

NEW!!

High-Precision Positioning Switch
METROL® Metrol

$\pm 0.5\mu\text{m}$ Repeatability

AIR GAP SENSORS

Pneumatic Sensors for
Precision Seating Confirmation

**2 Signal Point Setting Type
Available Now!**

DPA Series



IP67

Pneumatic Sensors for Precision Seating Confirmation



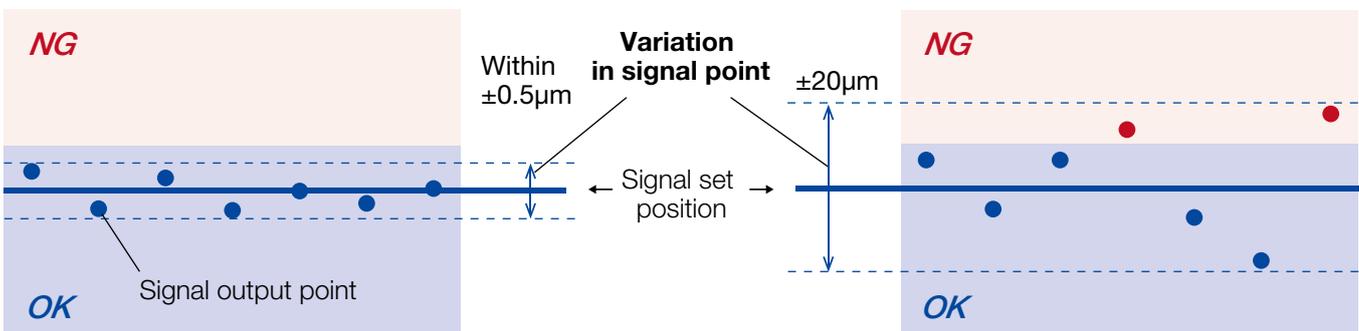
Effectively prevents CNC industrial machined defect products.

$\pm 0.5\mu\text{m}$ – Repeatability.

Detects workpiece floating due to cutting chips, preventing defective products at the manufacturing stage.

✓ Air Gap Sensors

✗ Conventional “pneumatic gap sensors”

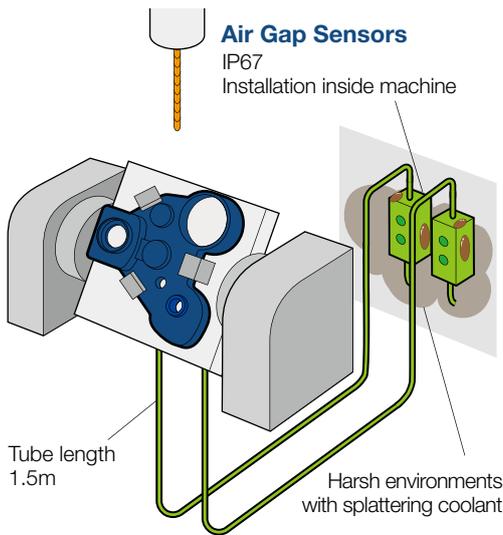


$\pm 0.5\mu\text{m}$ Repeatability

- Minimal signal point variation and **effective detection of workpiece floating** due to cutting chips.
- **Precision seating confirmation** can be realized within the allowable tolerance, **preventing machining defects**.

$\pm 20\mu\text{m}$ Repeatability

- Large signal variation means only **workpiece existence detection** is possible.
- **It is impossible** to detect workpiece floating due to cutting chips and **to accurately confirm workpiece and jig seating**.



IP67 Resistant to Coolant

Sensor can be installed inside machine tools.

Shortened air piping improves response speed and realizes **higher productivity**.

	✓ Air Gap Sensors	✗ Conventional "pneumatic gap sensors"
Tube length	1.5m (Internal installation)	12m (External installation)
Response speed	0.8 seconds	More than 5 seconds



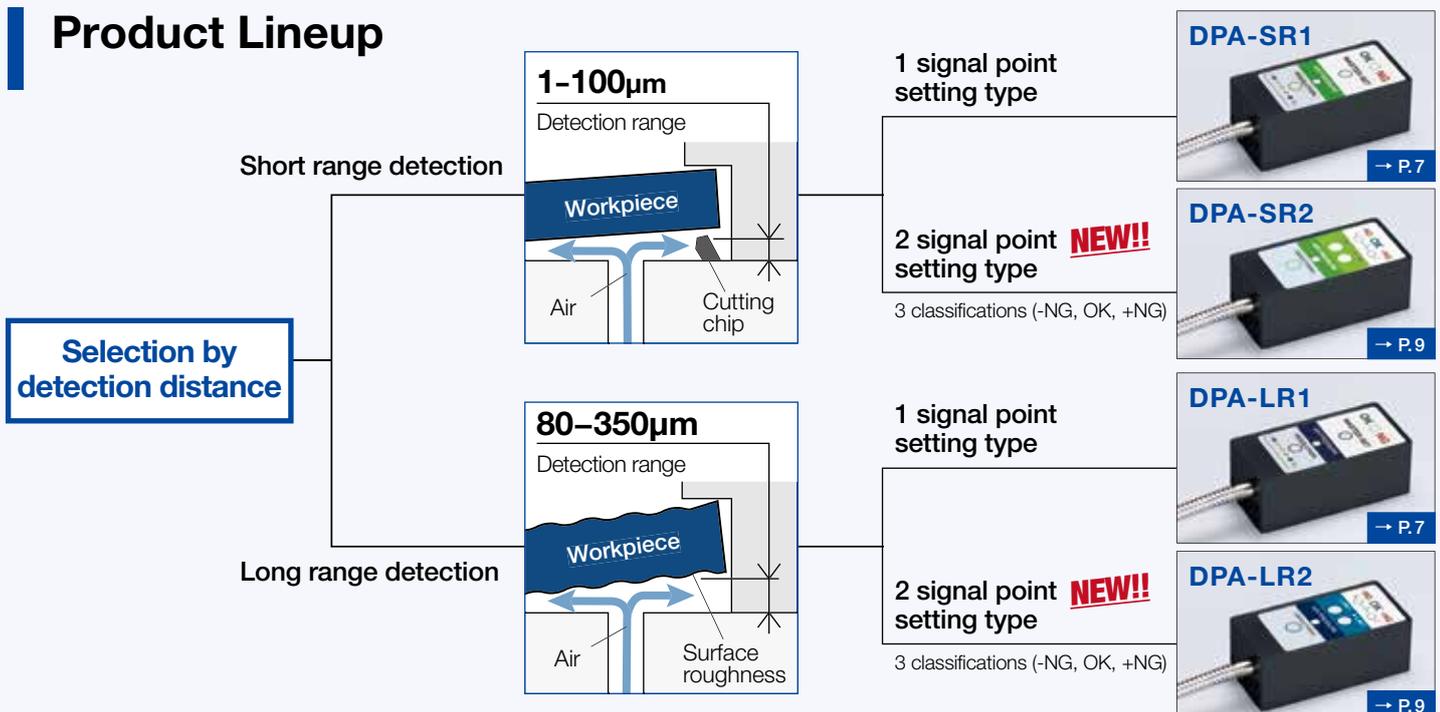
One-push Master Setting

The signal set point can be configured just by placing a master within allowable tolerance into the jig and **keep pressing the master set button for one second**.

Self-diagnosis Function

Alarm signal is output and LED flashes when the air pressure is outside appropriate measurement pressure range.

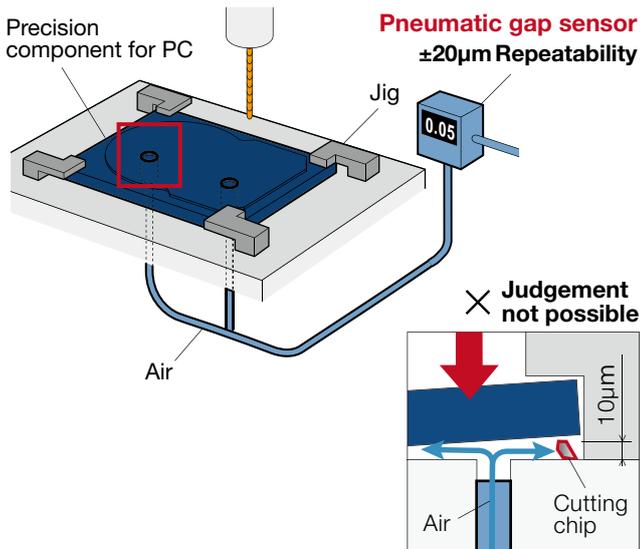
Product Lineup



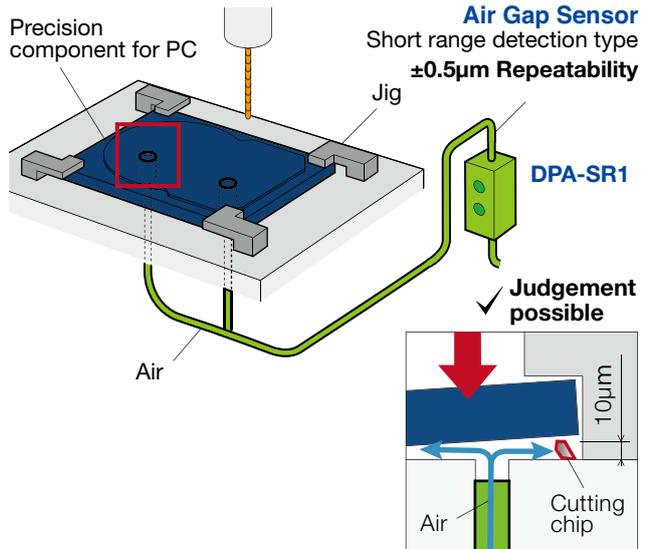
Application Examples

Ultra-precision machining can be realized by checking the precise seating of workpiece in jig. Effectively prevents defect products.

✗ ±20μm Repeatability.
10μm gap caused by cutting chips cannot be detected.

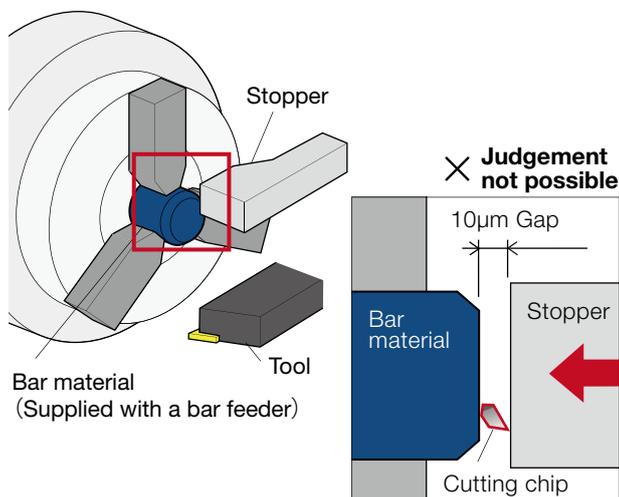


✓ ±0.5μm Repeatability.
Reliably detects 10μm gap caused by cutting chips and stops machining automatically.

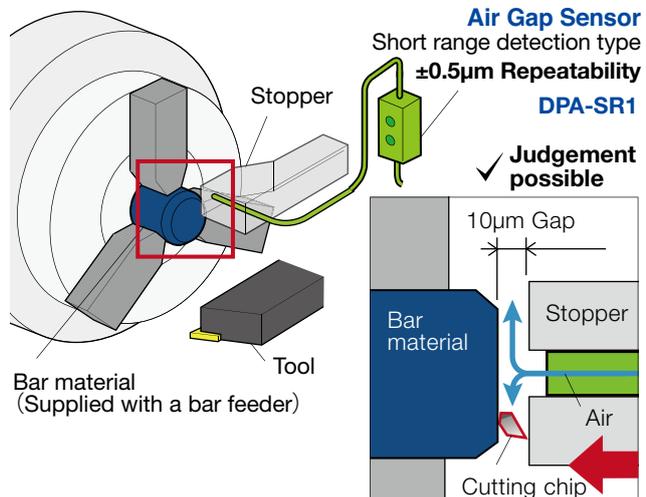


10μm gap caused by cutting chips can be detected reliably. Achieves ultra-precision machining with CNC lathes.

✗ Cutting chips put between the bar material and stopper, shifting the processing point.



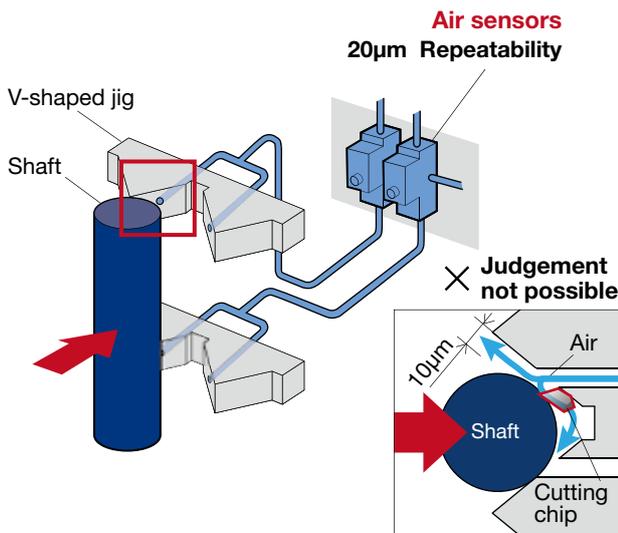
✓ With ±0.5μm repeatability, effectively detects 10μm gap due to cutting chips and stops machining automatically.



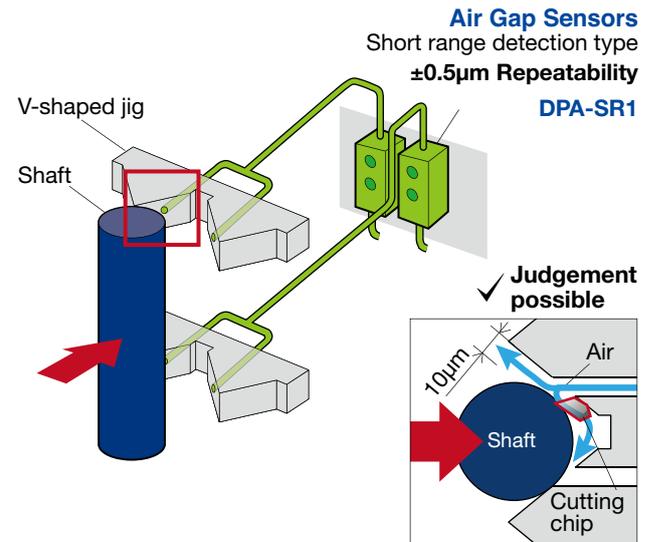
Application Examples

Detect shaft seating with $\pm 0.5\mu\text{m}$ repeatability. Defective products can be prevented.

✗ $\pm 20\mu\text{m}$ Repeatability.
A gap caused by cutting chips cannot be detected.

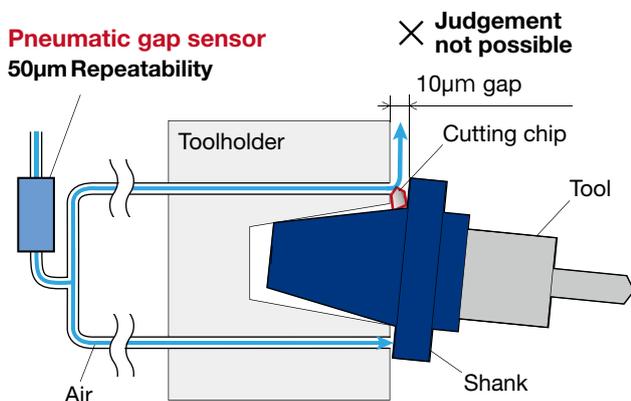


✓ $\pm 0.5\mu\text{m}$ Repeatability.
Reliably detect 10 μm uplift due to cutting chips and stop machining automatically.

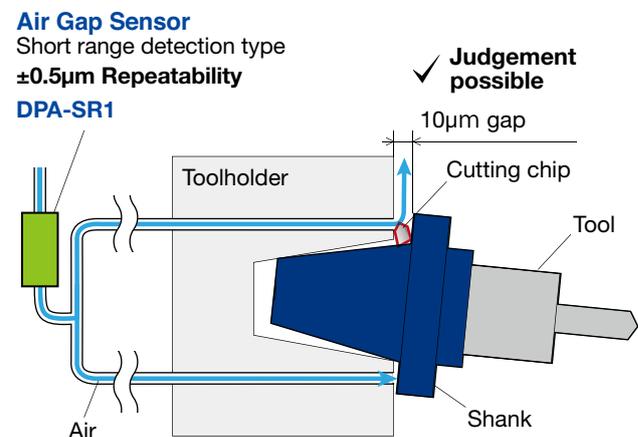


Shank adhesion confirmation realizes high-precision machining. Machining errors due to tool floating can be prevented.

✗ 50 μm Repeatability.
Poor adhesion of the shank produces defective products.



✓ $\pm 0.5\mu\text{m}$ Repeatability.
Stably detects 10 μm uplift due to cutting chips and stops machining automatically.

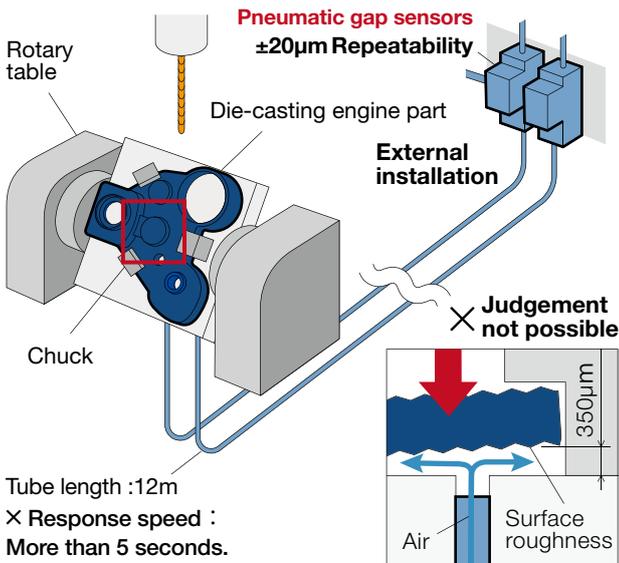


Application Examples

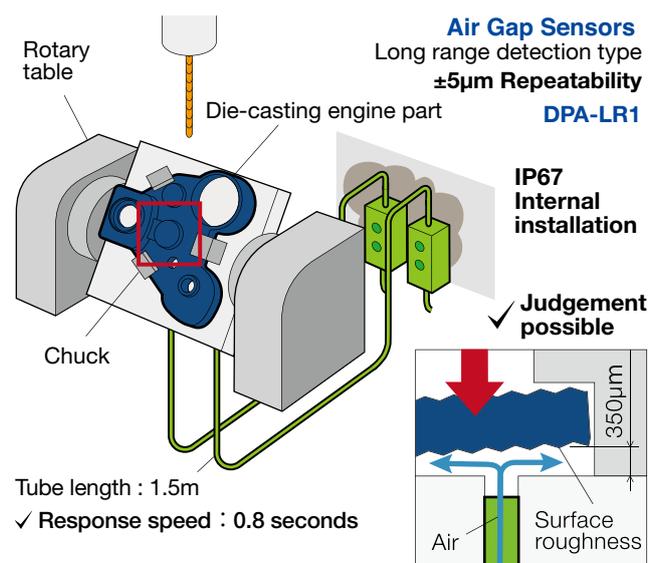
Effectively detects seating of die cast component with rough surface.

Shortened air piping improves productivity.

✗ $\pm 20\mu\text{m}$ Repeatability.
Rough workpiece surface makes precision seating detection impossible.

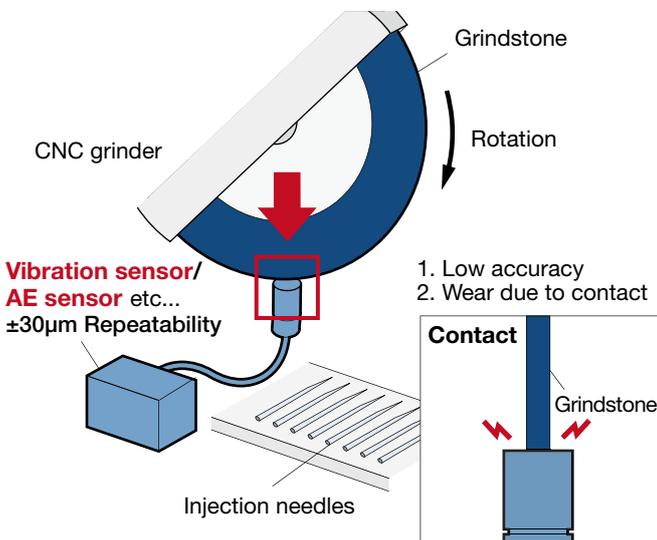


✓ $\pm 5\mu\text{m}$ Repeatability.
350 μm detection distance achieves precision seating confirmation.

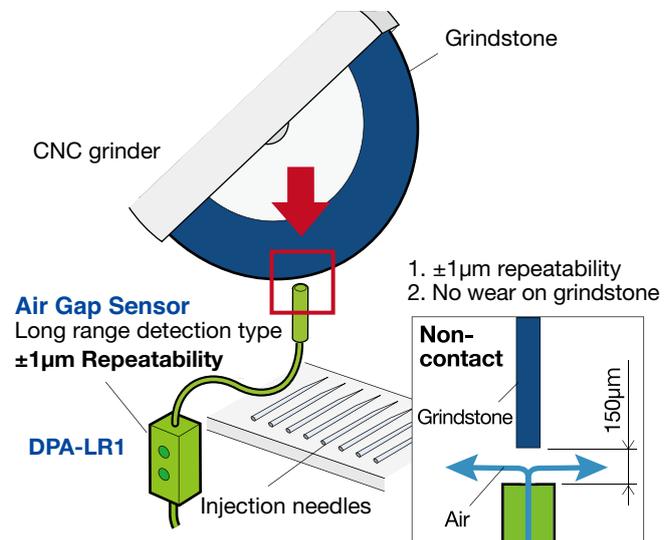


High accuracy, non-contact detection of the wear on rotating grindstones.
Realizes ultra-precision machining with CNC grinder.

✗ $\pm 30\mu\text{m}$ Repeatability.
Detects wear on grindstones with contact.



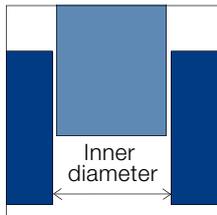
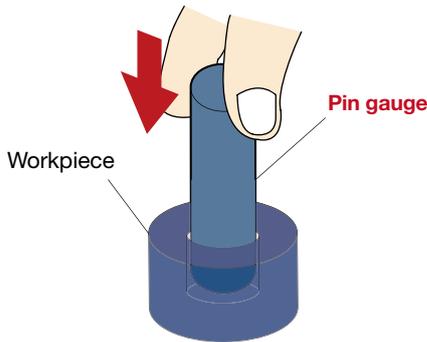
✓ $\pm 1\mu\text{m}$ Repeatability
High accuracy, non-contact detection of grindstone wear.



Application Examples

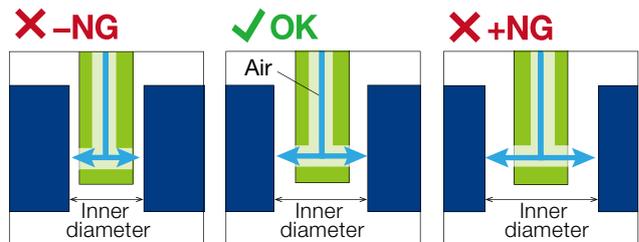
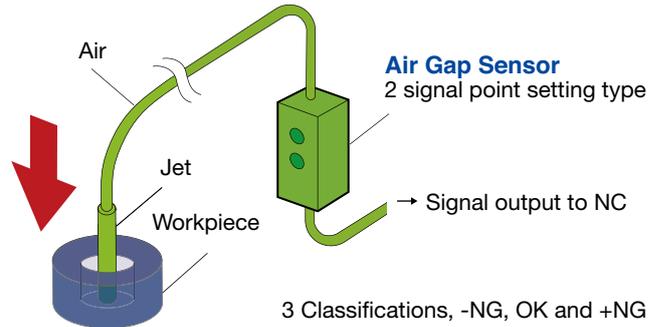
Replacement of the pin gauge drastically reduced the time for inner diameter inspection.

✗ Inner diameter inspection using pin gauge takes a lot of time.



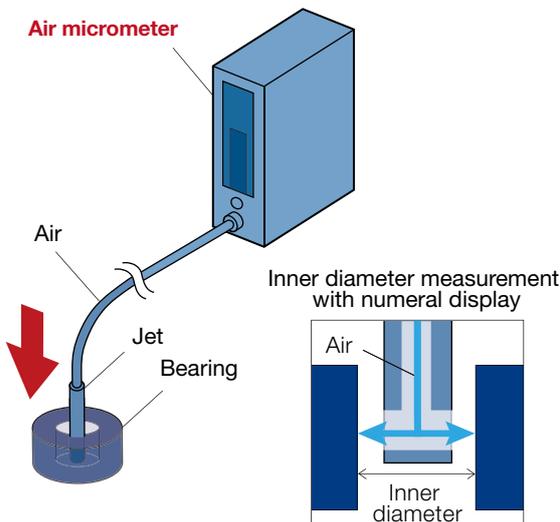
1. Inspection by inserting and extracting a pin gauge manually takes a lot of time.
2. Variations in inspection results among workers are caused.

✓ -NG / OK / +NG 3 classification significantly reduced the inspection time.

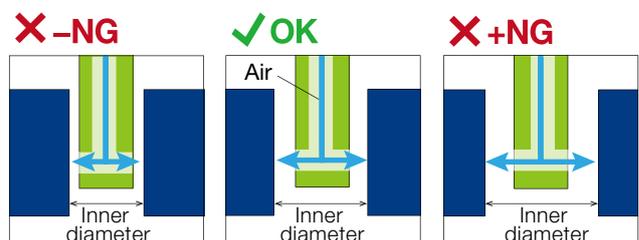
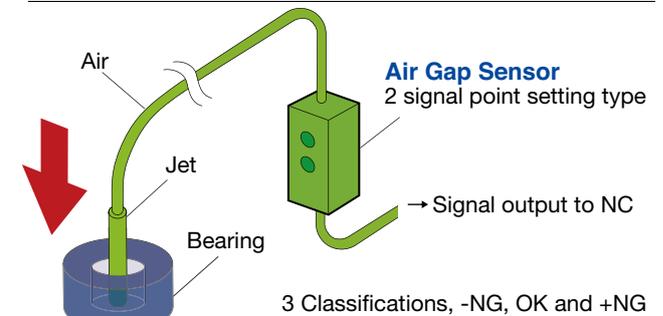


Replacement of the air micrometer reduced the cost significantly. Machine can be automated by externally outputting signals to NC.

✗ The air micrometer is expensive.



✓ -NG / OK / +NG 3 classification significantly reduced the cost for inner diameter measurement.



DPA-SR1/LR1

1 Signal Point Setting Type Short/Long Range Detection



* Photo shows the optional protective tube attached.

- **1–100µm Short Range Detection Type
DPA-SR1**

The gaps caused by cutting chips put between the workpiece and the jig can be detected reliably with $\pm 0.5\mu\text{m}$ to $\pm 1\mu\text{m}$ repeatability.

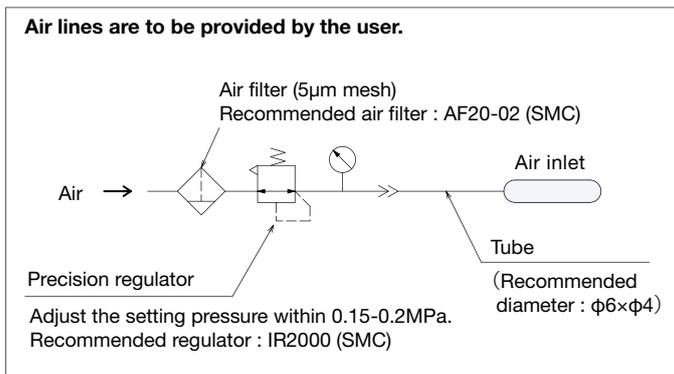
- **80–350µm Long Range Detection Type
DPA-LR1**

Reliably detects the gaps of 80 to 350µm with $\pm 1\mu\text{m}$ to $\pm 5\mu\text{m}$ repeatability. Best suited for seating confirmation of big workpieces or workpieces with rough surface.

Specification

Product name	DPA-SR1 (Short range detection type)	DPA-LR1 (Long range detection type)
Detection range	1–100µm (When using a recommended nozzle)	80–350µm (When using a recommended nozzle)
Signal point	Configurable by master set button	
Repeatability	$\pm 0.5\mu\text{m}$: Detection range 1–60µm $\pm 1\mu\text{m}$: Detection range 60–100µm Air Pressure change : within $\pm 1\%$ Tube length 1.5m/When using a recommended nozzle	$\pm 1\mu\text{m}$: Detection range 80–150µm $\pm 3\mu\text{m}$: Detection range 150–250µm $\pm 5\mu\text{m}$: Detection range 250–350µm Air Pressure change : within $\pm 1\%$ Tube length 1.5m/When using a recommended nozzle
Response speed	0.8 seconds (Tube length 1.5m/Time between the air pressure supply and the signal output of the sensor.)	
Electrical response speed	80ms	
Protective structure	IP67	
Setting pressure	0.15–0.2MPa	
Pipe diameter	O.D. $\phi 6$ X I.D. $\phi 4$ tube	
Fluid	Dry air (filtered to 5µm)	
Consumption flow rate	9ℓ/min (max)	24ℓ/min (max)
Operating temperature range	0°C–60°C (no condensation)	
Cable	Standard length 3m Oil resistance $\phi 5/4$ cores AWG 30	
Power supply voltage	DC24V $\pm 10\%$ Current consumption : less than 100mA	
Output specification	Photo MOS output (Non-voltage floating output) DC30V (max) 100mA (max)	

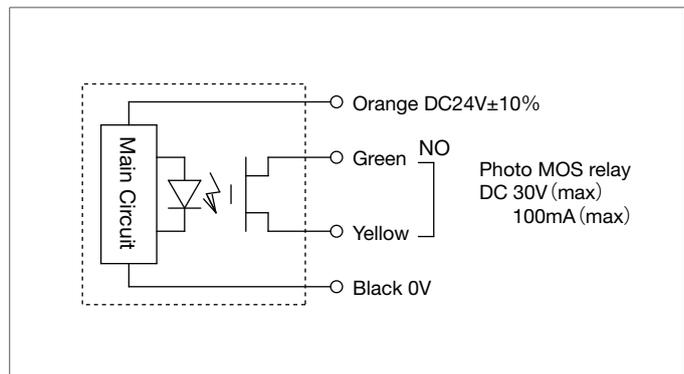
Air piping diagram



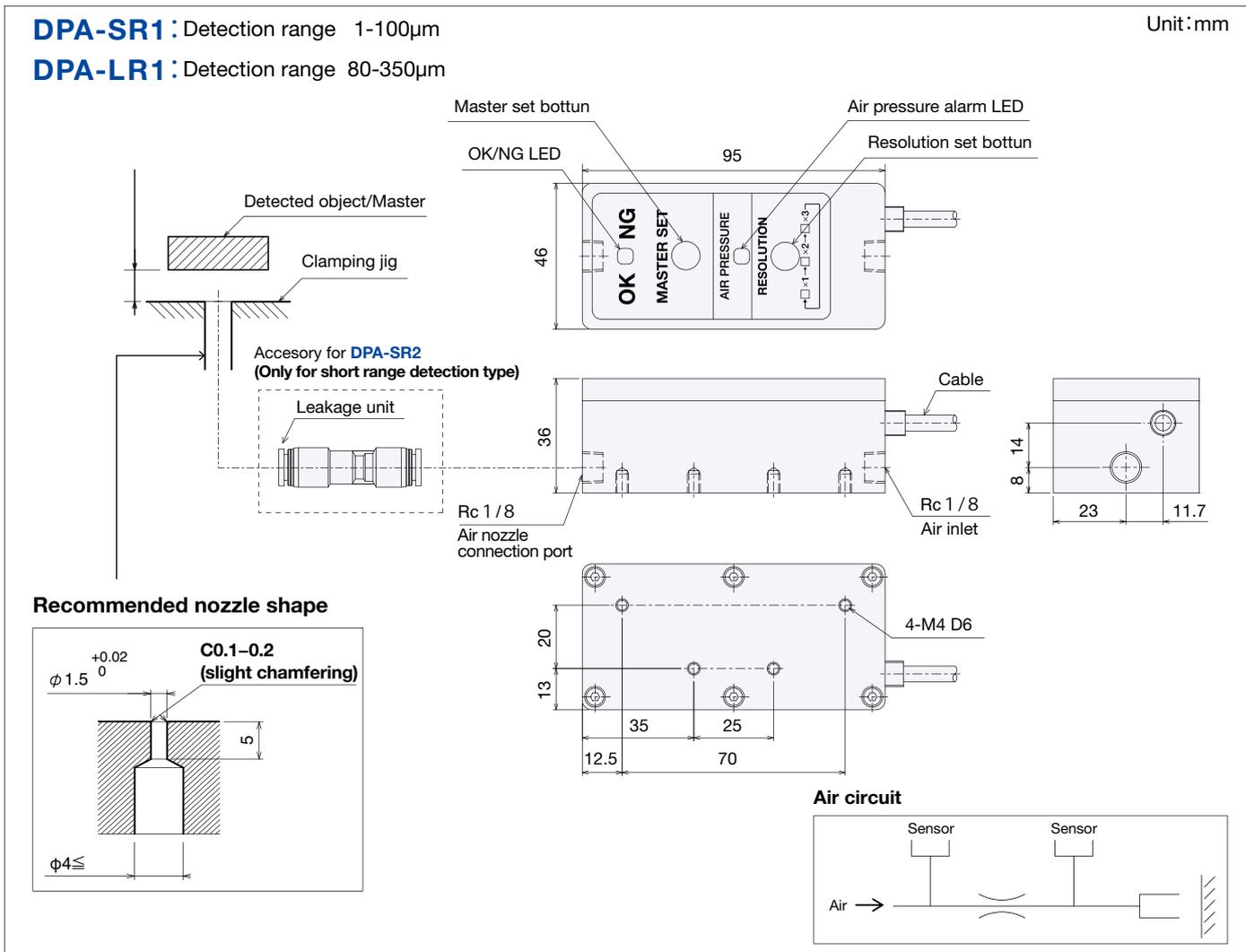
Precautions for air piping

Connect the air pipe after adjusting the setting pressure within the range of 0.15–0.2MPa.

Circuit diagram



Outer dimension



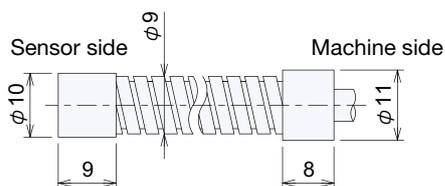
Options

Product No.	Tube length	Cable protection
DPA-SR1 DPA-LR1	Blank : 3m	Blank : No cable protection P2 : Protective tube 2m

► e.g.) DPA-SR1-P2

Protective tube for cable protection

Dimension : outer diameter $\phi 9$
Minimum bending radius : 25mm



Sensor side is screwed in and metal ring is attached to machine side.

Handling instruction

- 1) Because protective tube is not flexible, clamp it to fix so as not apply excessive force to the sensor.
- 2) When binding it up and clamp with other cables, make sure not to apply excessive force to the attachment end.
- 3) Cables are not waterproof.

DPA-SR2/LR2

2 Signal Point Setting Type Short/Long range detection

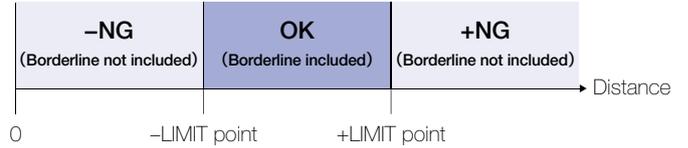
NEW



* Photo shows the optional protective tube attached.

• 3 Classifications (-NG, OK, +NG)

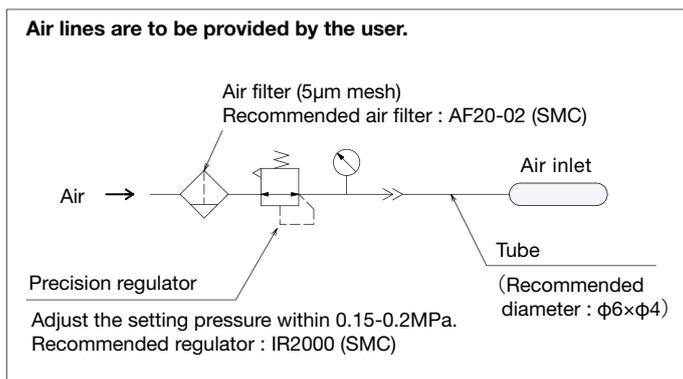
Displays results and outputs signals based on 3 classifications (-NG, OK, +NG) by setting upper and lower limit points.



Specification

Product name	DPA-SR2 (Short range detection type)	DPA-LR2 (Long range detection type)
Detection range	1–100µm (When using a recommended nozzle)	80–350µm (When using a recommended nozzle)
Signal point	Set by +LIMIT SET button, -LIMIT SET button, +LIMIT SET input and -LIMIT SET input	
Repeatability	±0.5µm : Detection range 1–60µm ±1µm : Detection range 60–100µm Air pressure change : within ±1% Tube length 1.5m/When using a recommended nozzle	±1µm : Detection range 80–150µm ±3µm : Detection range 150–250µm ±5µm : Detection range 250–350µm Air pressure change : within ±1% Tube length 1.5m/When using a recommended nozzle
Response speed	0.8 seconds (Tube length 1.5m/ Time between the air pressure supply and the signal output of the sensor.)	
Electrical response speed	10ms	
Protective structure	IP67	
Setting pressure	0.15–0.2MPa	
Pipe diameter	O.D. φ6 X I.D. φ4 tube	
Fluid	Dry air (filtered to 5µm)	
Consumption flow rate	9ℓ/min (max)	24ℓ/min (max)
Operating temperature range	0°C–60°C (no condensation)	
Cable	Standard length 3m Oil resistance φ5.5/16 cores AWG 28	
Power supply voltage	DC24V±10% Current consumption : less than 50mA	
Input specification	Photocoupler input DC24V±10%	
Output specification	Photocoupler output (Non-voltage floating output) DC24V±10% 15mA (max) Low level output voltage : less than 1.5V (at 15mA)	

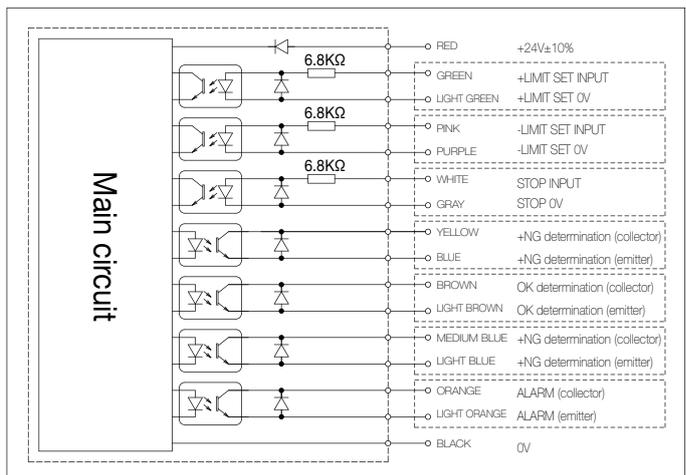
Air piping diagram



Precautions for air piping

Connect the air pipe after adjusting the setting pressure within the range of 0.15-0.2MPa.

Circuit diagram

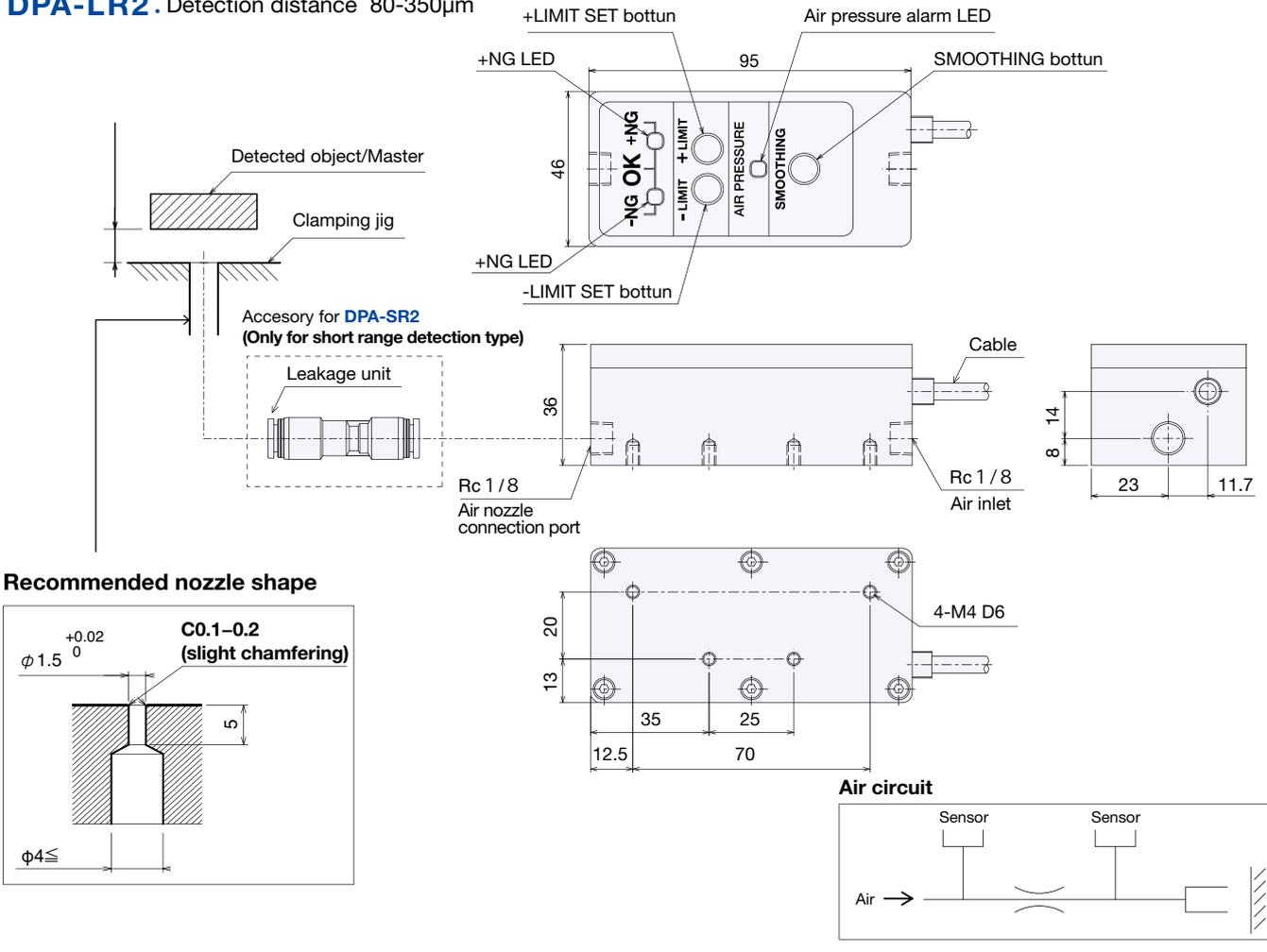


Outer dimension

DPA-SR2 : Detection distance 1-100 μ m

Unit : mm

DPA-LR2 : Detection distance 80-350 μ m



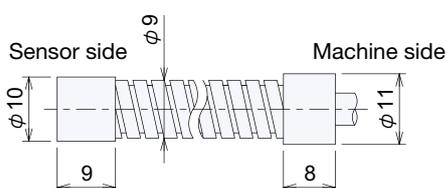
Options

Product No.	Tube length	Cable protection
DPA-SR2 DPA-LR2	Blank : 3m	Blank : No cable protection P2 : Protective tube 2m

► e.g.) DPA-SR2-P2

Protective tube for cable protection

Dimension : outer diameter $\phi 9$
Minimum bending radius : 25mm



Sensor side is screwed in and metal ring is attached to machine side.

Handling instruction

- 1) Because protective tube is not flexible, clamp it to fix so as not apply excessive force to the sensor.
- 2) When binding it up and clamp with other cables, make sure not to apply excessive force to the attachment end.
- 3) Cables are not waterproof.

Excellence Award in
“Tokyo Venture Technology Award 2015”



Precision Mechanical Type AIR GAP SENSOR for Short Range Detection

DPA-A2

Product name	DPA-A2
Repeatability	±1μm*
Response speed	0.8 seconds*
Protective structure	IP67
Detection range	2–80μm (10μm at the factory setting) Set with the signal point tab
Setting pressure	0.1MPa

*Tube length 1.5m / When using a recommended nozzle

For more detail, please contact us.

Case Study



DENSO Corporation

**“Prevented machining defects
 using precise workpiece seating confirmation”**

Read full case study here. ►





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