

# Ceramic Heater For Oxygen Sensor

## ■ Thimble Ceramic Heater For Oxygen Sensor

Oxygen sensor for automobiles is the major sensor component in electronic fuel injection engine control system, and is the key part to control automobile exhaust emission, reduce automobile pollution to the environment and improve fuel combustion quality of automotive engine.

Thimble Type oxygen sensor heaters are available in 1,2,3 or 4 wires depending on the construction project. Due to the environment legislations, newer vehicles only use oxygen sensors with internal heater, commonly found in 4-wire sensors, Thimble type with heater starts to work in approximately 40 seconds after ignition.



## ■ Thimble Oxygen Sensor Cutaway

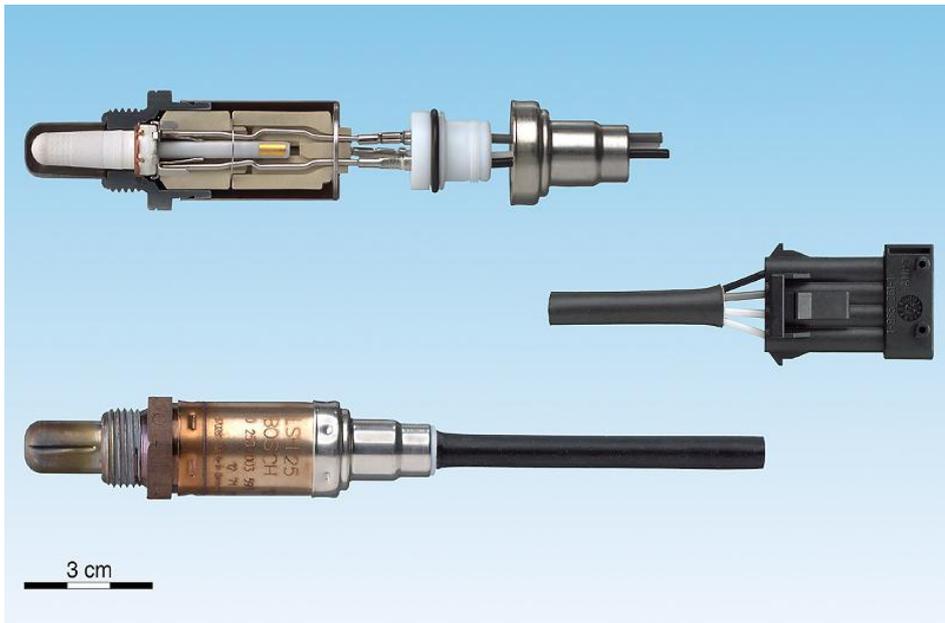
1. Ceramic inductor (zirconium tube)
2. Heater rod
3. Protective tube



## ■ Regular Product Model

Model	Size	Voltage	Resistance
INC-X5725TA	D2.5*57mm	13V	9±1%Ω
INC-X5729TDC	D2.9*57mm	12V	3.4±0.34Ω
INC-X37255TA	D2.55*37mm	13V	5±0.5Ω
INC-X50295TB	D2.95*50mm	13V	4.5±0.5Ω
INC-X53430TE	D3*53.4mm	13V	13±1Ω
INC-X56295TA	D2.95*56mm	13V	4.5±0.5Ω
INC-X5736TFB	D3.6*57mm	12V	2.7~3.3Ω
INC-X5736TG	D3.6*57.5mm	12V	2.3±0.3Ω
INC-X5729TF	D2.9*57mm	13V	13±1.3Ω

## ■ Product Assembled And Package Photos

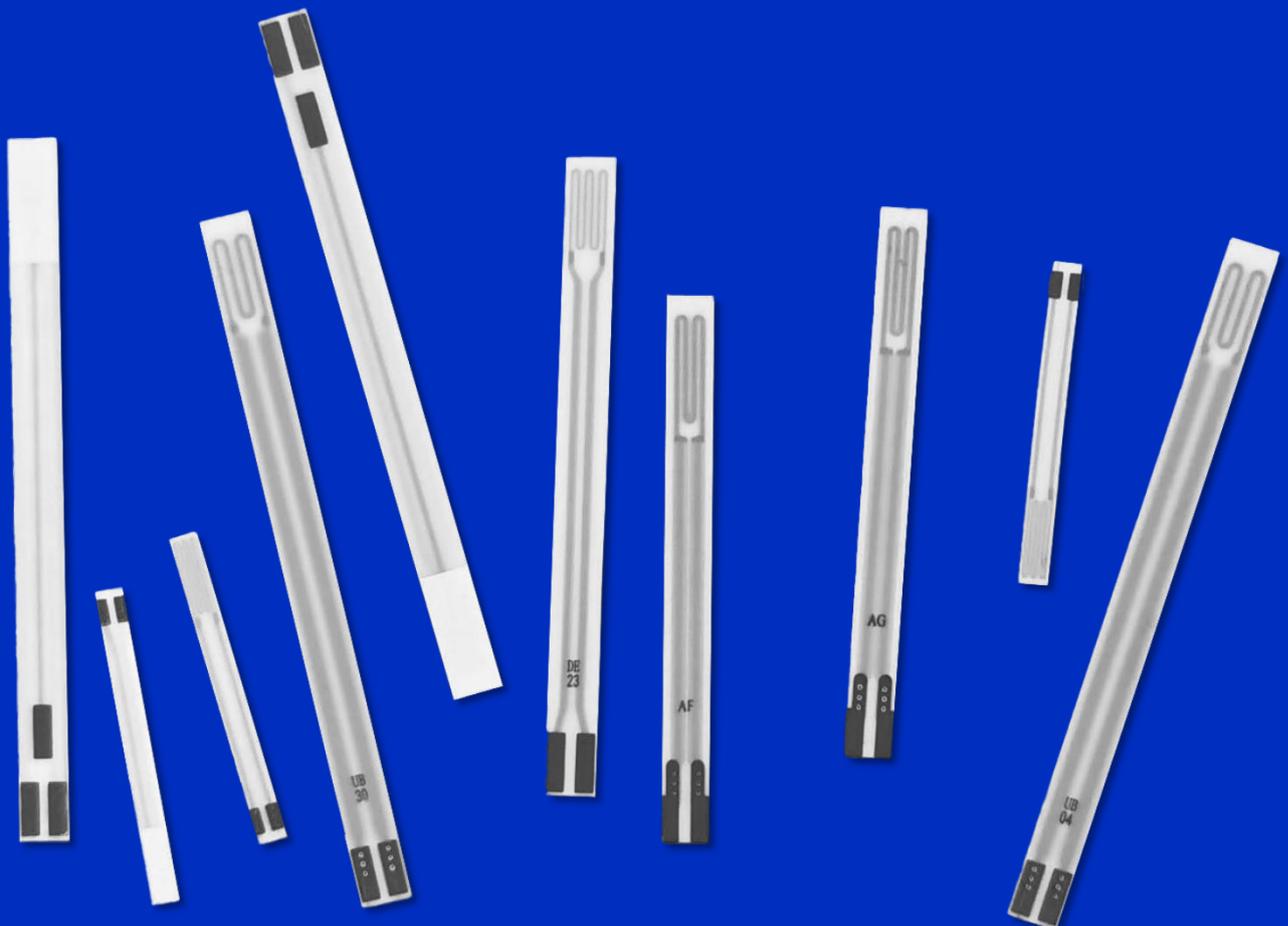
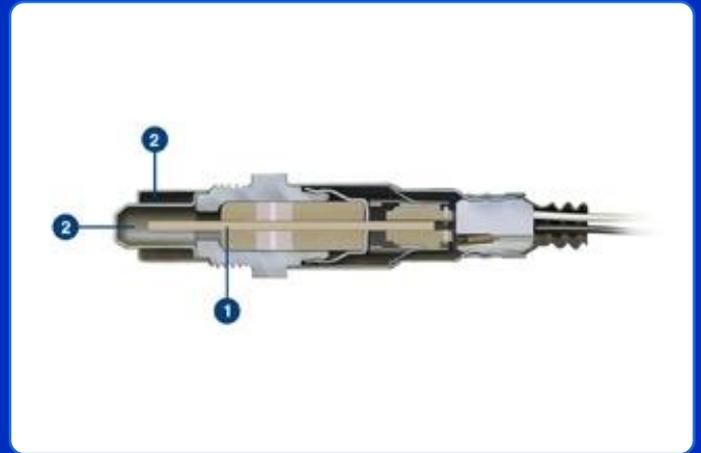


## ■ Planar Ceramic Heater For Oxygen Sensor

Planar ceramic heater oxygen sensors are subject to extreme conditions. A properly functioning oxygen sensor forms the basis for reliable engine operation and thus fuel economy, low pollutant emissions, and good exhaust gas values.

Oxygen sensors with planar ceramic heater characteristics:

- Quick ignition time.
- Good insulation performance.
- Strong resistance to high temperature and poisoning.
- Long lifetime.
- Pump current switch type, conventional switch type, air–fuel ration type, and wide range type are available.



## ■ Product Features

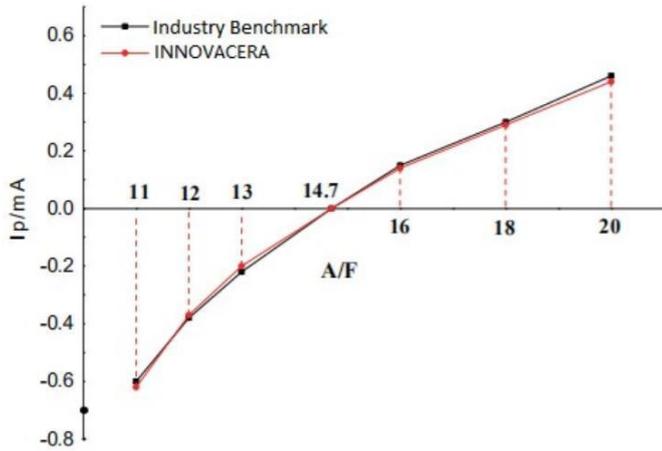
Switch Type	Conventional		XF Pump Current	
Heater Resistance	9±1.5Ω		3.0±0.5Ω	
Operating Voltage	12~14V		7~9V	
Exhaust Gas Temperature	350°C	800°C	350°C	800°C
Fuel-rich Voltage (λ=0.95~0.97)	800±65mV	700±65mV	900±150mV	800±150mV
Lean-Burn Voltage (λ=1.05~1.10)	50±30mV	50±30mV	20~250mV	20~250mV
Rich and Poor Response Time (600mV~300mV)	≤150ms	≤150ms	≤150ms	≤150ms
Poor and Rich Response Time (300mV~600mV)	≤100ms	≤100ms	≤100ms	≤60ms
High Temperature Insulation Resistance	@800°C, ≥1MΩ			
Light-Off Time	≤12s			
Inductive Resistance	≤500Ω		@780°C, 220Ω	
Three-Point Bending Strength	≥400MPa			
Note	The data above are standard values for conventional switching products, excluding XF products, heater resistance. Size can be customized as per customer request.		The data above are standard values. Pump current of several microamperes should be applied at the signal output terminal.	

Type	Air-Fuel Ration	Five-Wire Wide-Range Type – UN Products
Heater Resistance	2.1±0.3Ω	3.0±0.4Ω
Operating Voltage	7~9V	7~9V
Steady-state Current	1.3±0.2A	1.45±0.2A
High Temperature Insulation Resistance	@800°C, ≥1MΩ	
Light-Off Time	≤10s	
Inductive Resistance	@750°C, 30Ω	@780°C, 75Ω
Three-Point Bending Strength	≥400MPa	
Note	The data above are standard values, and the limit current in air is divided into two specification.	The data above are standard values, which should be matching with the resistance module.

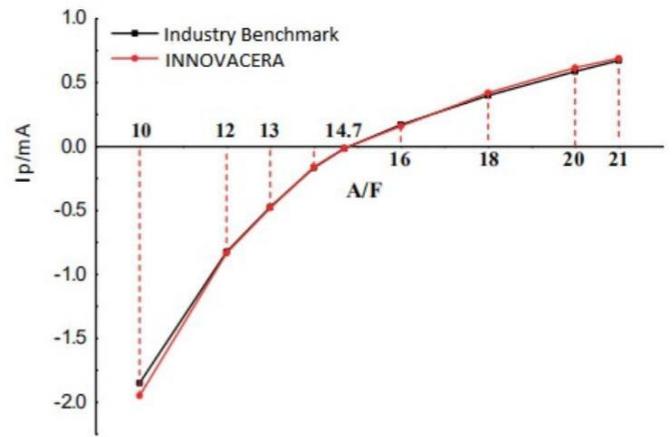
Type	Five-Wire Wide-Range Type – UN Products	
Heater Resistance	3.0±0.4Ω	3.0±0.4Ω
Operating Voltage	7~9V	9.5~11.5V
Steady-state Current	1.35±0.2A	1.1±0.2A
High Temperature Insulation Resistance	@800°C, ≥1MΩ	
Light-Off Time	≤10s	
Inductive Resistance	@780°C, 75Ω	@780°C, 300Ω
Three-Point Bending Strength	≥400MPa	
Note	The data above are standard values, which should be matching with the resistance module.	The data above are standard values, which should be matching with the resistance module. Properties parameters are applicable to UD type products

Type	Five-Wire Wide-Range Type – UC Products	Five-Wire Wide-Range Type – UF Products
Heater Resistance	3.0±0.4Ω	3.4±0.5Ω
Operating Voltage	8.0~10.0V	8.0~10.0V
Steady-state Current	1.0±0.2A	1.4±0.2A
High Temperature Insulation Resistance	@800°C, ≥1MΩ	
Light-Off Time	≤10s	
Inductive Resistance	@780°C, 80Ω	@780°C, 200Ω
Three-Point Bending Strength	≥400MPa	
Note	The data above are standard values, which should be matching with the resistance module. Properties parameters are applicable to UE type products.	The data above are standard values, which should be matching with the resistance module.

## ■ Product Characteristic Curve

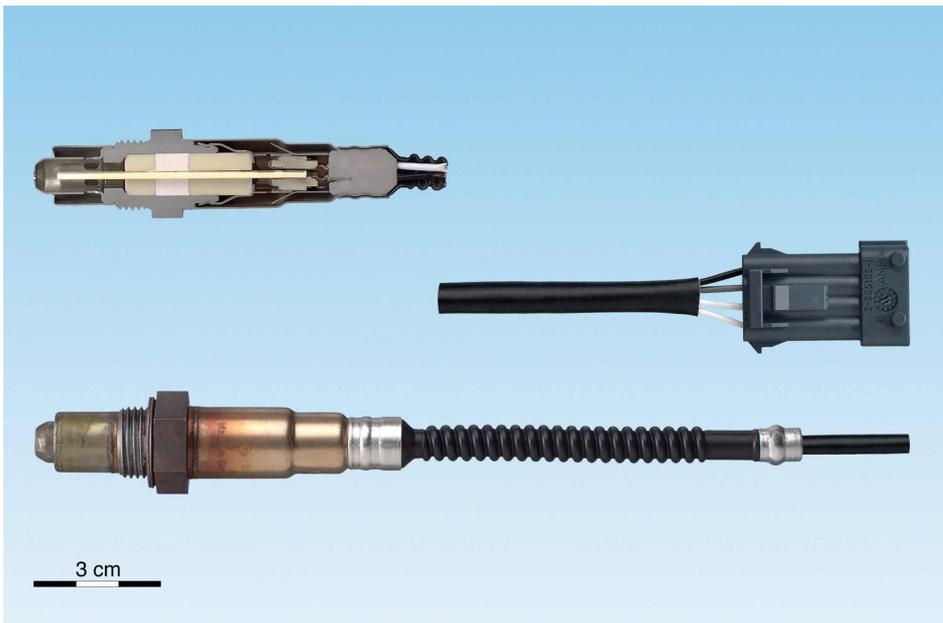


Air-Fuel Ratio Curve



Wide-Range Curve

## ■ Product Assembled And Package Photos



## ■ Size

Types	Model	Item	Resistance			Normal Temperature Resistance/ $\Omega$ (@24 $\pm$ 3 $^{\circ}$ C)	Remarks
			Length (mm)	Width (mm)	Thickness (mm)		
Conventional Switch Type	INC-F01	Ceramic Core BS	58.6 $\pm$ 0.5	4.4 $\pm$ 0.1	1.28 $\pm$ 0.1	9.0 $\pm$ 1.5	
		Ceramic Core DE	54.0 $\pm$ 0.5	4.4 $\pm$ 0.1	1.28 $\pm$ 0.1	9.0 $\pm$ 1.5	
		Ceramic Core DF	54.0 $\pm$ 0.5	4.4 $\pm$ 0.1	1.28 $\pm$ 0.1	6.0 $\pm$ 1.2	
		Ceramic Core DG	54.0 $\pm$ 0.5	4.4 $\pm$ 0.1	1.28 $\pm$ 0.1	13.0 $\pm$ 1.5	
		Ceramic Core DH	54.0 $\pm$ 0.5	4.4 $\pm$ 0.1	1.28 $\pm$ 0.1	4.0 $\pm$ 0.6	
		Ceramic Core CE	46.2 $\pm$ 0.5	4.4 $\pm$ 0.1	1.28 $\pm$ 0.1	9.0 $\pm$ 1.5	
		Ceramic Core CF	46.2 $\pm$ 0.5	4.4 $\pm$ 0.1	1.28 $\pm$ 0.1	6.0 $\pm$ 1.2	
		Ceramic Core XY	36.5 $\pm$ 0.5	4.2 $\pm$ 0.1	1.28 $\pm$ 0.1	9.0 $\pm$ 1.5	
		Ceramic Core XF	36.5 $\pm$ 0.5	4.4 $\pm$ 0.1	1.28 $\pm$ 0.1	3.0 $\pm$ 0.5	
		Ceramic Core MW	30.0 $\pm$ 0.5	2.5 $\pm$ 0.1	0.9 $\pm$ 0.1	/	Two Wire
		Ceramic Core MX	27.0 $\pm$ 0.5	2.5 $\pm$ 0.1	0.9 $\pm$ 0.1	17.0 $\pm$ 3.0	
Ceramic Core MY	27.0 $\pm$ 0.5	2.5 $\pm$ 0.1	0.9 $\pm$ 0.1	12.5 $\pm$ 1.5			
Air-Fuel Ratio Type	INC-U01	Ceramic Core AF	46.2 $\pm$ 0.5	4.0 $\pm$ 0.1	1.45 $\pm$ 0.1	2.1 $\pm$ 0.3	@A/F=4%, I <sub>p</sub> =0.3mA
		Ceramic Core AG	46.2 $\pm$ 0.5	4.0 $\pm$ 0.1	1.45 $\pm$ 0.1	2.1 $\pm$ 0.3	@A/F=4%, I <sub>p</sub> =0.3mA
Five-Wires Wide Range Type	INC-U02	Ceramic Core UN	52.5 $\pm$ 0.5	4.2 $\pm$ 0.1	1.30 $\pm$ 0.1	3.0 $\pm$ 0.4	@In Air, I <sub>p</sub> =4.0mA
		Ceramic Core UK	52.5 $\pm$ 0.5	4.2 $\pm$ 0.1	1.30 $\pm$ 0.1	3.0 $\pm$ 0.4	@In Air, I <sub>p</sub> =6.0mA
Five-Wires Wide Range Type	INC-U03	Ceramic Core UB	59.6 $\pm$ 0.5	4.4 $\pm$ 0.1	1.30 $\pm$ 0.1	3.0 $\pm$ 0.4	@In Air, I <sub>p</sub> =4.0mA
		Ceramic Core UC	59.6 $\pm$ 0.5	4.4 $\pm$ 0.1	1.30 $\pm$ 0.1	3.0 $\pm$ 0.4	@In Air, I <sub>p</sub> =4.0mA
		Ceramic Core UD	55.0 $\pm$ 0.5	4.25 $\pm$ 0.1	1.30 $\pm$ 0.1	3.0 $\pm$ 0.4	@In Air, I <sub>p</sub> =4.0mA
		Ceramic Core UE	55.0 $\pm$ 0.5	4.25 $\pm$ 0.1	1.30 $\pm$ 0.1	3.0 $\pm$ 0.4	@In Air, I <sub>p</sub> =4.0mA
		Ceramic Core UF	52.0 $\pm$ 0.5	4.2 $\pm$ 0.1	1.30 $\pm$ 0.1	3.4 $\pm$ 0.5	@In Air, I <sub>p</sub> =6.0mA



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