

Contact-Type Smart Sensor (Detection Type) E9NC-T

Tough Contact Sensor

- Long service life exceeding 60 million slide operations.
- Employs a robot cable that withstands bending.
- A flanged type that does not require mounting brackets and is easy to replace.
- The slim Sensor Head and compact and lightweight Preamplifier can save space.
- The same operating buttons as other N-Smart Sensors for easy and quick operations.

CE



Refer to *Safety Precautions* on page 7.

For the most recent information on models that have been certified for safety standards, refer to your OMRON website.

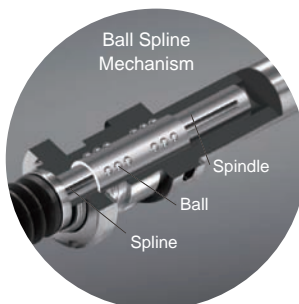
Features

Reliable

Durability means less maintenance.

Over 60 Million Slide Operations

The ball slides in the spline so that the spindle is operated directly and smoothly, eliminating play and offset. Also, rigid parts are used to reduce frictional resistance and increase the life of the Sensor.



Robot Cable That Withstands Bending^{*1}



^{*1} Specifications of the Sensor Head cable and of the connection cable between the Preamplifier and Amplifier Unit

Sensor Values Resist Changes for Vibration and Shock

- Vibration resistance: 100 m/s² (20 to 2,000 Hz)^{*2}
- Shock resistance: 1,000 m/s²^{*2}

^{*2} Specifications of the Sensor Head

Easy

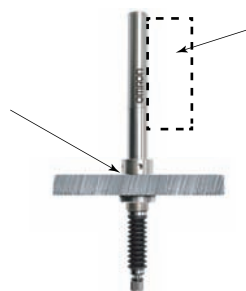
Easy to Mount and Saves Space

The Flanged Type Makes the Following Possible

- Just tighten the nuts. **No mounting bracket is required.**
- The flange is in contact with the mounting panel, **so the vertical position will not shift.**

No Presetting

The origin point is stored internally, so operation is possible without presetting it every time.











Saves Space

The separate Preamplifier is lightweight and compact. The Sensor Head is slim 8 mm in diameter.


E9NC-T

Ordering Information

Sensor Heads (Dimensions → page 9 and 10)

Type	Appearance	Measuring range (Moving range)	Resolution	Model
Straight type		5 mm	0.1 μm	E9NC-TH5S 2M
Right-angle air type				E9NC-TH5L 2M
Flanged type/ Straight type				E9NC-TH5SF 2M
Flanged type/ Right-angle air type				E9NC-TH5LF 2M
Straight type		12 mm		E9NC-TH12S 2M
Right-angle air type				E9NC-TH12L 2M
Flanged type/ Straight type				E9NC-TH12SF 2M
Flanged type/ Right-angle air type				E9NC-TH12LF 2M

Amplifier Units (Dimensions → page 11)

Connecting method	Appearance	Model	
		NPN output	PNP output
Pre-wired (2 m)		E9NC-TA21 2M	E9NC-TA51 2M

Accessories (Sold Separately)

Sensor Head Accessories




Connection Cable between Preamplifier and Amplifier Unit (Required) (Dimensions → page 12)

A Cable is not provided with the Sensor Head. It must be ordered separately.

Cable length	Model	Quantity
0.5 m	E9NC-TXC05	1
5 m	E9NC-TXC5	1
10 m	E9NC-TXC10	1
20 m	E9NC-TXC20	1

Probe (Dimensions → page 11)

The E9NC-TB1 is provided with the Sensor Head. Order replacements as required.

Type	Appearance	Model	Quantity
3-dia. probe		E9NC-TB1	1
Nylon probe		E9NC-TB2	1
Probe for flat surfaces		E9NC-TB3	1

Rubber boots (Dimensions → page 12)

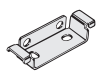
A rubber boot is provided with the Sensor Head. Order replacements as required.

Applicable Sensor Head	Model	Quantity
E9NC-TH5□	E9NC-G5	1
E9NC-TH12□	E9NC-G12	1

Amplifier Unit Accessories


Amplifier Unit Mounting Bracket (Dimensions → page 13)

A Mounting Bracket is not provided with the Amplifier Unit. It must be ordered separately as required.

Appearance	Model	Quantity
	E39-L143	1


DIN Track (Dimensions → page 13)

A DIN Track is not provided with the Amplifier Unit. It must be ordered separately as required.

Appearance	Type	Model	Quantity
	Shallow type, total length: 1 m	PFP-100N	1
	Shallow type, total length: 0.5 m	PFP-50N	1
	Deep type, total length: 1 m	PFP-100N2	1

End Plate (Dimensions → page 13)

An End Plate is not provided with the Amplifier Unit. It must be ordered separately as required.

Appearance	Model	Quantity
	PFP-M	1

E9NC-T

Ratings and Specifications

Sensor Heads

Type	Straight type	E9NC-TH5S	E9NC-TH12S
	Right-angle air type	E9NC-TH5L	E9NC-TH12L
	Flanged type/Straight type	E9NC-TH5SF	E9NC-TH12SF
Item	Flanged type/Right-angle air type	E9NC-TH5LF	E9NC-TH12LF
Measuring range (Moving range)		5 mm	12 mm
Resolution		0.1 μm	
Precision *1		1 μm	
Measuring force *1	Upward	0.35±0.25 N	0.4±0.3 N
	Horizontal	0.4±0.25 N	0.5±0.3 N
	Downward	0.45±0.25 N	0.6±0.3 N
Indicator (Preamplifier)		Operation indicator (blue/red)	
Ambient temperature range		Operating: -10 to 55°C; Storage: -20 to 60°C (with no icing or condensation)	
Ambient humidity range		Operating and storage: 35% to 85% (with no condensation)	
Maximum response speed		80 m/min	
Origin detection speed		80 m/min	
Origin position		1 ±0.5 mm from the spindle push-out position (the lowest point)	
Vibration resistance (destruction)		100 m/s ² (20 to 2,000 Hz) 20 minutes each in X, Y, and Z directions	
Shock resistance (destruction)		1,000 m/s ² 3 times each in X, Y, and Z directions	
Degree of protection	Sensor Head (Right-angle air type When the hose elbow for air is used.)	IEC IP67	
	Sensor Heads other than those listed above and Preamplifiers	-	
Number of sliding operations		60 million times (based on OMRON's dedicated evaluation)	
Probe		Carbide with a round surface, screw thread size: M2.5	
Connecting method		Pre-wired connector (2 m from the Sensor Head to the Preamplifier)	
Materials	Sensor Head	Stainless steel (SUS303)	
	Rubber boot	Nitrile rubber (NBR)	
	Preamplifier	ABS	
	Probe contact point *2	Carbide	
	Cable	PVC	
	Hose elbow for air (included) (Right-angle air type only)	Nickel-plated brass	
Tightening nut, Wave washer (Flanged type only)		Tightening nut: Stainless steel (SUS410), Wave washer: SK5	
Weight (packed state/Sensor Head only)		Approx. 340 g/approx. 110 g	
Accessories		Common: Wrench, Instruction Manual Right-angle air type: Hose elbow Flanged type: Tightening nut, wave washer, clamp wrench, pin	

*1. These values were measured at an ambient temperature of 20°C.

*2. For the case of the provided E9NC-TB1 (3-dia. probe)

Amplifier Units

Item	Type		Standard type
		NPN output	E9NC-TA21
		PNP output	E9NC-TA51
		Connecting method	Pre-wired type
Inputs/ outputs	Outputs	2 outputs	
	External inputs	1 input	
Power supply voltage		10 to 30 VDC, including 10% ripple (p-p)	
Display resolution		0.1 μm min.	
Power consumption *1		At Power Supply Voltage of 24 VDC Normal mode: 2,040 mW max. (Current consumption: 85 mA max.) Power saving eco mode: 1,920 mW max. (Current consumption: 80 mA max.)	
Control outputs *2		Load power supply voltage: 30 VDC max., open-collector output Load current: 100 mA max. in total for the 2 outputs (Residual voltage: At load current of less than 10 mA: 1 V max., at load current of 10 to 100 mA: 2 V max.) OFF current: 0.1 mA max.	
External inputs		Refer to *3.	
Indicators		7-segment displays (white) GO indicator (orange), HIGH/LOW indicator (orange), NO/NC indicator (orange), PRST indicator (green), ST indicator (blue)	
Protection circuits		Power supply reverse polarity protection, output short-circuit protection, and output reverse polarity protection	
Response time	Super-high-speed mode (SHS)	Operate or reset: 3 ms	
	High-speed mode (HS)	Operate or reset: 10 ms	
	Standard mode (Std)	Operate or reset: 100 ms	
	Giga mode (GIGA)	Operate or reset: 1,000 ms	
Threshold setting		Smart Tuning (2-point area tuning, tolerance tuning, 2-point tuning, 1-point tuning), or manual adjustment	
No. of banks		4	
Functions	Output mode selection	Normal output, hybrid output (Output is performed according to the combination of the two bits used to specify HIGH, GO, LOW, and error.)	
	Preset	Negative values can be displayed.	
	Resetting settings *4	Select from initial reset (factory defaults) or user reset (saved settings).	
	Eco mode	Select from OFF (digital display lit) or ECO (digital display not lit).	
	Bank switching	Select from banks 1 to 4.	
	Origin point use setting	Select whether using the Sensor Head origin point or setting the point at power ON as origin.	
	Direction	Switchable	
	Output	Select from Normal sensing mode or Area sensing mode.	
	External input	Select from preset, bank switching, input OFF, and tuning.	
	Display digits	Settable in units ranging from 0.0001 mm to 1 mm.	
	Hysteresis width	Select from standard setting or user setting. The hysteresis width can be set to a value from 0 to 9999.9999 in the user settings.	
Maximum connectable Units		30	
Ambient temperature range *5		Operating: Groups of 1 or 2 Amplifier units: -25 to 55°C, Storage: -30 to 70°C (with no icing or condensation)	
Ambient humidity range		Operating and storage: 35% to 85% (with no condensation)	
Insulation resistance		20 MΩ (at 500 VDC)	
Dielectric strength		1,000 VAC at 50/60 Hz for 1 minute	
Vibration resistance (destruction)		10 to 55 Hz with a 1.5-mm double amplitude for 2 hours each in X, Y, and Z directions	
Shock resistance (destruction)		500 m/s ² for 3 times each in X, Y, and Z directions	
Weight (packed state/Amplifier Unit only)		Approx. 115 g/approx. 75 g	
Materials	Case	Polycarbonate (PC)	
	Cover	Polycarbonate (PC)	
	Cable	PVC	
Accessories		Instruction Manual	

*1. At Power Supply Voltage of 10 to 30 VDC.
Normal mode: 2,250 mW max. (Current consumption: 75 mA max. at 30 VDC, 155 mA max. at 10 VDC)
Power saving eco mode: 2,100 mW max. (Current consumption: 70 mA max. at 30 VDC, 135 mA max. at 10 VDC)

*2. Load current: 20 mA max. in total for the 2 outputs when 4 or more units are linked.

*3. The following details apply to the input.

	Contact input (relay or switch)	Non-contact input (transistor)	Input time
NPN	ON: Shorted to 0 V (Sourcing current: 1 mA max.) OFF: Open or shorted to Vcc.	ON: 1.5 V max. (Sourcing current: 1 mA max.) OFF: Vcc - 1.5 V to Vcc (Leakage current: 0.1 mA max.)	ON: 9 ms min. OFF: 9 ms min.
PNP	ON: Shorted to Vcc (Sinking current: 3 mA max.) OFF: Open or shorted to 0 V.	ON: Vcc - 1.5 V to Vcc (Sinking current: 3 mA max.) OFF: 1.5 V max. (Leakage current: 0.1 mA max.)	

*4. The bank is not reset by the user reset function or saved by the user save function.

*5. Operating: Groups of 3 or 10 Amplifier units: -25 to 50°C
Groups of 11 or 16 Amplifier units: -25 to 45°C
Groups of 17 or 30 Amplifier units: -25 to 40°C

E9NC-T

I/O Circuit Diagrams

Output method	Model	Operation mode	Timing chart	NO/NC indicator	Output circuit
NPN	E9NC-TA21	NO		NO lit.	
		NC		NC lit.	
PNP	E9NC-TA51	NO		NO lit.	
		NC		NC lit.	

Signal Assignments to the Output Wire

When normal output mode and NO operation are set

	GO judgment	NoGO judgment	Error judgment or Undetermined
Control output 1	ON	OFF	OFF
Control output 2	OFF		ON

When hybrid output mode and NO operation are set

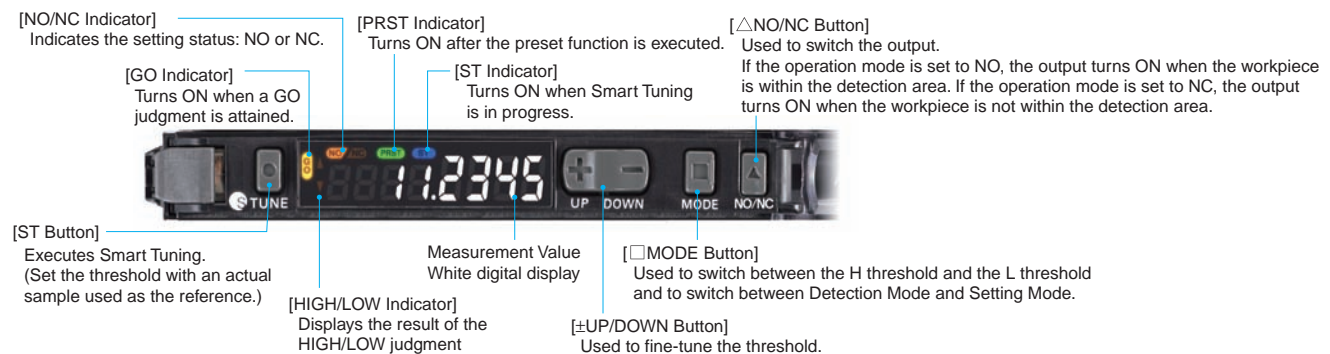
	LOW judgment	GO judgment	HIGH judgment	Error judgment or Undetermined
Control output 1	OFF	ON	ON	OFF
Control output 2	ON	ON	OFF	OFF

Note: 1. The output is reversed when the operation mode is set to NC. The indicator is not reversed.

2. If the judgment output mode is the normal sensing mode, the output is provided in the normal output pattern regardless of the setting.

Nomenclature




E9NC-TA21/TA51



Safety Precautions

To ensure safe operation, be sure to read and follow the Instruction Manual provided with the Sensor.

Sensor Heads

 WARNING	
<p>Do not forcibly bend or pull the cables. Do not put a heavy object on them or heat them. Doing so may damage the cables, resulting in a fire.</p>	
<p>Do not disassemble or alter the unit. There is a risk of injury or electric shock. And it may cause damage on the internal circuit.</p>	

Precautions for Safe Use

Please observe the following precautions for safe use of the products.

1. Installation Environment
 - Do not use the product in environments where it can be exposed to inflammable/explosive gas.
 - To secure the safety of operation and maintenance, do not install the product close to high-voltage devices or power devices.
2. Power Supply and Wiring
 - Be sure to use an E9NC-TA21, or E9NC-TA51 Amplifier Unit. Connecting to other amplifier unit may cause damage or fire.
 - When shortening cables, be sure to connect wires according to the specifications. Misconnection may cause damage or fire.
 - High-voltage lines and power lines must be wired separately from this product. Wiring them together or placing them in the same duct may cause induction, resulting in malfunction or damage.
 - Always turn OFF the power of the unit before connecting or disconnecting the connectors.
 - To prevent cables to cut, fix it in a place where too much tension should not be applied to it. Avoid pulling cables too strongly or bending them too much.
 - Repeated flexing: R50 or more
 - Permanent bend: R20 or more
 - Head and output cables must be placed separately from the power line.
3. Installation
 - Use screws or tightening nut for mounting and be sure to tighten screws with a specified torque.
 - Specified torque M3 screw: 0.6 N·m
 - Tightening nut: 1.0 N·m
4. Others
 - Do not attempt to disassemble, deform by pressure, incinerate, repair, or modify this product.
 - When disposing of the product, treat as industrial waste.
 - If you notice an abnormal condition such as a strange odor, extreme heating of the unit, or smoke, immediately stop using the product, turn off the power, and consult your dealer.

Precautions for Correct Use

Please observe the following precautions to prevent failure to operate, malfunctions, or undesirable effects on product performance.

1. Installation Environment

Do not install the product in locations subjected to the following conditions:

 - Surrounding air temperature outside the rating
 - Rapid temperature fluctuations (causing condensation)
 - Relative humidity outside the range of 35 to 85%
 - Presence of corrosive or flammable gases
 - Presence of dust, salt, or iron particles
 - Direct vibration or shock
 - Water, oil, or chemical fumes or spray, or mist atmospheres
 - Presence of intense magnetic, electric field or high frequency electric field (use the product in a place distant from a noise source such as high power relay and high-voltage high-current switch by 0.5 m or more)
2. Warming Up
 - The circuitry is not stable immediately after turning the power ON, and the values gradually change until the Sensor Head is completely warmed up.
 - Before using the product, check that its functionality and capability are normal.
3. Maintenance and Inspection
 - Always turn off the power of the unit before connecting or disconnecting cables.
 - Do not use thinner, alcohol, benzene, acetone, or kerosene to clean the sensor.
 - If oil that becomes extremely viscous when it's dry, such as cutting oil, attaches to the rubber boot, the operation may not work properly.
 - Wipe off with a waste cloth dampened with absolute alcohol.
 - The rubber boot may be significantly degraded by organic solvent or ozone in the air or ultraviolet rays in the environment. In such cases, replace the rubber boot regularly (6 months to a year).
4. Do not use this product under water, rain or outdoors.

Amplifier Units

WARNING

This product is not designed or rated for ensuring safety of persons either directly or indirectly. Do not use it for such purposes.



CAUTION

Do not use the product with voltage in excess of the rated voltage. Excess voltage may result in malfunction or fire.



Never use the product with an AC power supply. Otherwise, explosion may result.



Precautions for Safe Use

The following precautions must be observed to ensure safe operation of the product. Doing so may cause damage or fire.

1. Do not use the product in environments subject to flammable or explosive gases.
2. Do not use the product in environments subject to exposure to water, oil, chemicals, etc.
3. Do not attempt to disassemble, repair, or modify the product in any way.
4. Do not apply voltages or currents that exceed the rated ranges.
5. Do not use the product in any atmosphere or environment that exceeds the ratings.
6. Do not miswire such as the polarity of the power supply.
7. Connect the load correctly.
8. Do not short both ends of the load.
9. Do not use the product if the case is damaged.
10. When disposing of the product, treat it as industrial waste.
11. Burn injury may occur. The product surface temperature rises depending on application conditions, such as the ambient temperature and the power supply voltage. Use caution when operating the product.
12. When setting the sensor, be sure to check safety such as by stopping the equipment.
13. To secure the safety of operation and maintenance, do not install the product close to high-voltage devices and power devices.
14. High-voltage lines and power lines must be wired separately from this product. Wiring them together or placing them in the same duct may cause induction, resulting in malfunction or damage.
15. Do not install the product in locations subjected to strong magnetic field or electric field.
16. Do not impose voltage exceeding the rated voltage: 10 to 30 VDC, including 10% ripple (p-p).
17. Do not short-circuit the open collector output load.
18. Do not apply any load exceeding the ratings.
19. When supplying power to the product, make sure that the polarity of the power is correct, and do not connect to an AC power supply.
20. Make sure that the power supply is turned OFF before connecting, separating or adding the Sensor Head or the Amplifier Unit.

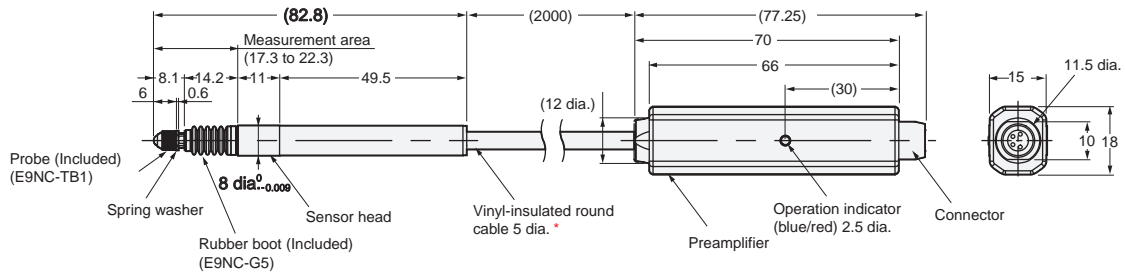
Precautions for Correct Use

1. Do not install the product in the following locations.
 - Locations subject to direct sunlight
 - Locations subject to condensation due to high humidity
 - Locations subject to corrosive gas
 - Locations subject to vibration or mechanical shocks exceeding the rated values
 - Locations subject to presence of dust, salt, or iron particles
2. Extended length on the amplifier end must be up to 100 m. For extension, use a cable with 0.3 mm² or larger.
3. Do not apply the forces on the Amplifier cable exceeding the following limits:
Pull: 40N; torque: 0.1N·m; pressure: 20N; bending: 3 kg
4. The product is ready to operate 2s after the power supply is turned ON. If the Sensor and load are connected to power supplies separately, turn ON the power supply to the product first.
5. Output pulses may occur when the power supply is turned OFF. Turn OFF the power supply to the load or load line first.
6. Do not pull or twist the connector at an excessive force when it is fixed to the Amplifier Unit. (within 9.8N)
7. The E3X-MC11, E3X-MC11-SV2, and E3X-MC11-S Mobile Consoles cannot be connected.
8. The E3C, E2C, E3X-NA and E3X-SD cannot be connected.
9. The E3X-HD, E3X-DA-S and E3X-DA-N/MDA cannot be connected.
10. The E3NX-FA, E3NC-LA and E3NC-SA cannot be connected.
11. The E3X-DRT21-S, E3X-CRT, E3NW-ECT, and E3NW-DS Sensor Communications Units cannot be connected.
12. Always keep the protective cover in place when using the product. Not doing so may cause malfunction.
13. Do not use thinner, benzene, acetone, and lamp oil for cleaning.

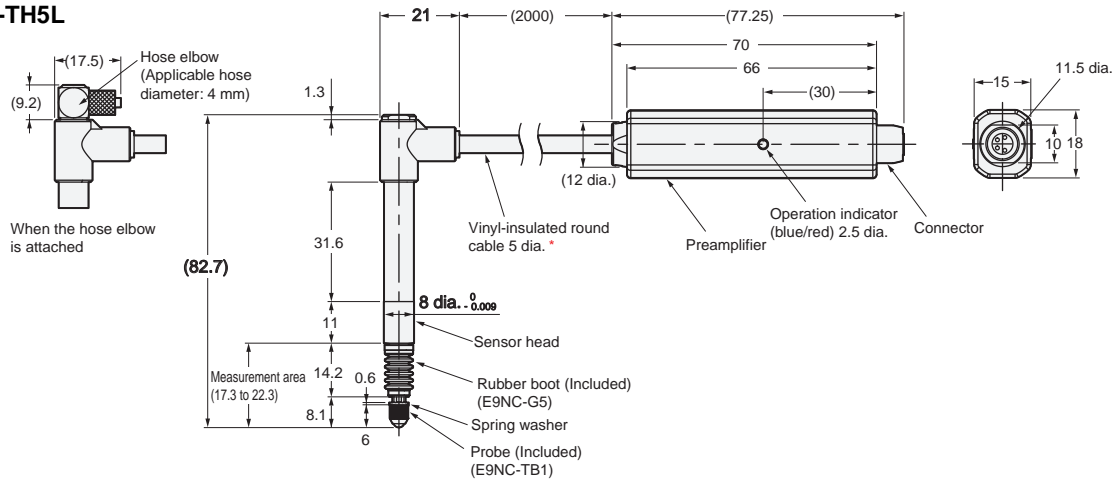
Dimensions

Sensor Heads

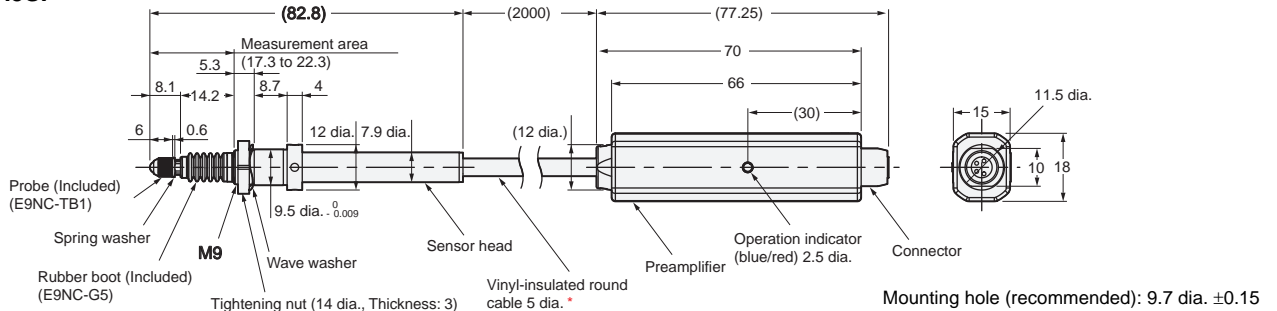
E9NC-TH5S



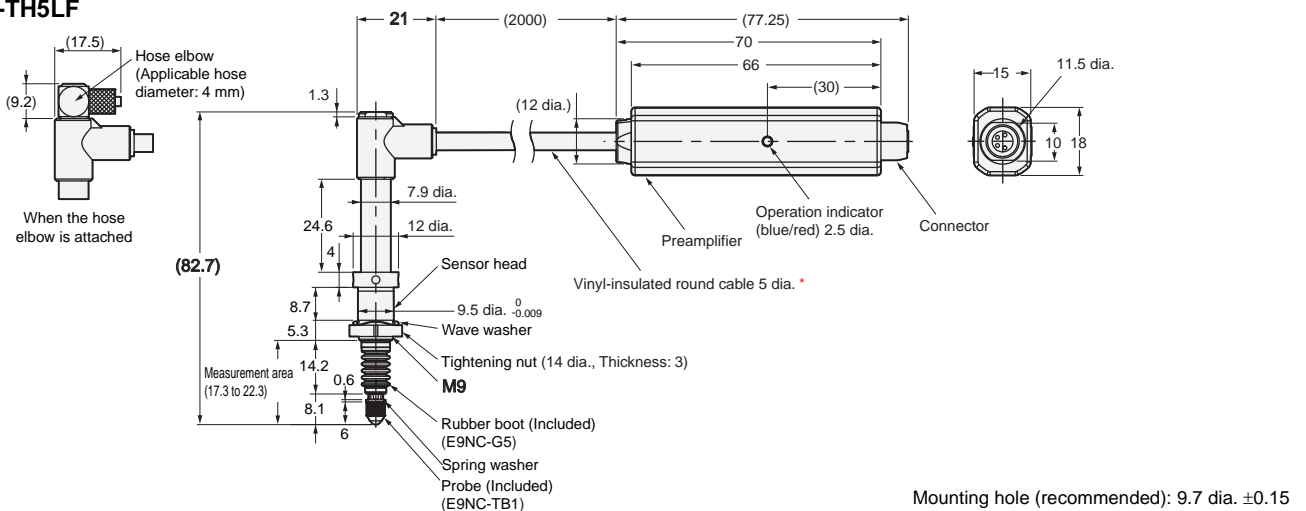
E9NC-TH5L



E9NC-TH5SF



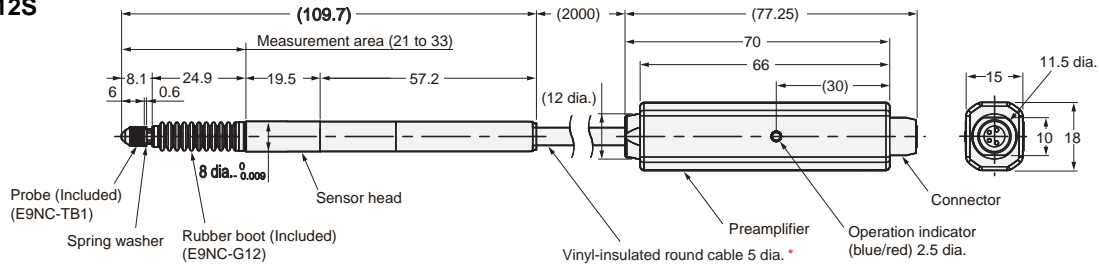
E9NC-TH5LF



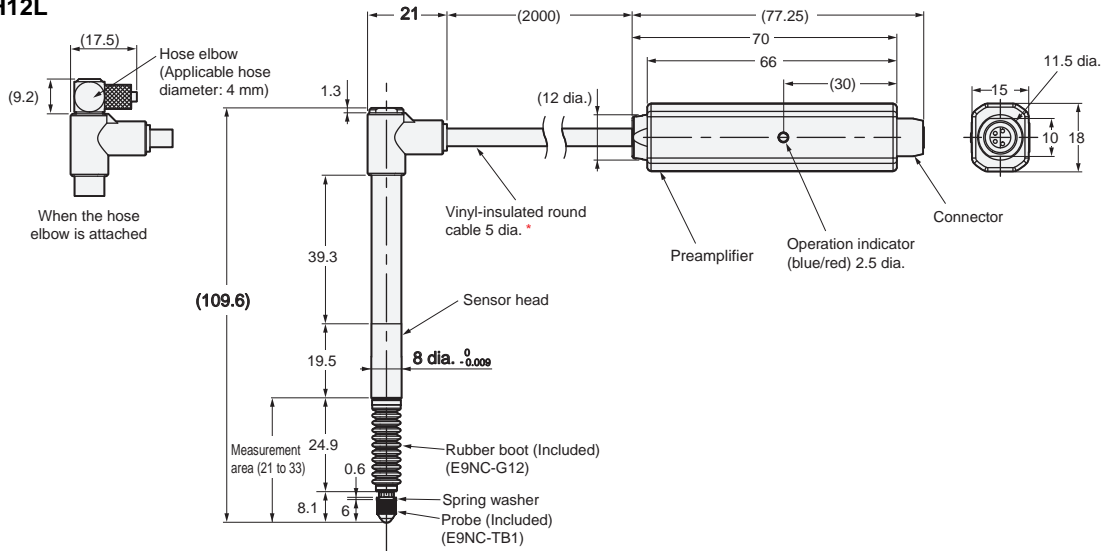
* The minimum bending radiuses of the Sensor Head cable are shown below.
 Repeated flexing: 50 mm
 Permanent bend: 20 mm

E9NC-T

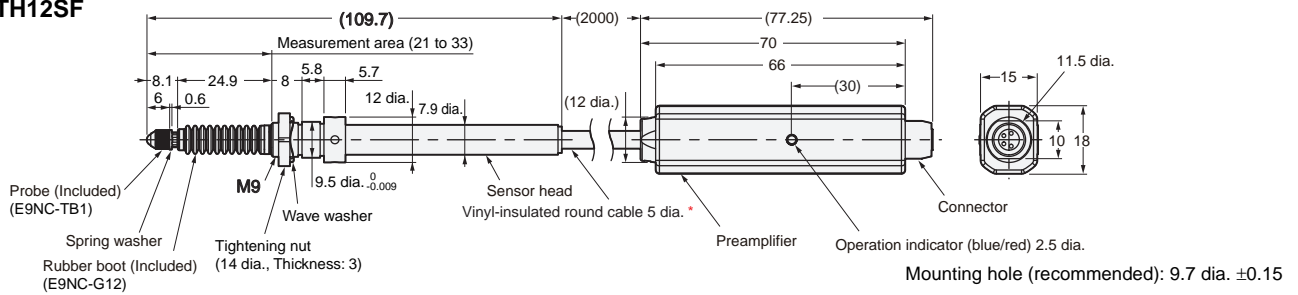
E9NC-TH12S



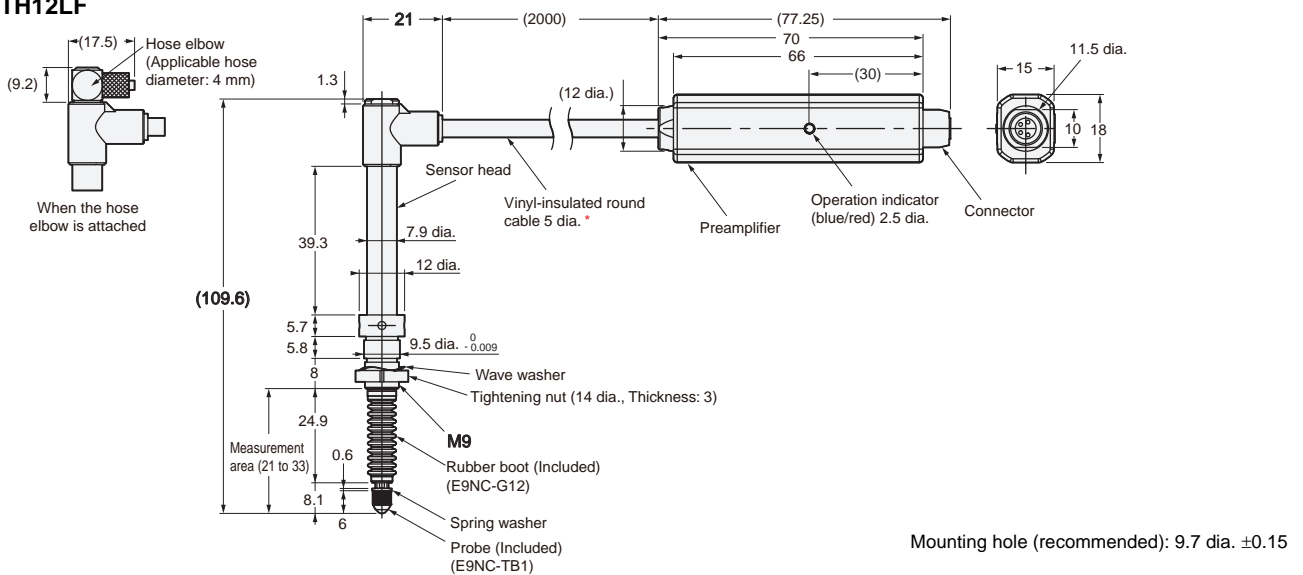
E9NC-TH12L



E9NC-TH12SF



E9NC-TH12LF



* The minimum bending radiuses of the Sensor Head cable are shown below.
 Repeated flexing: 50 mm
 Permanent bend: 20 mm

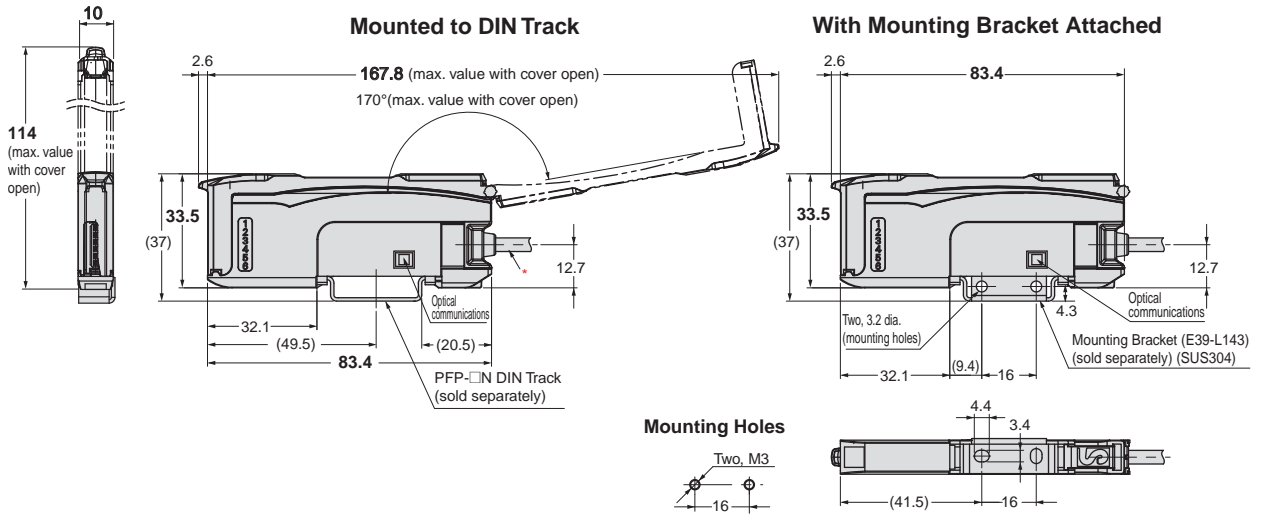
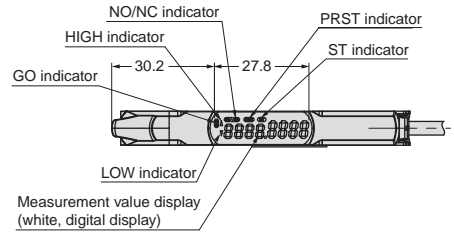
Amplifier Units

Pre-wired Amplifier Units

E9NC-TA21
E9NC-TA51



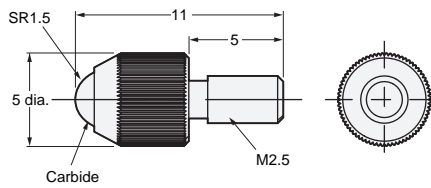
*Cable Specifications
Vinyl-insulated round cable, 4 dia., 5 conductors
(Conductor cross-section: 0.2 mm², Insulation diameter: 0.9 mm), Standard cable length: 2 m,
Minimum bending radius: 12 mm



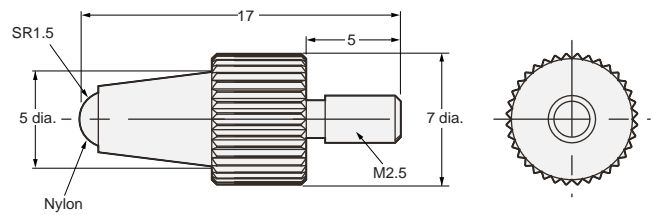
Accessories (Order Separately)

Probes

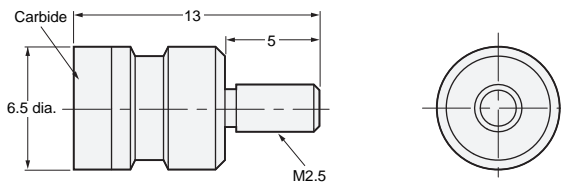
E9NC-TB1



E9NC-TB2



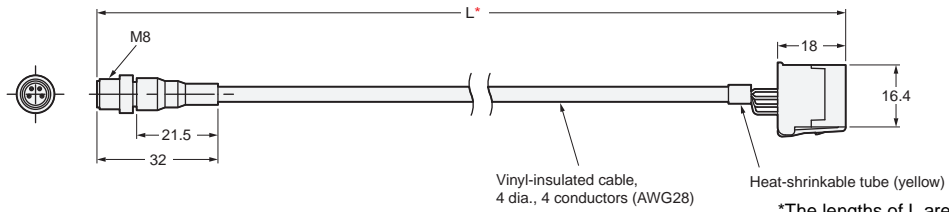
E9NC-TB3



E9NC-T

Connection Cables

- E9NC-TXC05
- E9NC-TXC5
- E9NC-TXC10
- E9NC-TXC20

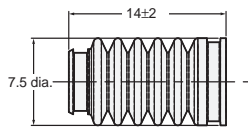


*The lengths of L are shown below.

Model	L (m)
E9NC-TXC05	0.5
E9NC-TXC5	5
E9NC-TXC10	10
E9NC-TXC20	20

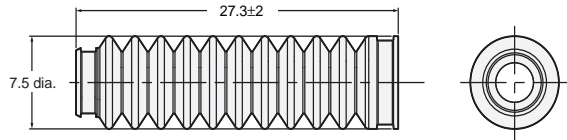
Rubber Boots

E9NC-G5



Material: Nitrile rubber (NBR)

E9NC-G12



Material: Nitrile rubber (NBR)

Terms and Conditions Agreement

Read and understand this catalog.

Please read and understand this catalog before purchasing the products. Please consult your OMRON representative if you have any questions or comments.

Warranties.

- (a) Exclusive Warranty. Omron's exclusive warranty is that the Products will be free from defects in materials and workmanship for a period of twelve months from the date of sale by Omron (or such other period expressed in writing by Omron). Omron disclaims all other warranties, express or implied.
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This document provides information mainly for selecting suitable models. Please read the Instruction sheet carefully for information that the user must understand and accept before purchase, including information on warranty, limitations of liability, and precautions.

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