

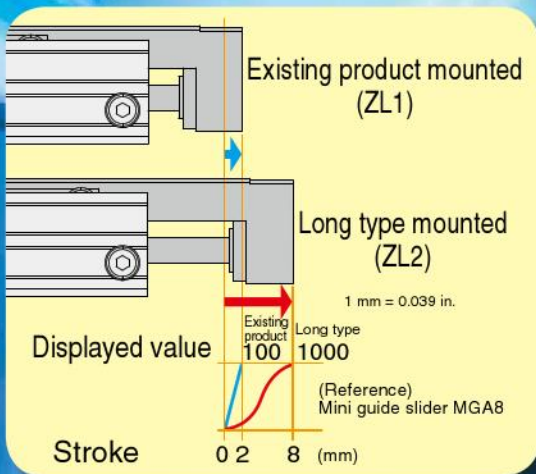
# Linear Magnetic Sensor Controller Long Type



Koganei brand

All products are **RoHS** directive compliant

**Position of actuator operation is visible!**



**Expanded sensing range!**




- **4-digit LED display**  
Green or red display color possible
- **Compatible actuators**  
Air hands and linear drive cylinders
- **Controller output specifications**  
4-point switching output is standard equipment  
Analog output (1 to 5 VDC) is standard equipment
- **European CE marking compliant**

# Linear magnetic sensor controller Long type

 Environmentally friendly **RoHS** compliant product!

**Converts position of actuator within the sensing range to numerical values.**

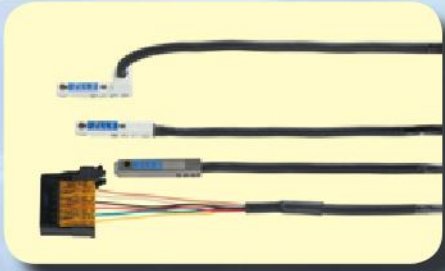
- ① Analog output (1 to 5 VDC) is standard equipment and detected position can be monitored from controller.
- ② Four-point switching output makes it possible to detect position in measured range.
- ③ Compatible with wide range of Koganei actuators because sensor heads are same shape as ZE types and □4 types.

 For information about actuators on which the linear magnetic sensor controller can be mounted, refer to "List of Compatible Actuators" pages ③ to ④.



4-digit LED display  
The display color can be changed to green or red.

Switch output display  
Indicator color is red only.



Sensor head  
ZLL □ - □



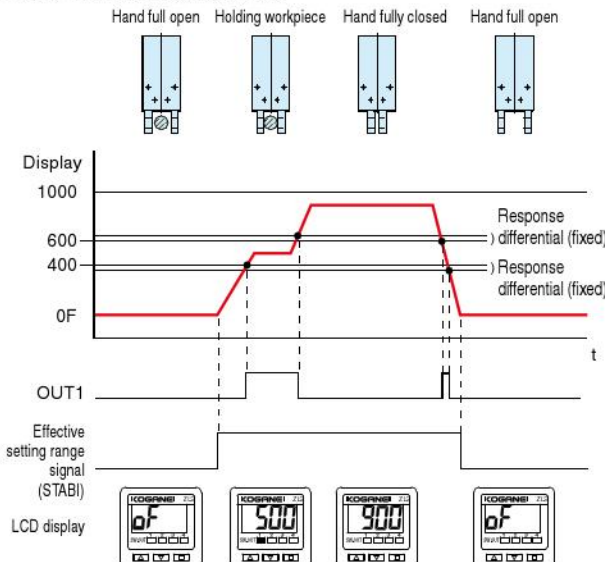
Linear magnetic sensor controller Long type  
ZL2 □ - □

## Output mode

### Window comparator mode

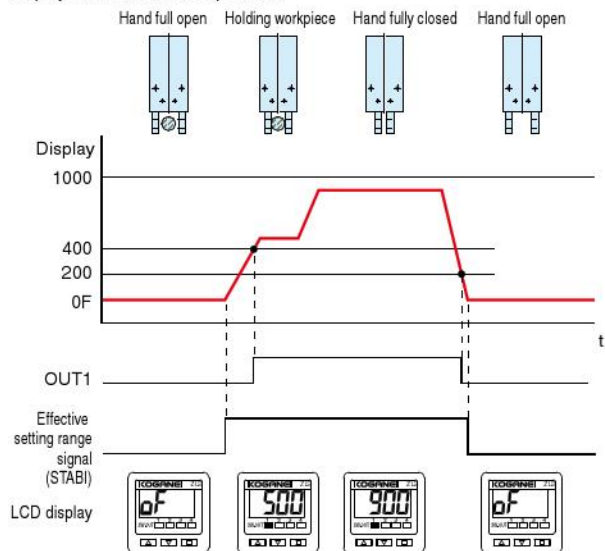
The ON range of each output can be set within the effective measuring range (sensor head ON range).  
Response differential is fixed (2 digits)

When the controller setting and sensor head setting positions are as shown below.  
OUT1 Threshold value setting Upper limit: 600 Lower limit: 400  
Display when hand is full open: 900



### Hysteresis mode

The ON position and OFF position each output can be set within the effective measuring range (sensor head ON range).  
When the controller setting and sensor head setting positions are as shown below.  
OUT1 Threshold value setting Upper limit: 400 Lower limit: 200  
Display when hand is full open: 900



CAUTION: When the effective measuring range signal is OFF (outside the measuring range), OUT also becomes OFF.

**CAUTION**

Read the safety precautions on page ⑤ before using this product.

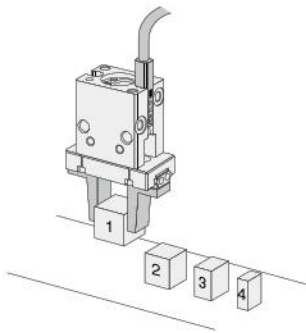
**Example of use**

Normal reed switches are intended to sense the end position of the actuator's operation and the position where it stops in the middle; so their characteristic sensing range is narrow. While linear magnetic sensor controllers can be set to turn on at any point within the sensing range, which is because they convert the variations in the magnetic flux of the sensor magnets to numerical values. With the long types (ZL2), the sensing range is 3 times larger than existing product (ZL1) (in-house comparison).



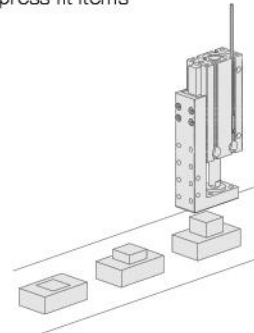
The sensing range varies depending on the mounted actuator.  
Refer to "List of Compatible Actuators" on pages ③ to ④.

## ● Workpiece identification by 4-point switching output



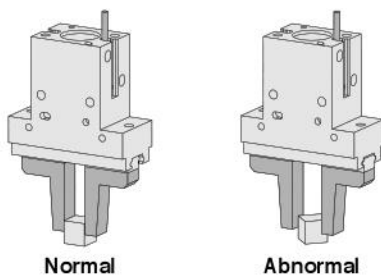
Given an air hand that needs to grasp 4 different sizes of workpieces, the sizes can be distinguished by setting the numerical value of the openness of the air hand, and then sending the switching output to the upper controller.

## ● Height check for press-fit items



Determining the acceptance criteria for the height of the workpiece that is injected is possible because at the position that the cylinder presses on the top of the workpiece that is being injected, the sensed numerical values are sent as analog output to the upper controller. In addition, the injection position is converted to numerical values so the injection completed criteria can be set more precisely than usual.

## ● Determining state of grasp on workpiece



To grasp a particular workpiece, the air hand determines whether the workpiece is grasped in the normal orientation or if some foreign object is being clamped by sending analog output of the numerical value detected for the closure of the air hand to the upper controller.

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## List of Compatible Actuators Air Cylinder (Reference Values)

### <Effective range>

The effective ranges are the smallest values measured by Koganei. However, they should be treated as reference values because the effective ranges noted herein may not be achieved due to irregularities in the sensing magnets and the usage environment.

This is a list of typical models. Refer to the catalog for each air cylinder to select variations.

Units (mm [in.])

Cylinder bore size		4.5	6	8	10	12	16	20	25	32	40	50	63	80	100	125
Typical model		[0.177]	[0.236]	[0.315]	[0.394]	[0.472]	[0.630]	[0.787]	[0.984]	[1.260]	[1.575]	[1.969]	[2.480]	[3.150]	[3.91]	[4.91]
Basic Cylinders 	BC BCSA BCTA BCD BCG	-	* Because the embedded types (ZLL1 and ZLL2) cannot be supported. Contact us regarding different situations.						16 [0.630]	18 [0.709]	25 [0.984]	30 [1.181]	30 [1.181]	34 [1.339]	32 [1.260]	36 [1.417]
High multi cylinders  (Note 1)	YMDA □ S	-	8 [0.315]	-	9 [0.354]	-	12 [0.472]	14 [0.551]	-	-	-	-	-	-	-	-
Multi mount cylinders  (Note 2)	BDA □ S BSA □ S BTA □ S BDAD □ S	-	10 [0.394]	-	12 [0.472]	-	14 [0.551]	-	-	-	-	-	-	-	-	-
Knock cylinders  (Note 2)	NDAS	-	10 [0.394]	-	11 [0.433]	-	16 [0.630]	-	-	-	-	-	-	-	-	-
Pen cylinders  (Note 2)	PBDA □ S PBSA □ S PBTA □ S	-	8 [0.315]	-	9 [0.354]	-	11 [0.433]	-	-	-	-	-	-	-	-	-
Jig cylinder C 	CDA □ S CSA □ S CTA □ S CCDA □ S CBDA □ S T-CDAS	-	11 [0.433]	9 [0.354]	10 [0.394]	12 [0.472]	14 [0.551]	20 [0.787]	22 [0.866]	18 [0.709]	22 [0.866]	23 [0.906]	26 [1.024]	30 [1.181]	28 [1.102]	-
Twin rod cylinders 	TBDA TBDAK TBDAM	-	-	-	9 [0.354]	-	9 [0.354]	10 [0.394]	10 [0.394]	10 [0.394]	-	-	-	-	-	-
Jig cylinder with guide 	SGDA SGDAY SGDAK □ SGDAP □ SGDAQ □	-	11 [0.433]	10 [0.394]	10 [0.394]	12 [0.472]	14 [0.551]	20 [0.787]	22 [0.866]	18 [0.709]	22 [0.866]	24 [0.945]	26 [1.024]	-	-	-
Rod slider 	ARS ARSZ ARSK	-	9 [0.354]	-	9 [0.354]	-	10 [0.394]	10 [0.394]	11 [0.433]	-	-	-	-	-	-	-
Mini guide sliders 	MGA □ S	8 [0.315]	8 [0.315]	8 [0.315]	8 [0.315]	8 [0.315]	8 [0.315]	8 [0.315]	-	-	-	-	-	-	-	-
MINI GUIDE TA- 	MGTS	-	8 [0.315]	8 [0.315]	8 [0.315]	8 [0.315]	8 [0.315]	8 [0.315]	-	-	-	-	-	-	-	-

Note 1. There are limits to the mounting groove that can be used due to the orientation of the installed sensor head. For details, refer to "User's Manual for the Linear Magnetic Sensor Controller, Long Type".

Note 2. These cylinders are compatible with ZLL3. A separate sensor holder is needed for installation. Order a sensor holder that is suitable for the cylinder you are using. For details, refer to the catalog for each cylinder.

## List of Compatible Actuators Air Hand (Reference Values)

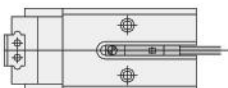
This is a list of typical models. Refer to the catalog for each air hand to select variations.

Typical model	Bore	Full stroke detection or effective range mm [in.]	Guideline for sensor mounting position ( $\pm 20$ [0.787])	
			Sensed value when fully closed	Sensed value when fully opened
 <b>NHB □ PG</b> <b>NHB □ PGY</b> <b>NHB □ PGJ</b>	8 [0.315]	○	Against end of groove <sup>Note 2</sup>	
	10 [0.394]	○	320 [12.6]	680 [26.8]
	16 [0.630]	○	300 [11.8]	700 [27.6]
	20 [0.787]	○	230 [9.1]	770 [30.3]
	25 [0.984]	○	250 [9.8]	750 [29.5]
	32 [1.260]	○	200 [7.9]	800 [31.5]
	40 [1.575]	○	120 [4.7]	880 [34.6]
	50 [1.969]	○	100 [3.9]	900 [35.4]
 <b>NHBDPGL</b>	8 [0.315]	○	Against end of groove <sup>Note 2</sup>	
	10 [0.394]	○	150 [5.9]	850 [33.5]
	16 [0.630]	○	150 [5.9]	850 [33.5]
	20 [0.787]	○	100 [3.9]	900 [35.4]
 <b>NHB □ PA</b>  <b>NHB □ P</b>	6 [0.236]	○	Against end of groove <sup>Note 2</sup>	
	10 [0.394]	○	380 [15.0]	620 [24.4]
	16 [0.630]	○	310 [12.2]	690 [27.2]
	20 [0.787]	○	250 [9.8]	750 [29.5]
	25 [0.984]	○	280 [11.0]	720 [28.3]
	10 [0.394]	○	620 [24.4]	380 [15.0]
	16 [0.630]	○	690 [27.2]	310 [12.2]
	20 [0.787]	○	750 [29.5]	250 [9.8]
 <b>NHB □ S</b>	8 [0.315]	○	400 [15.7]	600 [23.6]
	10 [0.394]	○	340 [13.4]	660 [26.0]
	16 [0.630]	○	310 [12.2]	690 [27.2]
	20 [0.787]	○	270 [10.6]	730 [28.7]
	25 [0.984]	○	300 [11.8]	700 [27.6]
 <b>NHBDSL</b> <b>NHBDSL G</b>	12 [0.472]	○	50 [1.969]	950 [37.4]
	16 [0.630]	○	70 [2.756]	930 [36.6]
	20 [0.787]	○	40 [1.575]	960 [37.8]
	25 [0.984]	○	50 [1.969]	950 [37.4]
 <b>NHE1D</b>	16 [0.630]	○	340 [13.4]	660 [26.0]
	20 [0.787]	○	280 [11.0]	720 [28.3]
	25 [0.984]	○	230 [9.1]	770 [30.3]
 <b>NHC1D</b>	10 [0.394]	○	480 [18.9]	700 [27.6]
	16 [0.630]	○	380 [15.0]	620 [24.4]
	20 [0.787]	○	330 [13.0]	670 [26.4]
	25 [0.984]	○	250 [9.8]	750 [29.5]
 <b>NHL1D</b>	8 [0.315]	○	Against end of groove <sup>Note 2</sup>	
	10 [0.394]	○	650 [25.6]	350 [13.8]
	16 [0.630]	○	400 [15.7]	200 [7.9]
	20 [0.787]	○	550 [21.7]	150 [5.9]
	25 [0.984]	○	650 [25.6]	150 [5.9]
 <b>AFDPG</b> <b>AFDPGL</b>	6 [0.236]	18 [0.709] <sup>Note 1</sup>	* The effective ranges for AFDPG(L) shown to the left are typical values, so they are just reference values.	
	8 [0.315]	22 [0.866] <sup>Note 1</sup>		
	12 [0.472]	28 [1.102] <sup>Note 1</sup>		
	14 [0.551]	32 [1.260] <sup>Note 1</sup>		
	18 [0.709]	26 [1.024] <sup>Note 1</sup>		
	25 [0.984]	60 [2.362] <sup>Note 1</sup>		

Note 1. Effective ranges indicate open-close strokes of both fingers.





**AFDPGH** has different piston diameters on left and right, so contact us regarding its use.

Note 2. Install sensor switches so they butt against the inner end of the groove on the air hand. (Refer to the diagram below)



Before selecting and using products, please read all the Safety Precautions carefully to ensure proper product use. The Safety Precautions shown below are to help you use the product safely and correctly, and to prevent injury or damage to assets beforehand. ISO4414 (Pneumatic fluid power - Recommendations for the application of equipment to transmission and control systems), Follow the Safety Precautions for: ISO4414 (Pneumatic fluid power-General rules and safety requirements for systems and their components), JIS B 8370 (Pneumatic fluid Power-General rules relating to systems regulations)

**The directions are ranked according to degree of potential danger or damage: “DANGER!”, “WARNING!”, “CAUTION!”, and “ATTENTION!”**

 <b>DANGER</b>	Indicates situations that can be clearly predicted as dangerous. If the noted danger is not avoided, it could result in death or serious injury. It could also result in damage or destruction of assets.
 <b>WARNING</b>	Indicates situations that, while not immediately dangerous, could become dangerous. If the noted danger is not avoided, it could result in death or serious injury. It could also result in damage or destruction of assets.
 <b>CAUTION</b>	Indicates situations that, while not immediately dangerous, could become dangerous. If the noted danger is not avoided, it could result in light or semi-serious injury. It could also result in damage or destruction of assets.
 <b>ATTENTION</b>	While there is little chance of injury, this content refers to points that should be observed for appropriate use of the product.

**■ This product was designed and manufactured as parts for use in General Industrial Machinery.**

- When selecting and handling equipment, the system designer or another person with sufficient knowledge and experience should always read the safety precautions, catalog, instruction manual and other literature before commencing operation. Making mistakes in handling is dangerous.
- After reading the Owner’s Manual, Catalog, etc., always place them where they can be easily available for reference to users of this product.
- If transferring or lending the product to another person, always attach the Owner’s Manual, Catalog, etc., to the product where they are easily visible, to ensure that the new user can use the product safely and properly.
- The danger, warning, and caution items listed under these “Safety Precautions” do not cover all possible cases. Read the Catalog and Owner’s Manual carefully, and always keep safety first.
- Only the controller (ZL2) is compliant with EMC directives. The sensor head (ZLL) cannot be used in environments with high magnetic fields.

 **DANGER**

- Do not use for the applications listed below:
  1. Medical equipment related to maintenance or management of human lives or bodies.
  2. Mechanical devices or equipment designed for the purpose of moving or transporting people.
  3. Critical safety components in mechanical devices.
 This product has not been planned or designed for purposes that require advanced stages of safety. It could cause injury to human life.
- When mounting the product and workpiece, always firmly support and secure them in place. Dropping or falling the product or improper operation could result in injury.
- Never attempt to modify the product. It could result in abnormal operation leading to injury, electric shock, fire, etc.
- Never attempt inappropriate disassembly, assembly, or repair of the product relating to its basic inner construction, or to its performance or functions. It could result in injury, electric shock, fire, etc.
- Do not splash water on the product. Spraying water on the product, washing the product, or using the product under water creates the risk of malfunction, leading to injury, electric shock, fire, etc.
- Do not use the linear magnetic sensor controller or sensor head in locations where dangerous substances, such as flammable or ignitable substances, are present. These sensor controllers and sensor heads are not explosion-proof. It could ignite or burst into flames.
- Do not make any adjustments (connecting or disconnecting wiring connectors, mounting or positioning sensor heads, etc.) to mechanisms attached to the product while the product is operating. This could result in abnormal operation leading to injury.

 **WARNING**

- Do not use the product in excess of its specification range. Doing so creates the risk of product breakdown, loss of function, or damage. It could also drastically reduce the operating life.
- Before supplying electricity to the device and before starting operation, always conduct a safety check of the area where the machine is operating. Unintentional supply of electricity creates the risk of electric shock or injury due to contact with moving parts.
- Do not touch anything where electrically charged parts are exposed, such as the terminals, while the electric power is on. There is a possibility of electric shock and abnormal operation.
- Do not throw the product into fire. The product could explode and/or produce toxic gases.
- Do not sit on the product, place your feet on it, or place other objects on it. Accidents such as falling could result in injury. Dropping or toppling the product may result in injury, or it might also damage or break it, resulting in abnormal or erratic operation, runaway, etc.
- Before conducting maintenance, inspection, repair, replacement, or any other similar work, always completely cut off the electric power supply.
- Do not damage any cords, such as the lead wires of the sensor heads. Allowing the cords to be damaged, bent excessively, pulled, rolled up, placed under heavy objects or squeezed between two objects, may result in current leaks or defective continuity that will lead to fire, electric shock, or abnormal operation.
- Do not apply an external magnetic field to the controller and sensor head while the linear magnetic sensor controller is in operation. Unintended operations could damage equipment or cause injury.
- Use safety circuits or system designs to prevent damage to machinery or injury to personnel if the machine is shut down, such as due to emergency stop or electrical power failure.
- Avoid wiring parallel to or in the same conduit as power or high-voltage lines. The linear magnetic sensor controller may be affected by electric noise that results in erratic operation.
- Make sure that the polarity of wiring connections is correct. The wrong polarity could result in damage to the linear magnetic sensor controller and sensor head.
- Installing two or more cylinders equipped with the sensor heads of linear magnetic sensor controllers in parallel could cause malfunctions, so separate the sensor heads by at least 40 mm [1.575 in.].

## CAUTION

- Do not use the products in locations that are subject to direct sunlight (ultraviolet rays), dust, salt, iron powder, or high humidity. Also, do not use the products if the media and/or ambient atmosphere includes organic solvents, phosphate ester type hydraulic oil, sulfur dioxide gas, chlorine gas, or acids. Such uses could lead to loss of functions within a short period, sudden degradation in performance, or reduced operating life. For details on materials used in the product, refer to the names of materials in the specifications.
- When installing the product, leave room for adequate working space around it. Failure to ensure adequate working space will make it more difficult to conduct daily inspections and maintenance, which could eventually lead to system shutdown or damage to the product.
- Do not use the linear magnetic sensor controller or sensor head in locations subject to large electrical currents or strong magnetic fields. This could result in erratic operation.
- Do not scratch, dent, or deform the product by climbing on it, using it as a step, or placing objects on top of it. It could result in damaged or broken a product that results in operation shutdown or degraded performance.
- Always post a "Work in Progress" sign for installations, adjustments, or other operations, to avoid unintentional supplying of air or electrical power, etc. Unintended power supply can cause electric shock and sudden operation, creating the risk of personal injury.
- Do not pull on the cords of the lead wires, etc., of the linear magnetic sensor controller and sensor head, do not grab them when lifting or carrying the equipment, or place heavy objects or excessive loads on them. Such actions could result in current leaks or defective continuity that leads to fire, electric shock, or abnormal operation.
- Use only the sensor head specified for this product. Use of sensor heads other than those specified could lead to erratic operation of, or damage to, the product.
- When handling linear magnetic sensor controllers and sensor heads, do not apply excessive shocks (294.2 m/s<sup>2</sup> [30 G] or larger) by striking, dropping, or bumping against them. Even if their casing is undamaged, their inner parts may suffer breakdown, causing erratic operation.
- Avoid short circuiting the loads. Turning the switch output on while the load is short-circuited causes overcurrent, which will damage the linear magnetic sensor controller. Example of short-circuited load: The lead wire of a switch output is directly connected to the power supply.
- Tighten screws with a tightening torque of 0.2 N·m [0.148 ft·lbf] when mounting the sensor head. Over-tightening beyond the allowed tightening torque may damage the sensor head.
- Be sure to connect the sensor head and controller while the power is turned off. Connecting the sensor head while the power is supplied may cause erratic operation of the controller because of surge voltage, etc.

## ATTENTION

- When considering the possibility of using this product in situations or environments not specifically noted in the Catalog or Instruction Manual, or in applications where safety is an important requirement, such as in an aircraft facility, combustion equipment, leisure equipment, safety equipment and other places where human life or assets may be greatly affected, use the product sufficiently within its specified ratings and performance and take adequate safety precautions, such as the use of fail-safes. Be sure to consult us with such applications.
- Always check the Catalog and other reference materials for product wiring and piping.
- Use a protective cover, etc., to ensure that people do not come into direct contact with the operating portion of mechanical devices, etc.
- Do not control in a way that would cause workpieces to fall during power failure. Take control measures so that they prevent the workpieces, etc., from falling during power failure or emergency stop of the mechanical devices.
- When handling the product, be sure to wear protective gloves, safety glasses, safety shoes, etc., to keep safe.
- When the product can no longer be used, or is no longer necessary, dispose of it appropriately as industrial waste.
- Pneumatic equipment can exhibit degraded performance and function over its operating life. Always conduct daily inspections of the pneumatic equipment, and confirm that all requisite system functions are satisfied, to prevent accidents from happening.
- For inquiries about the product, contact your nearest Koganei sales office or Koganei overseas department. The address and telephone number is shown on the back cover of this catalog.

## Other

- Always observe the following items.
  1. When using this product in pneumatic systems, always use genuine Koganei parts or compatible parts (recommended parts). When doing maintenance or repairs, always use genuine Koganei parts or compatible parts (recommended parts). Always observe the required methods.
  2. Never inappropriately disassemble or assemble the product in relation to its basic construction, performance, or functions.

Koganei cannot be responsible if these items are not properly observed.

## Handling Instructions and Precautions



### General precautions

### Wiring

1. When using a power supply with a commercially available switching regulator, be sure to connect a frame ground (F.G.) terminal.
2. Always connect a frame ground (F.G.) terminal when using devices that generate electrical noise, such as switching regulators and inverter motors, in the vicinity of the sensor mount position.
3. After completing wiring work, check to make sure that all connections are correct.

### Other

1. Check fluctuations in the power source to confirm they do not exceed the ratings before turning on the power.
2. Avoid use during the transitional state (1 second) when the power is turned on.
3. Do not operate the keys using a needle or any other sharp instrument.

## Warranty and General Disclaimer

### 1. Warranty Period

The warranty period for Koganei products is 1 year from the date of delivery.

\* However, some products have a 2-year warranty; contact your nearest Koganei sales office or the Koganei overseas department for details.

### 2. Scope of Warranty and General Disclaimer

- (1) When a product purchased from Koganei or from an authorized Koganei distributor or agent malfunctions during the warranty period in a way that is attributable to Koganei's responsibility, Koganei will repair or replace the product free of charge. Even if a product is still within the warranty period, its durability is determined by its operation cycles and other factors. Contact your nearest Koganei sales office or the Koganei overseas department for details.
- (2) The Koganei product warranty covers individual products. Therefore, Koganei is not responsible for incidental losses (repair of this product, various expenses required for replacement, etc.) caused by breakdown, loss of function, or loss of performance of Koganei products.
- (3) Koganei is not responsible for any losses or for any damages to other machinery caused by breakdown, loss of function, or loss of performance of Koganei products.
- (4) Koganei is not responsible for any losses due to use or storage of the product in a way that is outside of the product specifications prescribed in Koganei catalogs and instruction manuals, and/or due to actions that violate the mounting, installation, adjustment, maintenance or other safety precautions.
- (5) Koganei is not responsible for any losses caused by breakdown of the product due to factors outside the responsibility of Koganei, including but not limited to fire, natural disaster, the actions of third parties, and intentional actions or errors by the purchaser.

# Handling Instructions and Precautions

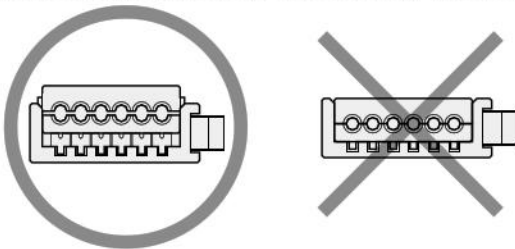


## Mounting and Piping

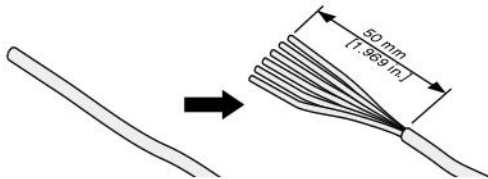
### Sensor head and connector connection overview

The ZLL-□-□L sensor head is provided to you with the mini plug wire mount plug connected to the sensor head unit. A special tool is required if you need to reconnect in order to adjust the length. Use the following procedure when reconnecting.

- Be sure to use the mount plug and the special tool shown below when reconnecting.  
 6P mini clamp wire mount plug Model: ZL-6M  
 Special tool Model: 1729940-1  
 Tyco Electronics Japan G.K.
- Check to make sure that the connector cover (lead wire inlet) is sitting above the body of the connector. Note that a connector whose cover is even with the body of the connector cannot be used.

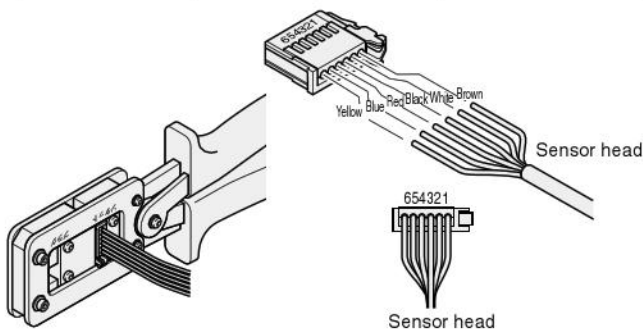


- Cut the sensor head cable to the required length. Strip the outer covering of the cable, 50 mm [1.969 in.] from the end, to expose the lead wires. Do not strip the insulation from the individual lead wires at this time.



- Insert the lead wires into the connector cover holes in accordance with the information in the table below. Check to make sure the lead wires are fully inserted (wire goes in about 9 mm [0.354 in.]) as far as they will go by viewing the semi-transparent top cover of the connector. Note that supplying power while connections are incorrect will damage the sensor head and controller.

Connector side number	Signal name	Lead wire color
1	Sensor head voltage (+)	Sensor head brown lead
2	Sensor head voltage output A_IN	Sensor head white lead
3	Sensor head voltage output B_IN	Sensor head black lead
4	Indicator (LED) input	Sensor head red lead
5	GND	Sensor head blue lead
6	Sensor head voltage output C_IN	Sensor head yellow lead

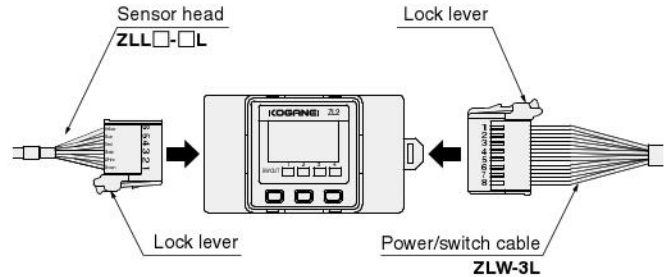


- Taking care not to allow the lead wires to come out of the connector, use the special tool (don't try to use any other tool) to squeeze the cover and body of the connector until the cover is pressed into the body.

Connection is complete when the cover is even with the connector body.

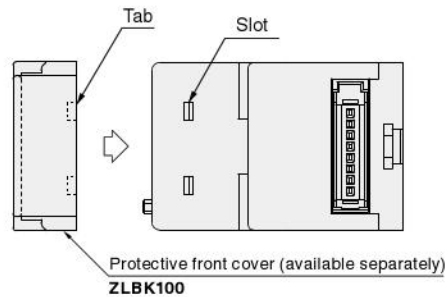
- Double check to make sure that wiring is correct.

### Attaching and detaching of the sensor head and power/switch cables

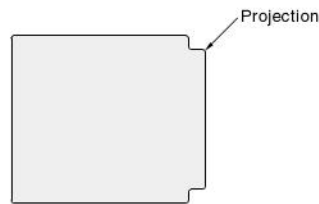


To attach the sensor head and the power/switch cables, position the lock levers as shown in the illustration above, and then insert until they lock into place with the controller side connectors. To disconnect, press the lock lever down as far as it will go as you pull the connector to unplug it. At this time, take care not to apply undue force to the lead wires.

### Attaching the protective front cover



Attach the protective front cover so the tabs inside the cover enter the slots on the Linear Magnetic Sensor Controller.



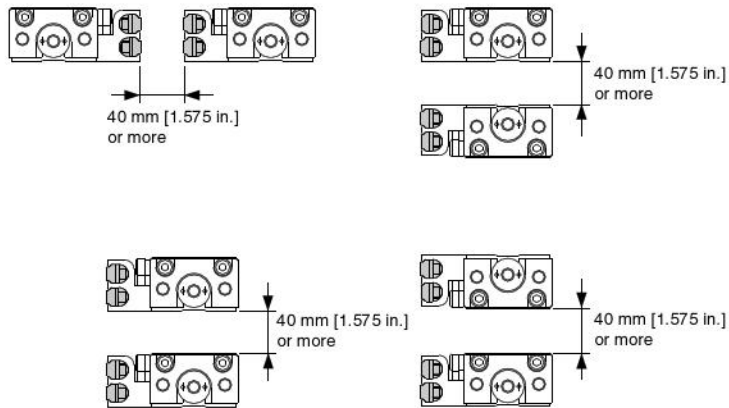
\* To remove the protective front cover, hook your finger on the projection on one side of the cover and remove it.

### Sensor head installation precautions

- After inserting the sensor head into the Air Hand or cylinder switch mounting groove (depending on which you are using) and move the sensor head to the suitable position, secure it in place with the fixing screw. Use a tightening torque of 0.2 N·m [0.148 ft·lbf] or less.
- For information about the sensor head insertion direction, see the "Sensor switch mounting method" for the Air Hand or cylinder you are using.

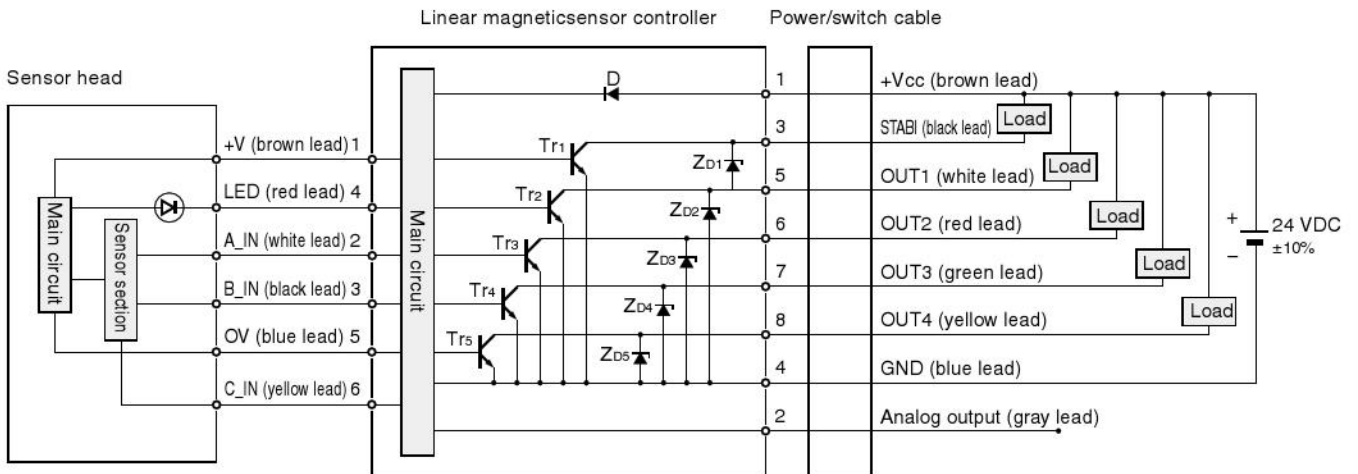
# Installation Adjacent to Linear Magnetic Sensor Controller, Long Type

Using actuators in close proximity could cause malfunctions, so separate the sensor heads by at least 40 mm [1.575 in.].



(Reference: Mini guide sliders)

## Inner Circuit Diagrams



Note: Note that extending the cable can cause a drop in voltage due to cable resistance.

- |          |  |
|----------|--|
| Signal D | : Power supply reverse-polarity protection diode |
| ZD1~ ZD5 | : Surge voltage absorption zener diode           |
| Tr1~Tr5  | : NPN output transistors                         |

# Linear magnetic sensor controller

ZL2



## Specifications

### ● Controller

Item	Model	ZL2
Power supply voltage		24 VDC ±10%
Consumption current		50 mA max. (Not including supply power to sensor.)
Sensor input supply power and voltage		5 VDC
Sensor input maximum input voltage		3.0 V
Switch output method		NPN open collector output, 5 points
Load voltage		30 VDC
Load current		50 mA max.
Switch output volume repeatability		±1% F.S. ±1 digit <sup>Note</sup>
Internal voltage drop		0.3 V MAX. (When I <sub>c</sub> = 5 mA)
Response time		5 ms MAX.
Operation indicator light		Lights red when each switch output is on.
Value display		1/1000 division display within effective measuring range(4 digits, 2-color display: red and green)
Analog output voltage range		DC1 to 5V within effective measuring range, DC0.8V outside effective measuring range (1kΩ output impedance)
Analog output repeatability		±1% of F.S (25°C±5°C [77°F±9°F]) <sup>Note</sup>
Insulation resistance		100 MΩ MIN. (500 VDC Megger, between case and lead wire terminal)
Withstand voltage		500 VAC (50/60 Hz) in 1 minute (between case and lead wire terminal)
Shock resistance		294.2 m/s <sup>2</sup> [30 G] (non repetitive)
Ambient temperature		0 to 50°C [32 to 122°F] (non-condensation, non-freezing)
Storage temperature range		-10 to 70°C [14 to 158°F] (non-condensation, non-freezing)
Mass		40 g [1.411 oz]

Note: This performance excludes the mechanical looseness of a cylinder with a fixed magnet (standalone performance). In the case of a movable type cylinder whose magnet is not fixed, the movable part and repeatability are reduced.

### ● Sensor head

Item	Model	ZLL□-□□
Power supply voltage		5 VDC±5%
Consumption current		20 mA max.
Mounting methods		Body embedded type (ZLL1, ZLL2), □4 type (ZLL3)
Operation indicator light		Red LED lights at optimal sensitivity position (Operation position can be changed by setting.)
Lead wire		Heat-resistant, oil-resistant vinyl sheath instrumentation cable φ2.8 [0.110] 6 core With 6P connectors
Insulation resistance		100 MΩ MIN. (500 VDC Megger, between case and lead wire terminal)
Withstand voltage		500 VAC (50/60 Hz) in 1 minute (between case and lead wire terminal)
Shock resistance		294.2 m/s <sup>2</sup> [30 G] (non repetitive)
Protective structure		IP67
Vibration resistance		88.3 m/s <sup>2</sup> [9 G] (Double amplitude: 1.5 mm [0.059 in.] 10 ~ 55 Hz)
Ambient temperature		0 to 50°C [32 to 122°F] (non-condensation, non-freezing)
Storage temperature range		-10 to 70°C [14 to 158°F] (non-condensation, non-freezing)
Mass		20 g [0.705 oz] (When 1L lead wire length is 1000 mm [39 in.] )

## Connector number

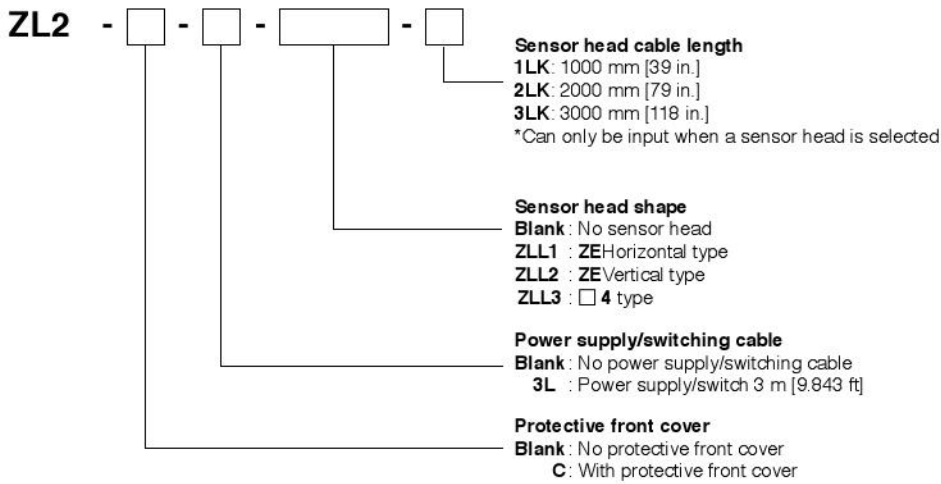
### ● Sensor head

Connector side number	Signal name	Lead wire color
1	Sensor head voltage (+)	Sensor head brown lead
2	Sensor head voltage output A_IN	Sensor head white lead
3	Sensor head voltage output B_IN	Sensor head black lead
4	Indicator (LED) input	Sensor head red lead
5	GND	Sensor head blue lead
6	Sensor head voltage output C_IN	Sensor head yellow lead

### ● Power supply

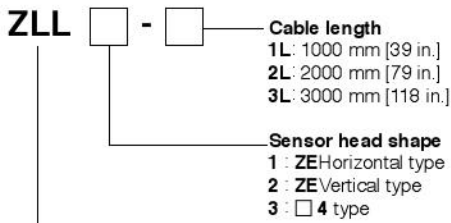
Pin No.	Signal name	Lead wire color
1	Power supply voltage input (24 V)	Brown
2	Analog output (1 to 5V)	Gray
3	Effective measuring range signal output (STAB1)	Black
4	GND	Blue
5	Switch output OUT1	White
6	Switch output OUT2	Red
7	Switch output OUT3	Green
8	Switch output OUT4	Yellow

## Order Codes

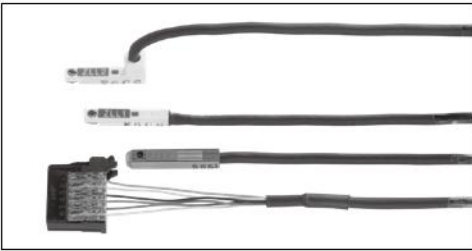


## Additional parts (available separately)

### ● Sensor head



Sensor head for long detection type



\* When purchasing a sensor head by itself, you need to set the sensor head parameters. (Refer to page 5 of the instruction manual that comes with the product.)

### ● Power supply/switching cable

**ZLW-3L**



### ● Protective front cover

**ZLBK100**



### ● Mini clamp wire mount plug, 6 P (for sensor head)

**ZL-6M**



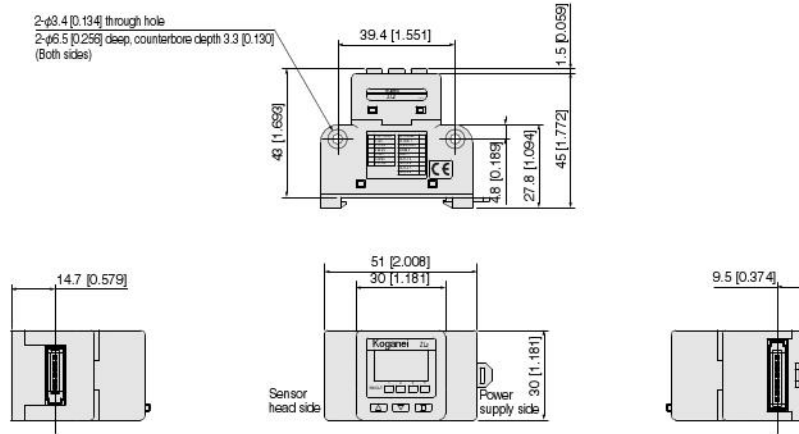
### ● Mini clamp wire mount plug, 8 P (for power supply/switching cable)

**ZL-8M**

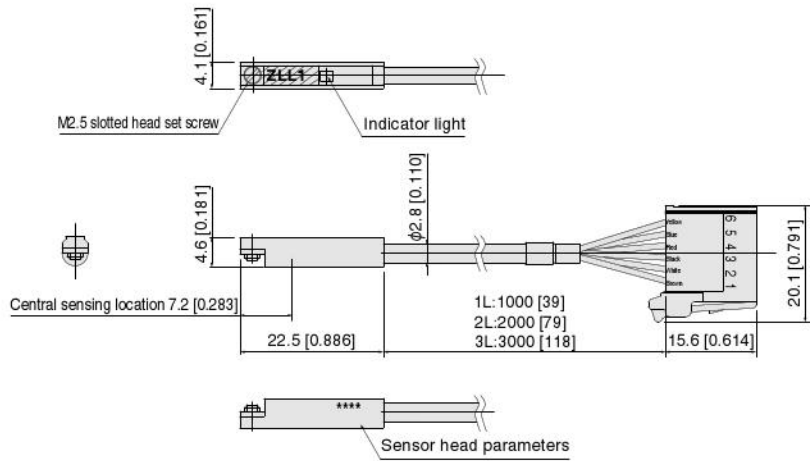


# Dimensions (mm [in.])

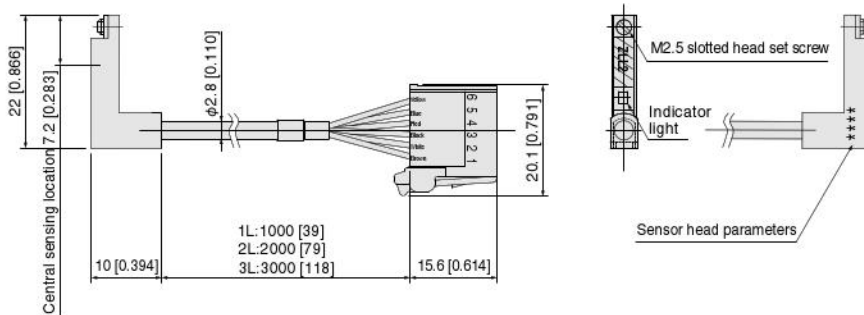
## ● ZL2-□-□(controller)



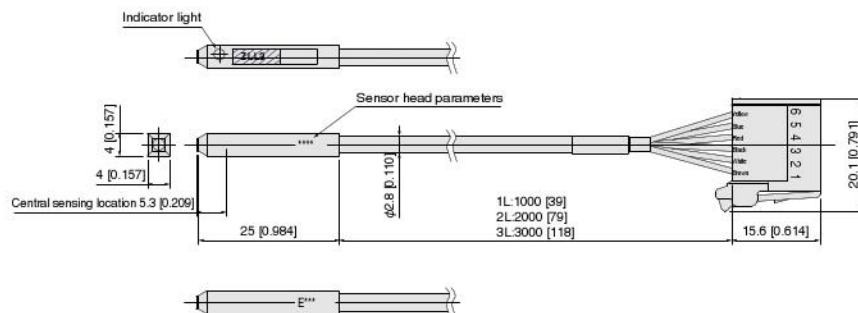
## ● ZLL1-□L (ZE Horizontal type)



## ● ZLL2-□L (ZE Vertical type)

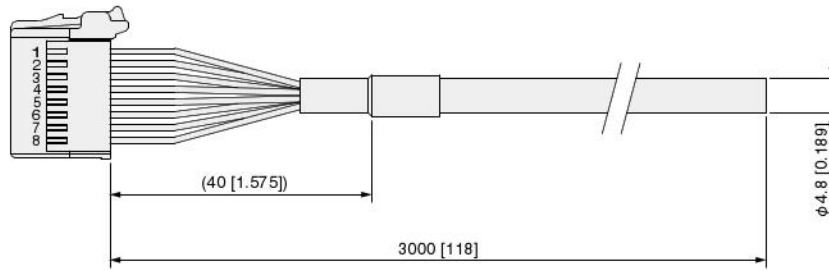


## ● ZLL3-□L (□4 type)

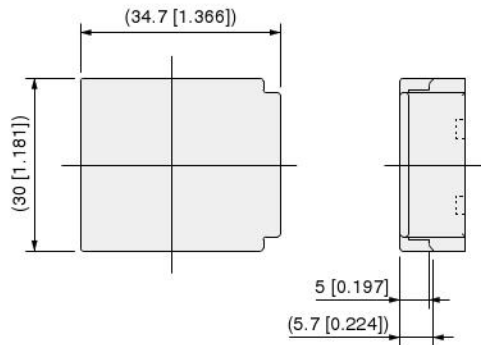


# Dimensions (mm [in.])

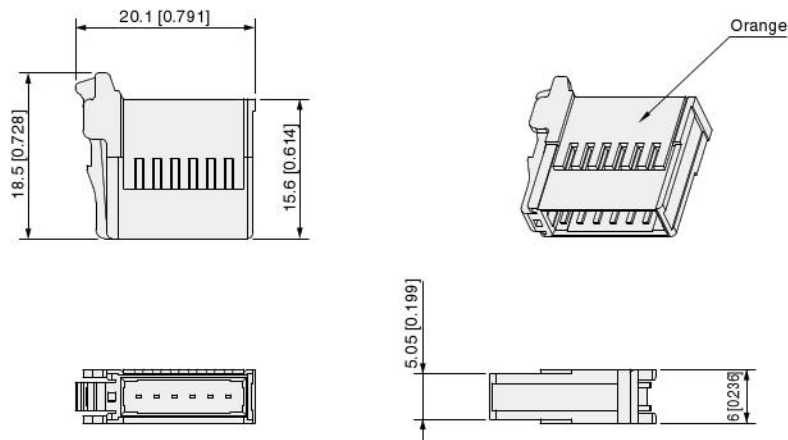
## ● ZLW-3L (power supply/switching cable)



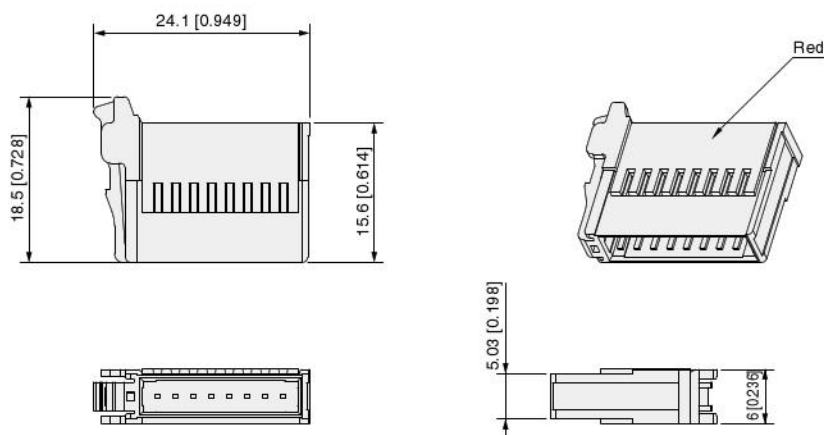
## ● ZLBK100 (protective front cover)



## ● ZL-6M (mini clamp wire mount plug, 6 P, for sensor head)



## ● ZL-8M (mini clamp wire mount plug, 8 P, for power supply/switching cable)

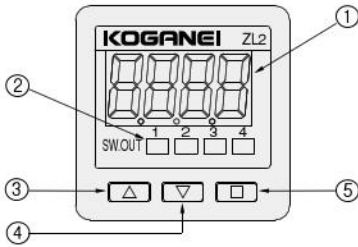





## Setting guidelines

### ⚠ CAUTION

1. Incorrect wiring to the sensor head or power/switch cables creates the risk of damage to both the controller and sensor head. Confirm that wiring is correct before turning on power.
2. Record write conditions that were configured by writing them to flash memory. Note that flash memory has a limited life, and the number of rewrites is 10,000.

### ■ Nomenclature and functions



No.	Name	Description
①	Display	Shows effective measuring range %, setting details, error indicators.
②	Switch output indicators	Light when switch output is ON (CH1 to CH4).
③	UP key (  )	Use to increase a setting value.
④	DOWN key (  )	Use to decrease a setting value.
⑤	MODE key (  )	Use when configuring settings.

\* Regarding operation and setting procedures, refer to the instruction manual (M020961) and the User's Manual that come with the product.

MEMO

A series of horizontal dotted lines for writing.

# Limited Warranty

KOGANEI CORP. warrants its products to be free from defects in material and workmanship subject to the following provisions.

**Warranty Period** The warranty period is 180 days from the date of delivery.

**Koganei Responsibility** If a defect in material or workmanship is found during the warranty period, KOGANEI CORP. will replace any part proved defective under normal use free of charge and will provide the service necessary to replace such a part.

**Limitations**

- This warranty is in lieu of all other warranties, expressed or implied, and is limited to the original cost of the product and shall not include any transportation fee, the cost of installation or any liability for direct, indirect or consequential damage or delay resulting from the defects.

- KOGANEI CORP. shall in no way be liable or responsible for injuries or damage to persons or property arising out of the use or operation of the manufacturer's product.

- This warranty shall be void if the engineered safety devices are removed, made inoperative or not periodically checked for proper functioning.

- Any operation beyond the rated capacity, any improper use or application, or any improper installation of the product, or any substitution upon it with parts not furnished or approved by KOGANEI CORP., shall void this warranty.

- This warranty covers only such items supplied by KOGANEI CORP. The products of other manufacturers are covered only by such warranties made by those original manufacturers, even though such items may have been included as the components.

The specifications are subject to change without notice.

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