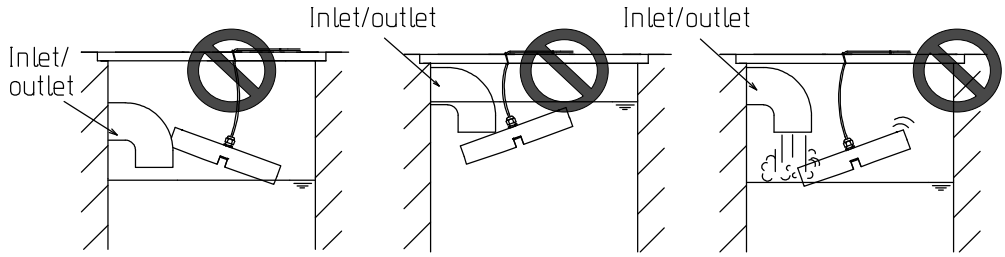
Secure the cable in a way that it does not restrict the sensor movement. If the portion below the fixing point is too long, faulty operation may result at high levels due to sagging cable. If too short, erratic output may result at low levels due to the electrode not coming into contact with the empty pit attachment.



* Refer to 11. GLOSSARY.

【C. Without using guide rods】

(1) Select a location without obstructions (piping, etc.) that restrict float movement.



⚠ CAUTION

Empty pit will causes the sensor to switch to the oil detection state. If this should be avoided, use the empty pit attachment and the guide rods.

Avoid proximity to inlet or other turbulent locations. Faulty operation may result.

Use an earth rod inside the pit, and connect it to terminal ② of the converter or the external terminal of the junction box. If not, the sensor will not operate correctly.

(2) Secure the sensor cable.

⚠ CAUTION

Secure the cable in a way that it does not restrict the sensor movement. If the portion below the fixing point is too long and thus affects sensor movement, faulty operation may result at high levels due to sagging cable. If too short, erratic output may result at low levels due to the electrode not in contact with water.

5.3 Mounting the converter.

The converter needs a plug in socket. Socket (11PFA from Omron or equivalent) is optionally available from Nohken.

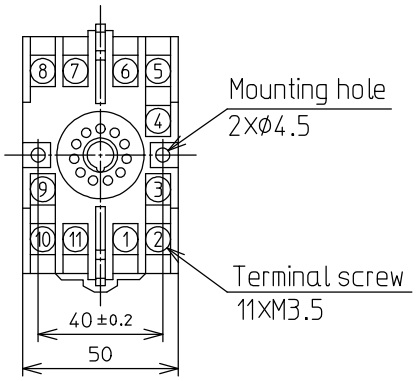
5.3.1 Mounting the socket

(1) Screw mounting

Secure the socket using tapping screws (nominal 4), or tap M4 threads in the mounting holes and secure the socket with M4 screws.

(2) Rail mounting

Use a DIN-rail (35mm) to secure the socket.



11PFA mounting dimensions

⚠ CAUTION

After inserting the converter into the socket, snap the clip on the socket in place. If not, the converter may slip off and be damaged.

6. WIRING

6.1 Before Wiring

6.1.1 Disconnect power to the cable.

⚠ WARNING

Disconnect power before wiring, or electric shock, leakage, ignition or user injury due to short circuit can result.

6.2 Wiring

(1) Connect cable to the terminals. Always use a screw driver to tighten the screws. Terminal screws are of M3.5. Use a cable rug of R1.25-3.5 or equivalent sizes. See Fig. 6-2 when wiring.

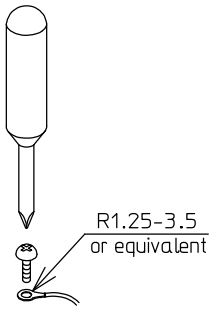


Fig. 6-1

(2) Sensor cable has no polarity. Connect one of the conductors.

⚠ CAUTION

Sensor cable has 2 cores, a white conductor and a black conductor. As they are internally shot circuited, connect one or both of them to the converter or the junction box.
When both conductors are used, connect them to the same terminal. When one of them is used, ensure the other conductor that is not connected will not come into contact with other part of the sensor.

Connect the guide rod, mounting board or earth electrode to terminal ② of the converter or the external terminal of the junction box. Connecting only one of them will result in faulty operation.

6.3 System and wiring diagrams

(1) One sensor per converter.

(2) Select either 100 to 120V AC or 200 to 240V AC power range.

(3) 24V DC version is available on request.

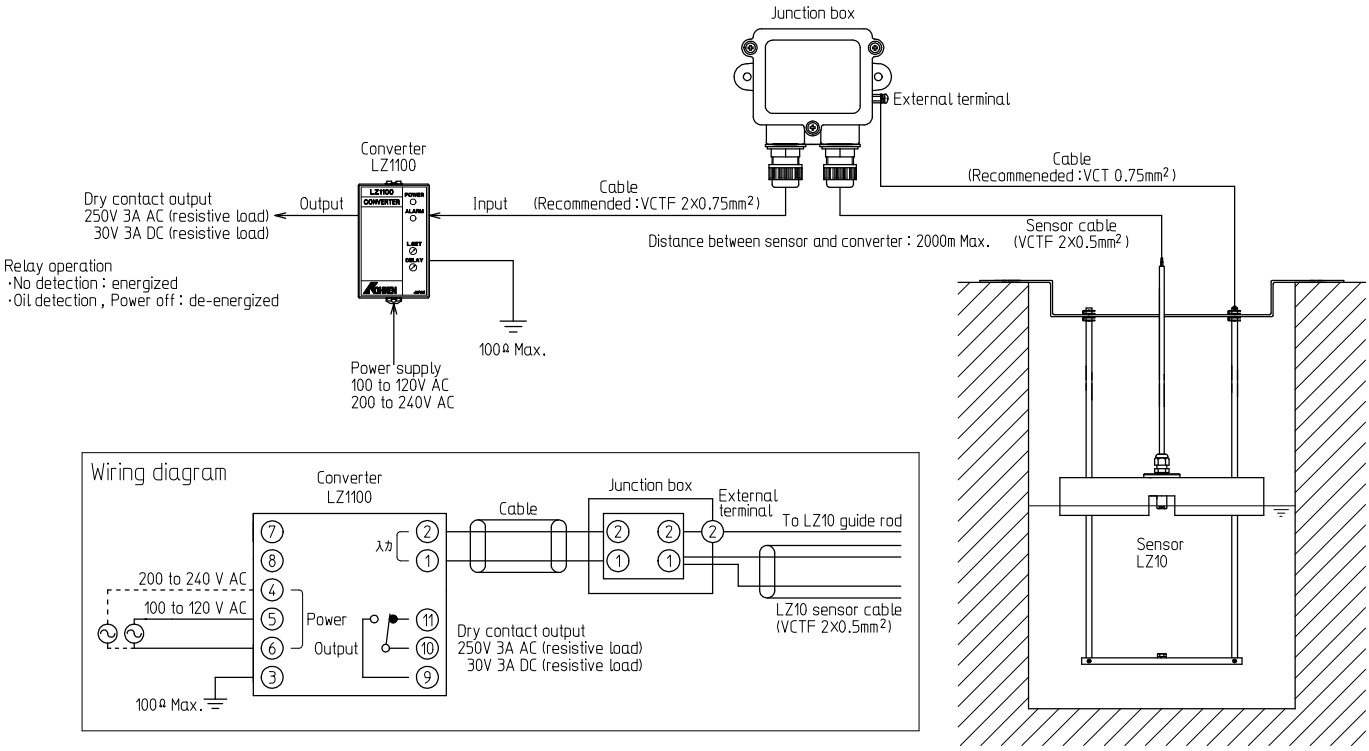


Fig.6-2: System and wiring diagrams

7. OPERATION

7.1 Operation

Converter operation

	Timer operation	Relay output		POWER LED	ALARM LED
	Approx.3 to 10 sec.	⑩ – ⑪	⑩ - ⑨		
No detect	N/A	Open	Close	ON-Green	OFF
Oil detect	In operation	Open	Close	ON-Green	ON-Orange
	Expired	Close	Open	ON-Green	ON-Red
Power OFF	-	Close	Open	OFF	OFF

7.2 Pit water setting

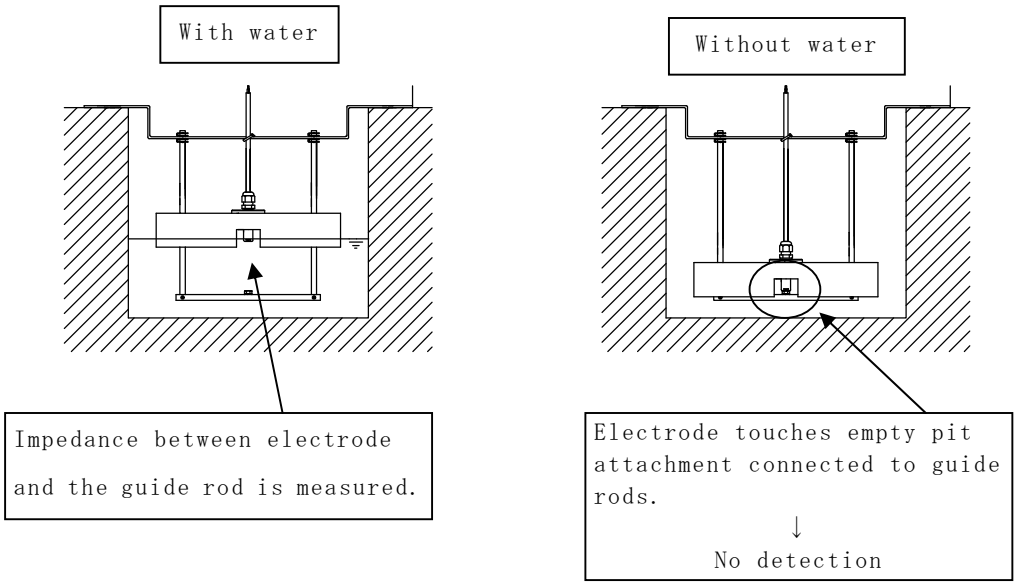
L.SET trimmer is factory set to its middle position. This means that for normal operation such as draining, the sensor is in a non-detection state when the electrode is in contact with water. If the sensor indicates oil detection with the electrode in contact with water and without oil, turn the L.SET trimmer clockwise until the ALARM LED turns off. Use a slotted screw driver (size 2 or 2.5) to turn the trimmer.

7.3 Timer operation

Timer operates when the sensor switches from a non-detection state to the oil detection state. The timer is factory set to approximately 3 seconds. Turning the DELAY trimmer clockwise extends the time (10 seconds max.). Use a slotted screw driver (size 2 or 2.5) to turn the trimmer. The timer does not operate when the sensor switches from the oil detection state to a non-detection state.

7.4 Preventing empty pit error

Empty pit causes the sensor to indicate oil detection. The empty pit attachment prevents this fault, since the electrode comes into contact with the attachment.



7.5 Operation check

Prior to actual application, supply power to the sensor and check its operation. The sensor should be in a non-detection state when the float is in contact with water (relay terminals 10 and 9 should be electrically continued.)

The sensor should indicate oil detection when lifted from the water surface (after timer has expired, no continuity between relay terminals 10 and 9).

If the sensor does not operate as it should, check for incorrect wiring and buildup on the electrode. This manual should also be consulted. Contact our sales office for any questions.

8. MAINTENANCE AND INSPECTION

Perform maintenance and inspection once or twice a year. More frequent maintenance will be required depending on operating conditions such as installation, material type, and temperature.

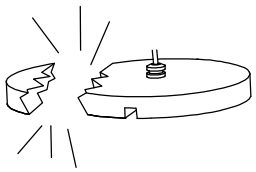
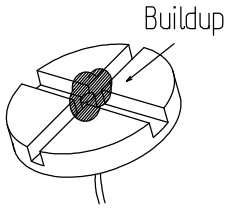
The sensor has to be removed from the pit for maintenance.

Read section 4. Handling Notes before starting. Ensure ample space for maintenance.

⚠ WARNING

Disconnect power before maintenance, or electric shock, leakage, or ignition or user injury due to short circuit can result.

8.1 Maintenance procedure

8.1.1 Check for visible damage that may impair performance. Repair or replace if any.	
8.1.2 Check for buildup on the sensor and the empty pit attachment. Clean if any. Do not use a metal spatula or other tools that can damage the sensor.	
8.1.3 Ensure with a tool that screws are properly tightened. If loose, tighten with a tool.	

8.2 Mounting

See 5. Mounting.

8.3 Wiring

See 6. Wiring.

8.4 Component replacement

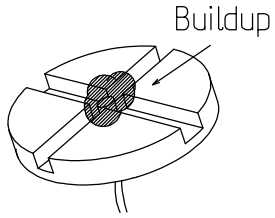
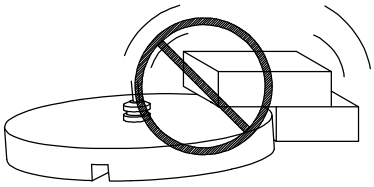
All new components must be of the same specifications as those of the old ones, and provided by Nohken. Be careful since some components look the same but are of different specifications.

9. STORING

Observe instructions below when storing the sensor after delivery before use, or after removing from the tank. Failure to do so can result in faulty operation.

9.1 Store the sensor in the following conditions.

- Temperature: Sensor -20 to +50℃ (no dew condensation)
  Converter -20 to +60℃ (no dew condensation)
- Humidity: 85%RH Max.
- Vibration: not excessive
- Atmosphere: not corrosive (without NH_3, SO_2, or Cl_2)

9.2 Remove buildup. Buildup left near the float can harden and adversely affect operation when the sensor is used the next time.	
9.3 Do not place anything on the sensor or the cable to avoid damaging them.	

REFERENCE

Wrap the sensor with polyethylene sheet and seal it to protect from moisture and dust. If the sensor is stored where temperature change is enormous, enclose desiccant such as silica gel in the polyethylene sheet.

10. TROUBLESHOOTING

⚠ CAUTION

In the event of trouble, perform the following and nothing else.
If you have any question, please contact our sales office.

Trouble	Possible cause	Corrective action	Reference
Does not detect oil.	Buildup on the electrode.	Remove buildup.	8. Maintenance and Inspection
Indicates oil detection without oil.	Buildup on the electrode or the empty pit attachment.	Remove buildup.	8. Maintenance and Inspection
	Float movement is restricted.	Move the sensor to a place without obstruction that restricts float movement.	5.2 Mounting the sensor
	Cable below the fixing point is too short.	Correct the cable length.	5.2 Mounting the sensor
	Cable between sensor and converter is broken.	Correct cable connection.	6. Wiring
	Pit water setting is incorrect.	Correct the setting.	7.2 Pit water setting
Relay chatters.	Turbulent surface.	Mount the sensor in a place without turbulence, or extend the timer setting.	5.2 Mounting the sensor 7.3 Timer operation

11. GLOSSARY

Terms used in this manual are defined in the chart below. This chart excludes the terms which have already been defined earlier in this manual.

Impedance	Electric resistance of measured material
Guide rod	Rod in 304 stainless steel that prevents the sensor from moving left or right.
Empty pit attachment	Board to prevent faulty operation when the pit is empty, and to accommodate the guide rods.
Cable tie	Plastic strip that secures cable in place.

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