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J.2.2 αiCZ Sensor (Analog Output, A860-2140-T***)

The αiCZ sensor (analog output, A860-2140-T***) is a sensor of analog output type used for the spindle or used as a separate sensor. Note that the interface and system configuration of this sensor differ from those of the absolute αiCZ sensor (A860-2142-T***) described later.

Names and specification numbers

Name	Specification number	Remarks			
		Number of teeth	Maximum speed	Sensor ring	
				Inner diameter	Outer diameter
αiCZ sensor 512	A860-2140-T411	512	15,000min^{-1}	ϕ82	ϕ102.8
αiCZ sensor 768	A860-2140-T511	768	10,000min^{-1}	ϕ125	ϕ154
αiCZ sensor 1024	A860-2140-T611	1024	8,000min^{-1}	ϕ160	ϕ205.2

Absolute maximum ratings

Item	Specification
Power supply voltage	-0.5 V to +7.0 V
Operating temperature range	0°C to +50°C
Humidity	95%RH or less

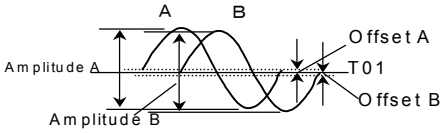
Electrical specifications

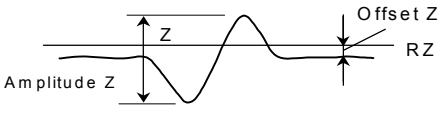
Item			Specification
Power supply voltage			5 V ±5%
Current consumption			150 mA or less
Output signal	VA, VB	αiCZ sensor 512	512λ/rotation
		αiCZ sensor 768	768λ/rotation
		αiCZ sensor 1024	1024λ/rotation
	VZ	Common to all models	1λ/rotation

Signal name	Check pin	Output amplitude	Offset
Phase A Phase B	A (Relative to T01) B (Relative to T01)	1000±100mVp-p	±50mV
Phase Z	Z (Relative to RZ)	660 to 1650 mVp-p	±50mV

(Preamplifier output at room temperature and 500 min^{-1})

For connector pins, see "Details of cable (K89) for connection with the αiSP series" described later.



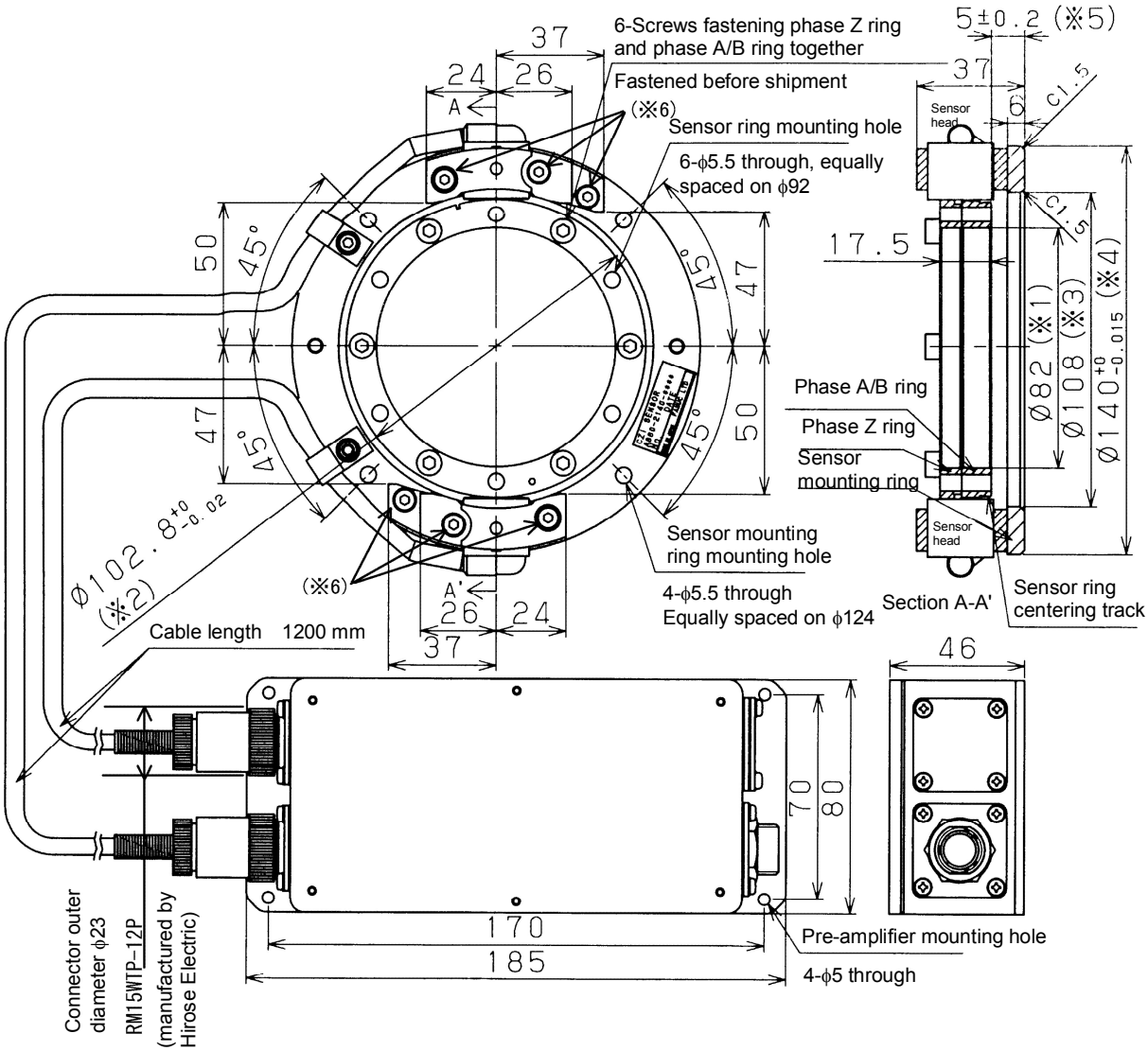


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Dimensions

αiCZ sensor 512

A860-2140-T411



For details of installation, see "Installation."

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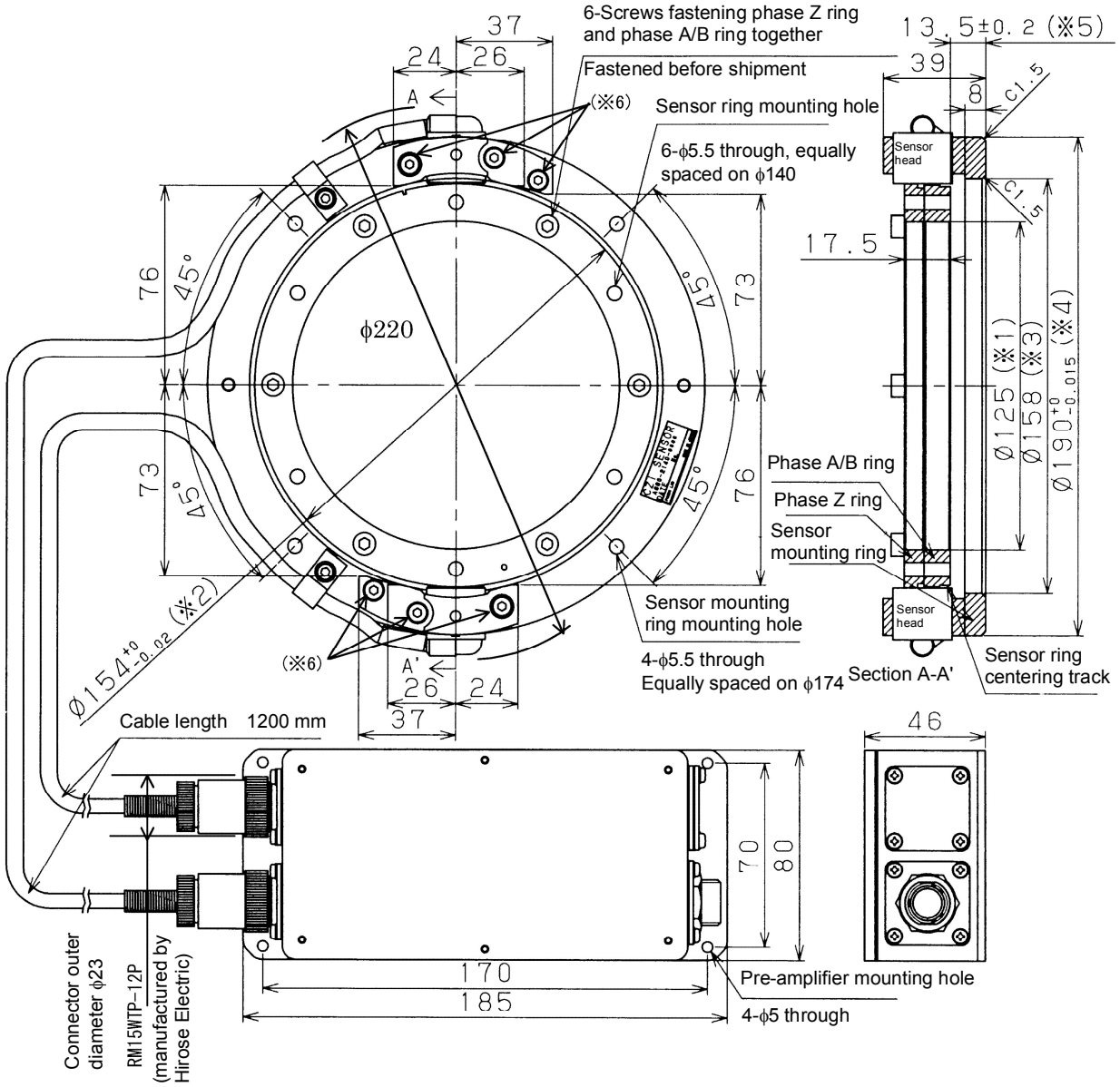
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NOTE

- The inner diameter(*1) of the sensor ring is set with a plus tolerance. (*2) indicates the outer diameter of the tooth surface of the sensor ring.
- The inner diameter(*3) of the sensor mounting ring is set with a plus tolerance. (*4) indicates the outer diameter of the sensor mounting ring.
- (*5) indicates the distance from the bottom of the sensor mounting ring to the bottom of the sensor ring.
- The sensor head cannot be adjusted mechanically. So, do not loosen the screws marked (*6).
- Use the sensor at a temperature not higher than 50°C.
- Because the αiCZ sensor is adjusted as a combination of the sensor ring, sensor, and preamplifier in advance, they must be used as a set.
- The sensor is a precision part. Use special care in handling. Particularly, do not apply external force to the sensor element.
- The sensor is an electronic part. To prevent chips, oil, water, and other harmful materials from being attached to the sensor, take dust-proof and water-proof measures on the machine side.
- The waterproofness of the preamplifier box is equivalent to IP55. However, if the preamplifier box is continuously exposed to coolant, for example, the sensor can fail. Provide highest-level water protection to prevent the preamplifier box from being exposed to coolant or the like.
- Ensure that no vibration greater than 1 G is applied to the preamplifier box.
- Make a shield wire connection. Connect the preamplifier box to ground or to the machine cabinet.
- For easy maintenance, mount the sensor at a position where it can be replaced easily.

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αiCZ sensor 768
A860-2140-T511



For details of installation, see "Installation."

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ТЕХНОЛОГИИ ДЛЯ ПРОИЗВОДСТВА

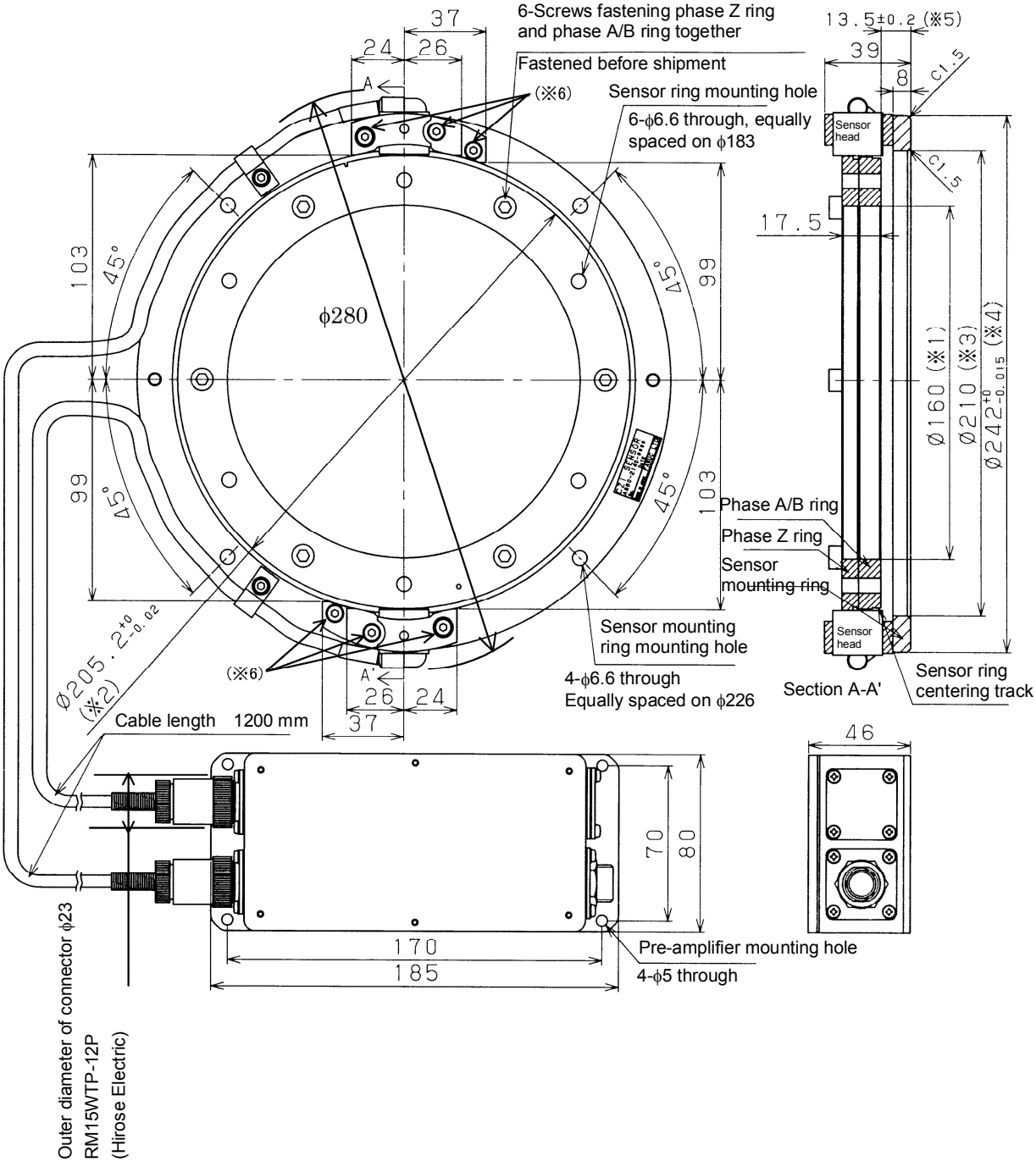
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- (*5) indicates the distance from the bottom of the sensor mounting ring to the bottom of the sensor ring.
- The sensor head cannot be adjusted mechanically. So, do not loosen the screws marked (*6).
- Use the sensor at a temperature not higher than 50°C.
- Because the αiCZ sensor is adjusted as a combination of the sensor ring, sensor, and preamplifier in advance, they must be used as a set.
- The sensor is a precision part. Use special care in handling. Particularly, do not apply external force to the sensor element.
- The sensor is an electronic part. To prevent chips, oil, water, and other harmful materials from being attached to the sensor, take dust-proof and water-proof measures on the machine side.
- The waterproofness of the preamplifier box is equivalent to IP55. However, if the preamplifier box is continuously exposed to coolant, for example, the sensor can fail. Provide highest-level water protection to prevent the preamplifier box from being exposed to coolant or the like.
- Ensure that no vibration greater than 1 G is applied to the preamplifier box.
- Make a shield wire connection. Connect the preamplifier box to ground or to the machine cabinet.
- For easy maintenance, mount the sensor at a position where it can be replaced easily.

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αiCZ sensor 1024
A860-2140-T611



For details of installation, see "Installation."

РЕМСТАНМАШ
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NOTE

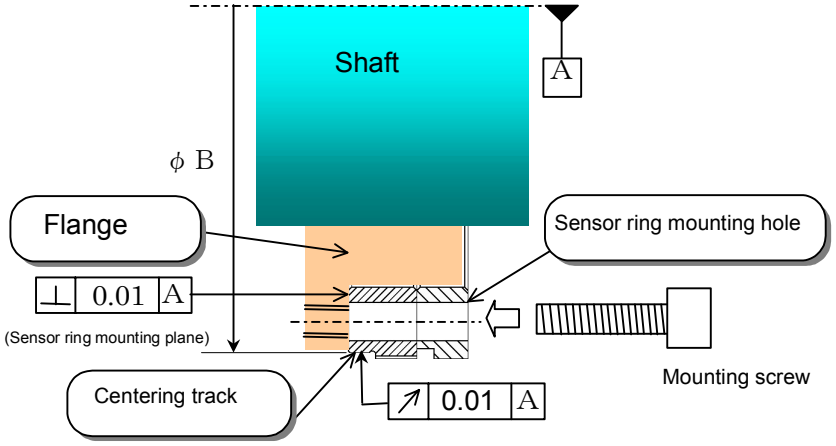
- The inner diameter(*1) of the sensor ring is set with a plus tolerance. (*2) indicates the outer diameter of the tooth surface of the sensor ring.
- The inner diameter(*3) of the sensor mounting ring is set with a plus tolerance. (*4) indicates the outer diameter of the sensor mounting ring.
- (*5) indicates the distance from the bottom of the sensor mounting ring to the bottom of the sensor ring.
- The sensor head cannot be adjusted mechanically. So, do not loosen the screws marked (*6).
- Use the sensor at a temperature not higher than 50°C.
- Because the αiCZ sensor is adjusted as a combination of the sensor ring, sensor, and preamplifier in advance, they must be used as a set.
- The sensor is a precision part. Use special care in handling. Particularly, do not apply external force to the sensor element.
- The sensor is an electronic part. To prevent chips, oil, water, and other harmful materials from being attached to the sensor, take dust-proof and water-proof measures on the machine side.
- The waterproofness of the preamplifier box is equivalent to IP55. However, if the preamplifier box is continuously exposed to coolant, for example, the sensor can fail. Provide highest-level water protection to prevent the preamplifier box from being exposed to coolant or the like.
- Ensure that no vibration greater than 1 G is applied to the preamplifier box.
- Make a shield wire connection. Connect the preamplifier box to ground or to the machine cabinet.
- For easy maintenance, mount the sensor at a position where it can be replaced easily.

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Installation

Installing the sensor ring

Install the flange on the shaft side and screw it in the axis direction by using the sensor ring mounting hole. In assembly, perform centering using the centering track so that the swing from the center of rotation is 10 μm or less.



Specification	Outer diameter of centering track (ϕB)	Positions of sensor ring mounting holes	Mounting screw	Recommended tightening torque (Nm)
A860-2140-T411	ϕ101	6-ϕ5.5 through, equally spaced on ϕ92 circumference	M5	2.4 to 3.4
A860-2140-T511	ϕ152.2	6-ϕ5.5 through, equally spaced on ϕ140 circumference	M5	2.4 to 3.4
A860-2140-T611	ϕ203.4	6-ϕ6.6 through, equally spaced on ϕ183 circumference	M6	4.1 to 5.8

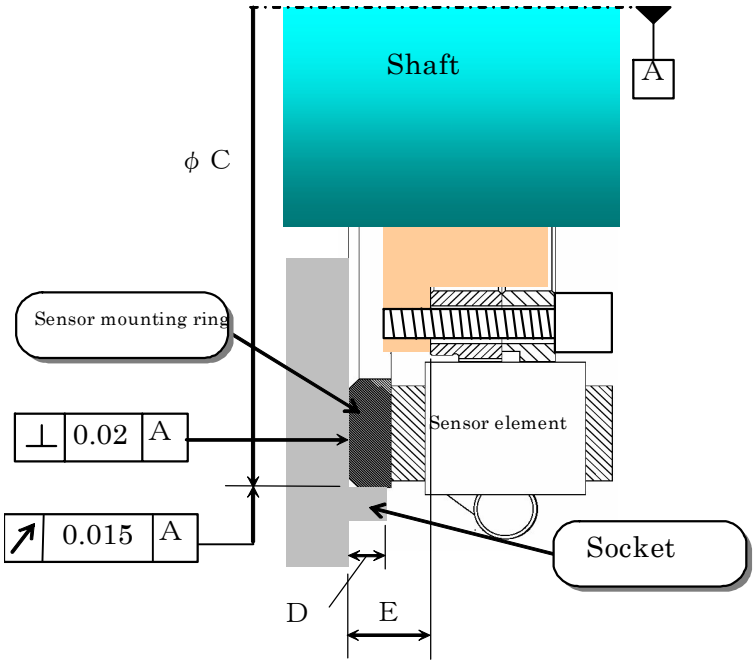
NOTE

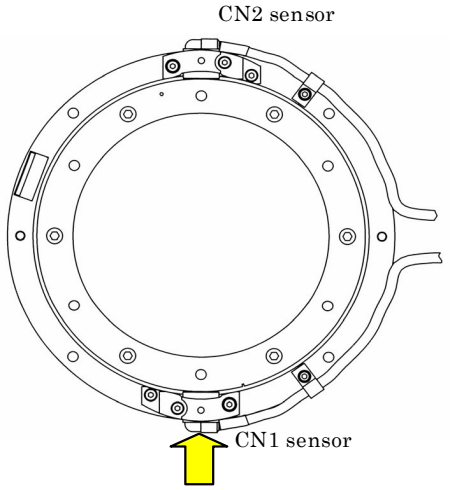
- For centering, the outer diameter of the flange must be designed so that there is a gap of about 0.1 mm between the flange and the inner surface of the sensor ring.
- Secure the sensor ring on the end face with screws (avoid heat shrink fitting to mount the sensor ring).
- The sensor ring consists of a phase Z ring and phase A/B ring, which are fastened together by using screws in advance. Never detach these screws. Spot facing is not provided. So, at the time of machine design, be careful not to cause interference with the screw heads.
- Centering must be performed with the centering track (the outer surface of the phase Z ring and the teeth pitch circle are not coaxial). When performing centering, use a tool such as a plastic hammer not to damage the gear teeth.
- Magnetic matter attached to gear teeth can lead to a detection error. After centering is completed, remove such foreign matter by air blowing.

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Installing the sensor mounting ring

When installing the sensor mounting ring, provide a socket on the machine side, and fit the sensor mounting ring into the socket. (The dimensions of the socket on the machine side must satisfy the accuracy indicated in the table below. Otherwise, detection precision may deteriorate.) When fastening the mounting ring with the screws, press the mounting ring against the socket from the CN1 sensor side as shown in the figure below. After the installation, check that the gap between the sensor ring and sensor is 0.08 mm or more by using a thickness gage.





Fasten the sensor mounting ring while pressing it in the arrow direction.

Specification	Outer diameter of sensor mounting ring	Inner diameter of socket (ϕC)	Socket height (D)	Distance between bottom of sensor mounting ring and bottom of sensor ring (E)
A860-2140-T411	$\phi 140^{+0}_{-0.015}$	$\phi 140^{+0.015}_{-0}$	5.5 or less	11.5±0.2
A860-2140-T511	$\phi 190^{+0}_{-0.015}$	$\phi 190^{+0.015}_{-0}$	7.5 or less	13.5±0.2
A860-2140-T611	$\phi 242^{+0}_{-0.015}$	$\phi 242^{+0.015}_{-0}$	7.5 or less	13.5±0.2

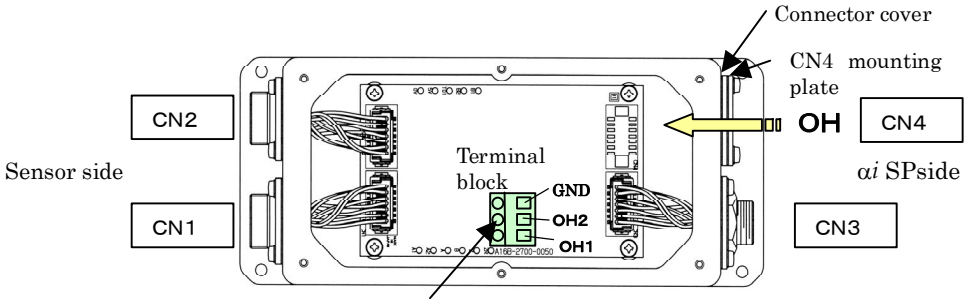
NOTE

- Provide a sock on the machine side where possible, and fit the sensor mounting ring into the socket. Avoid making centering adjustments by tapping the outer surface of the sensor mounting ring.

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Installing the OH line

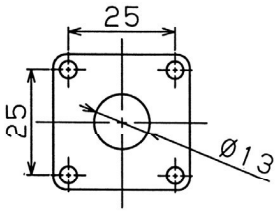
Open the lid of the preamplifier box, and remove the connector cover on the CN4 side. Draw the OH line from CN4 and connect the line to the terminal block on the printed circuit board.



Tighten with flat-blade screwdriver (tightening torque: 0.3 Nm).

A cable clamp for the OH line is to be prepared by the user. Use the attached CN4 connector mounting plate to secure the cable clamp.

Recommended cable clamp: SKINTOP ST-7 from Lapp Kabel
Outer diameter of the OH cable: ϕ5.2±0.3
Hole diameter on the CN4 connector mounting plate: ϕ13



CN4 connector mounting plate

NOTE

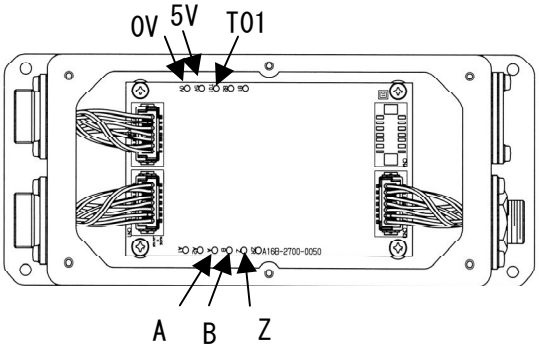
- Adjustments have been made for the sensor, preamplifier, and sensor ring at the same time. Therefore, use them as a set. The variable resistor on the printed circuit board in the preamplifier is also adjusted in advance. So, do not readjust the variable resistor. Furthermore, the sensors cannot be adjusted mechanically. So, do not loosen the screws fastening the CN1 and CN2 sensors.
- The connectors on the sensor side are labeled "CN1" (in black) and "CN2" (in blue). Make connections according to the figure above.

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Checking the output signals

When checking the output signals, see "Electrical specifications." (The output signals need not be adjusted.)

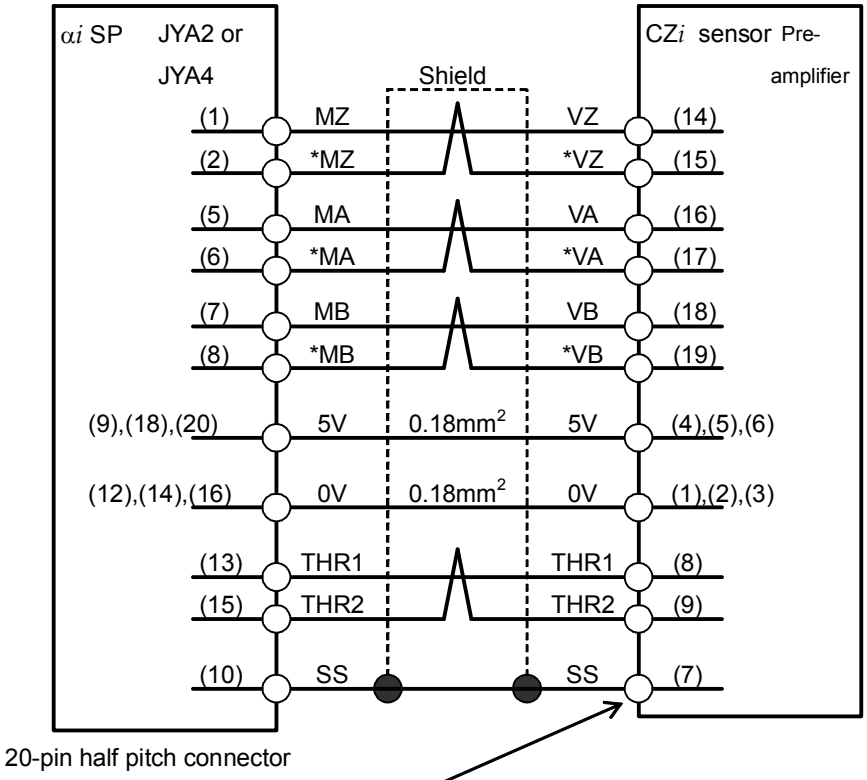
- Supply power to the 0 V and 5 V pins when checking the waveforms without making a connection to the α*i* SP.
- The Lissajous figure of the phase A/B output signal is a complete circle.



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Details of cable (K89) for connection with the αiSP series

When the CZi sensor is used as a separate sensor (connected to connector JYA4), THR1 and THR2 need not be wired.



Hirose Electric
Crimp type
Crimp pin: HR22-SC-122 (15 pins required per connector)
Housing: HR22-12WTPA-20SC
Crimping tool: HR22-TA-2428HC (Hirose Electric)
Solder type
HR22-12WTPA-20S

Cable specification: 0.18-mm^2 twisted pair 4 pairs + 0.18-mm^2 6 common shielded cable
Recommended wire: A66L-0001-0367
For the connector conforming to the recommended wire on the JYA2 side, see Subsection 9.4.1.
For cable details, see Appendix B, "CABLES."