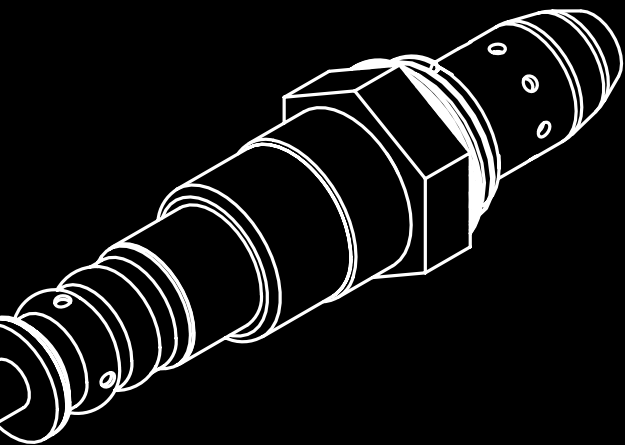
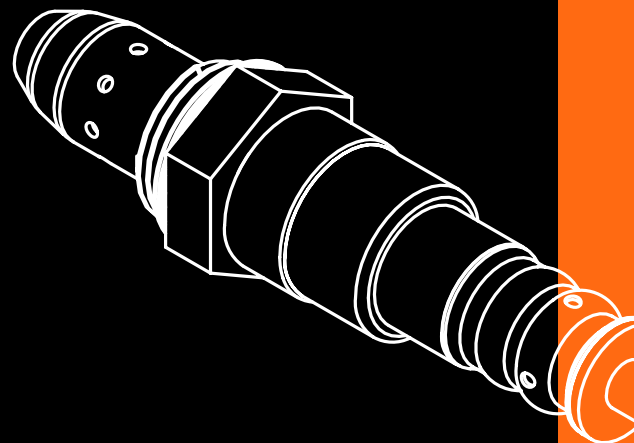
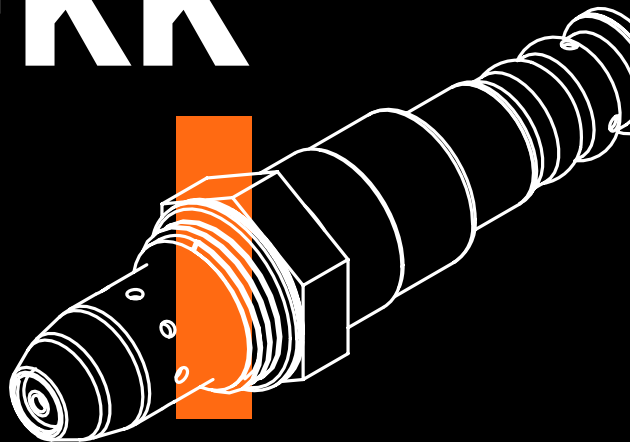


OSx

A/F Oxygen Sensor



FKK



A/F sensor for burner

Oxygen sensor and controller for optimization of combustion equipments

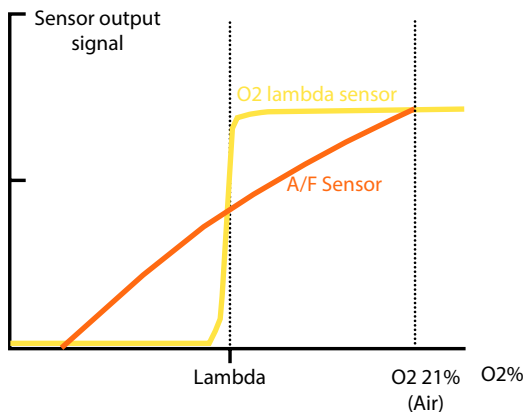


- 1 Wide band oxygen sensor
- 2 All in one solution: sensor + controller
- 3 Calibration, diagnostic function

What is the role of A/F sensor?

A/F sensor or wideband oxygen sensor, is an advanced type of oxygen sensor that provides accurate and detailed information about the air-to-fuel ratio (A/F) in the exhaust gases of a burner or boiler. It is a critical component for modern combustion systems, particularly those with performance or efficiency optimization goals.

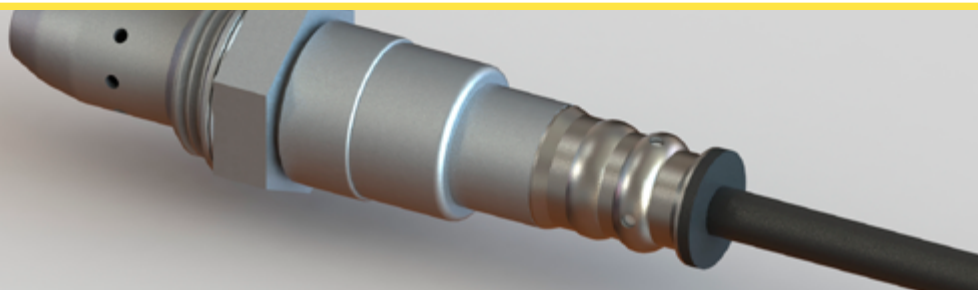
Difference between lambda sensor and A/F sensor



The output of the lambda O₂ sensor changes abruptly after stoichiometry (complete combustion), whereas the output of the A/F sensor changes smoothly from stoichiometry to atmosphere. Since the output is almost linear with respect to the air-fuel ratio, it is relatively easy to control the output to be close to the ideal air-fuel ratio ($\lambda=1$).

Therefore, it can realize more precise adjustment of the gas/air mixture ratio in burners and boilers, contributing to reductions in emissions of environmentally hazardous substances such as HC, CO, and NO_x.

Beside A/F sensors operate on the principle of the Nernst voltage and are equipped with an additional pump cell compare to lambda sensor. This pump cell actively moves oxygen ions through the sensor, allowing it to maintain a precise A/F ratio measurement even under varying conditions and independently of ambient temperature.

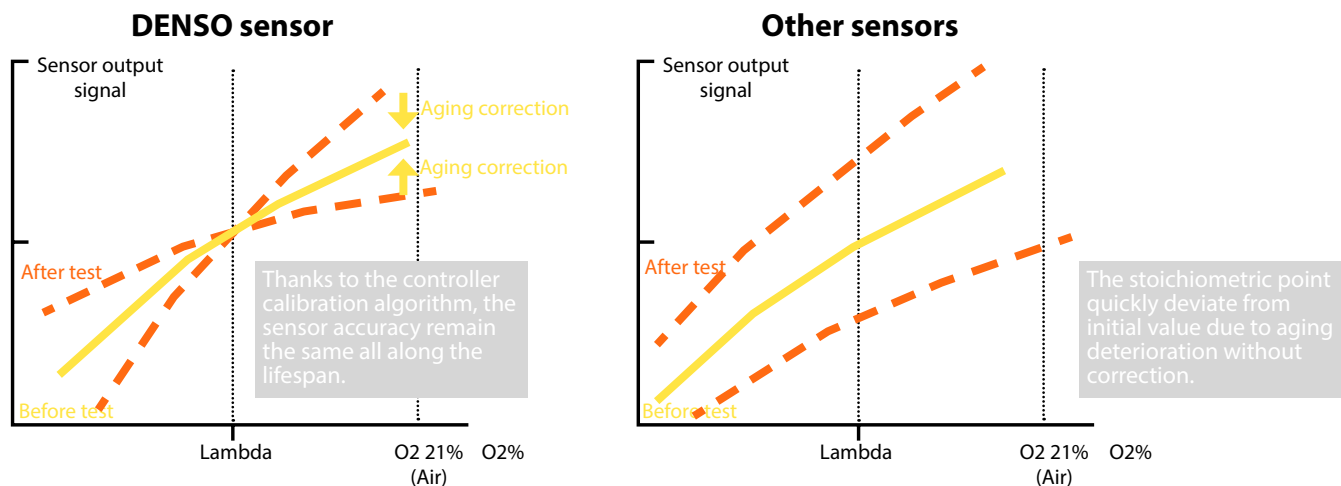


Particularity of DENSO sensor

DENSO's A/F sensor employs technology cultivated in automotive industry and provides customers with high accuracy and high reliability even in harsh environments such as high temperatures.

In order to use the A/F sensor, an IC chip called ASIC is required for the control part, so we provide a set of sensor + extension cable + control module in order to ease the development, calibration and usage.

The unique sensor structure developed by DENSO achieves higher accuracy and reliability than other companies. High accuracy of stoichiometric output and original correction algorithm can reduce the influence of deterioration over time. Beside the controller provide many useful functions for easy use.



Wide band oxygen sensor technology benefits

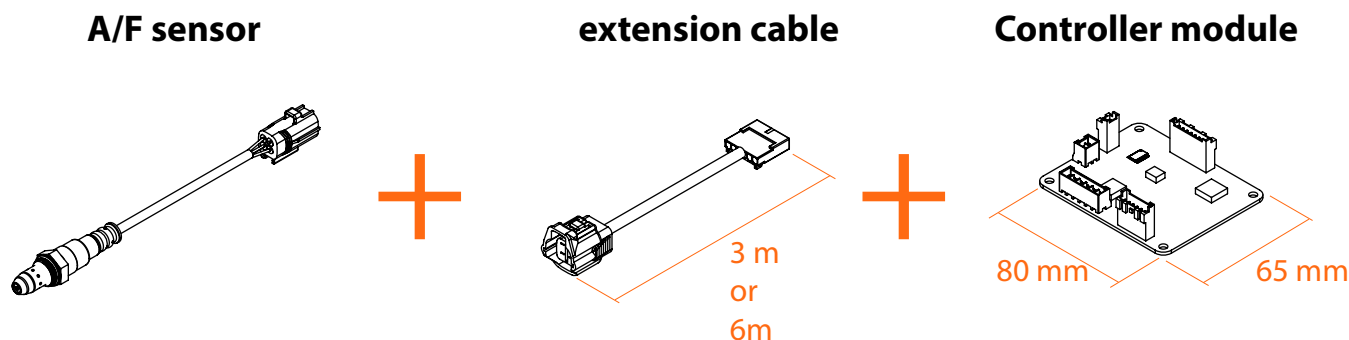
- Detects a wide range of air-fuel ratios (up to 25% oxygen) in exhaust gas
- Long rating life
- 4 to 20mA output similar to conventional oxygen analyzer
- Auto-calibration, heater control, auto-diagnostic, error notification functions
- Resistant to oxidation and corrosion
- High cost performance
- Compliant with CE, UL, RoHS and REACH standards

Application

- Small to large gas /H2 burners
- Small to large gas/H2 boilers
- Commercial gas/H2 furnace/ burner
- Laboratory equipment
- Other uses

Set content

In order to ease the development, calibration and usage the sensor is provided as a set of A/F sensor + 3m or 6m extension cable + a controller module with linear output signal.



A/F Oxygen sensor

Highly responsive air-fuel ratio sensor to optimize burner combustion and lower emissions

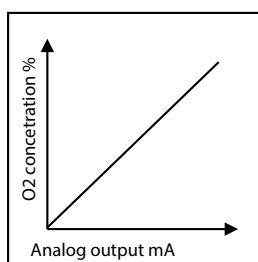
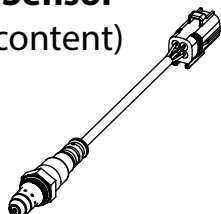
Closed-Loop Control and feedback application

A/F sensors are typically used in closed-loop control systems, where the burner control unit (ECU) uses the sensor's λ readings to continuously adjust the fuel volume. This allows for highly accurate and real-time control of the A/F ratio.

Example of use in Closed-Loop Control

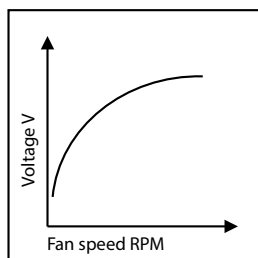
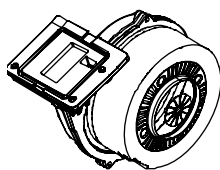
- Optimisation of combustion
- Burner failure monitoring

A/F Sensor
(O₂ content)



Target O₂% =
4~18mA

Fan
(Fan speed /Air mass flow)



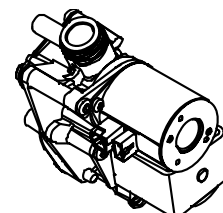
Target
fan speed RPM

**Burner failure
monitoring
> Stop gas**

Calculate and
adjust optimal
flame temp
(λ) in real time

Burner controller

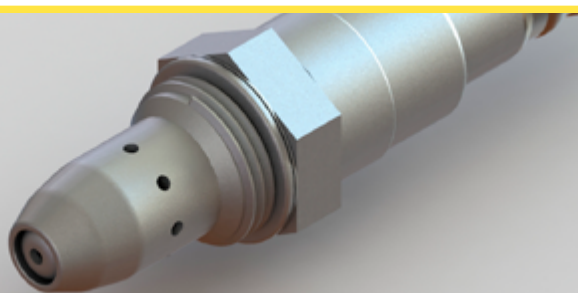
Gas valve
(control)



Gas volume
control

Air volume
control

**Optimisation of
Air/Fuel ratio**



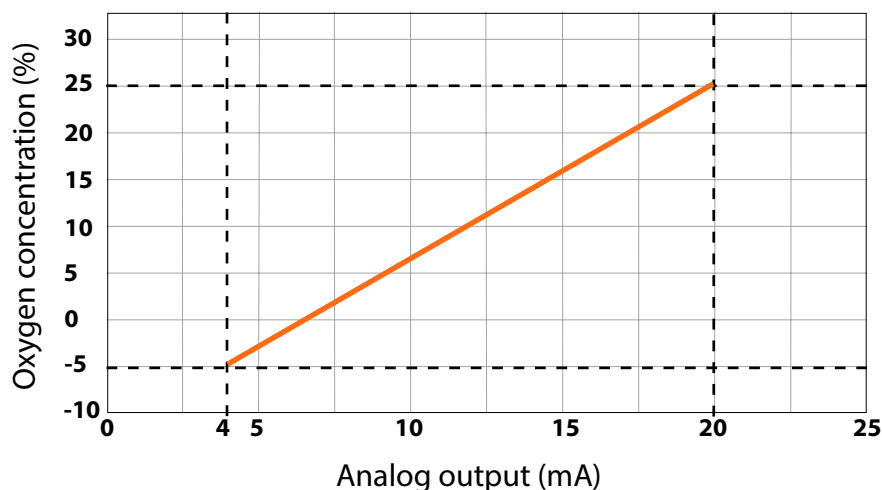
Output signal features

Thanks to the ASIC chip in the mini controller unit and internal algorithms, the output signal is linear, making development, calibration, and operation very easy.

Measurement accuracy: $\pm 0.70\%$

Response time: 765 ms

Measuring range: -5-25% O₂ (4-20mA)



Main features

O ₂ concentration measurement	O ₂ concentration measurement Output signal: Linear 4 to 20mA O ₂ concentration range: -5 to 25
Heater ON/OFF control	Internal heater temperature of O ₂ sensor automatically controlled by digital input according to ambient temperature
Base air calibration control	Base air calibration control with digital input Compensates for changes in analog output signal due to aging of the O ₂ sensor. This calibration must be performed in ambient air (approximately 21% O ₂)
READY / ERROR notification	Notification function for READY and ERROR modes
Diagnostic	OSx-2 controllers can perform automatic diagnostics to ensure the highest level of security and best performance

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