

# Technical Data Combination Probe KS1D ECO



Fig. 1 Combination Probe KS1D ECO

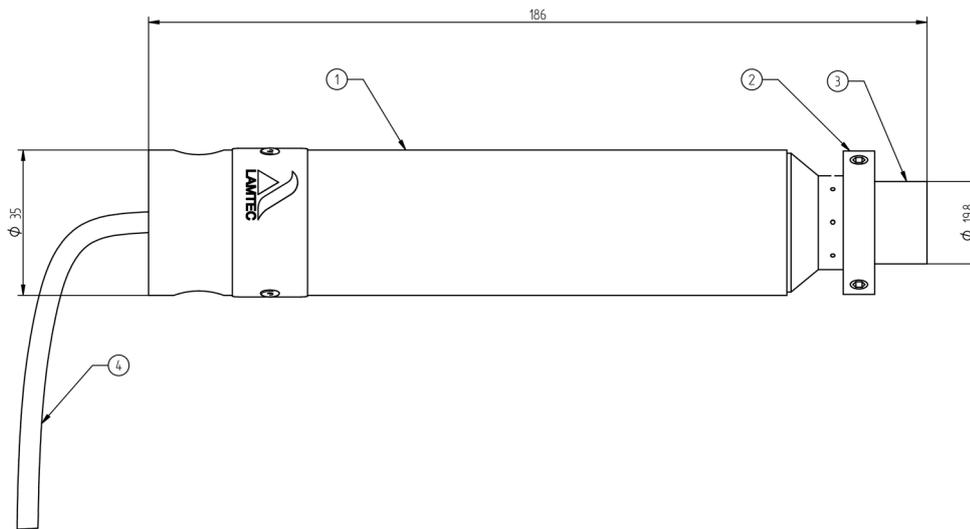
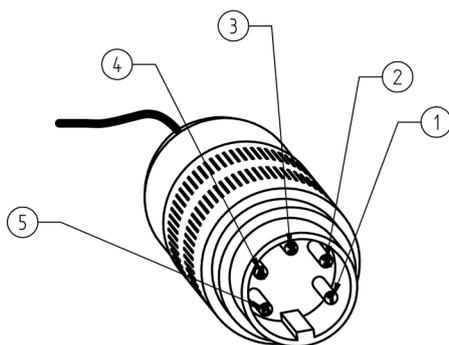


Fig. 2 Combination Probe KS1D ECO (dimensions in mm)

1	Combination Probe KS1D ECO
2	Locking ring for GED ECO
3	Probe head



- 1 = (+) probe signal O<sub>2</sub>/ CO<sub>e</sub> (black)
- 2 = (-) probe signal CO<sub>e</sub> (grey)
- 3 = probe heating (white)
- 4 = probe heating (white)
- 5 = (-) probe signal O<sub>2</sub> (red or blue)

Fig. 3 Pin assignment for plug

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Technical data*	
Measuring range	O <sub>2</sub> : 0 ... 21 % O <sub>2</sub>
	CO <sub>e</sub> : 0 ... 1,000 ppm (0 ... 10,000 ppm upon request)
Measuring precision	O <sub>2</sub> : ± 5 % of measured value - not better than ± 0.3 vol. %
	CO <sub>e</sub> : ± 25 % of measured value- not better than ± 20 ppm after prior calibration under operating conditions with a CO reference measurement
	In measuring range ≤ 100 ppm: ± 10 ppm
Sensor signal	O <sub>2</sub> : -30 ... +150 mV
	CO <sub>e</sub> : -30 ... +800 mV
Response time	O <sub>2</sub> : t <sub>60</sub> : < 3 s t <sub>90</sub> : < 9 s
	CO <sub>e</sub> : t <sub>60</sub> : < 3 s (electronically filtered at the factory < 9 s) t <sub>90</sub> : < 4 s (electronically filtered at the factory < 13 s)
Relaxation time (measurement readiness after overload)	O <sub>2</sub> : t <sub>90</sub> : < 8 s
	CO <sub>e</sub> : t <sub>90</sub> : < 9 s
Offset in ambient air	O <sub>2</sub> : < 0.3 vol. %
	CO <sub>e</sub> : < 2 ppm
Repeat accuracy	O <sub>2</sub> : < 0.1 % deviation from measured value
	CO <sub>e</sub> : < 0.7 % deviation from measured value
Drift	O <sub>2</sub> : < 1.7 % from measured value (after 1000 h of operation in EL light fuel oil and 1004 switching cycles ON/OFF)
	CO <sub>e</sub> : < 18.4 % from measured value (after 1000 h of operation in EL light fuel oil and 1004 switching cycles ON/OFF)
Cross sensitivity**	O <sub>2</sub> : to CO <sub>2</sub> (15 vol. %) < 0.1 vol. %
	O <sub>2</sub> : to CO (874 ppm) < 0.1 vol. %
	O <sub>2</sub> : to CH <sub>4</sub> (76 ppm) < 0.1 vol. %
	O <sub>2</sub> : to SO <sub>2</sub> (76 ppm) < 0.1 vol. %
	O <sub>2</sub> : to NO (245 ppm) < 0.1 vol. %
	CO <sub>e</sub> : to CO <sub>2</sub> (15 vol %) < 26 ppm
	CO <sub>e</sub> : to O <sub>2</sub> (1 vol. %) < 38 ppm
Heating consumption	10 ... 25 W (according to design, measuring gas temperature, and measuring speed)
Lifetime	> 3 years (in case of light fuel oil and natural gas)
Weight	560 g   1.23 lb
Material of probe housing	1.4571/1.4301
Material of connecting line	Nickel-plated copper strand FEP insulation
Operating temperature of the measuring cell (sensor) at 13 V heating voltage in the air (20 °C   68 °F)	650 °C   1,202 °F
Measuring principle	Zirconium dioxide cell (ZrO <sub>2</sub> ) potentiometric (voltage probe)
Heating time	10 minutes until operating temperature is reached

\* Information according to EN 16340:2014 D

\*\* O<sub>2</sub>: Information assumes an operating gas composition of 5 vol. % O<sub>2</sub>, rest is N<sub>2</sub>  
CO<sub>e</sub>: Information assumes an operating gas composition of 5 vol. % O<sub>2</sub>, 333 ppm CO<sub>e</sub>, rest is N<sub>2</sub>  
(333 ppm CO<sub>e</sub> = 166.5 ppm H<sub>2</sub> + 166.5 ppm CO)

## Technical Data Combination Probe KS1D ECO

Conditions for use		
Mounting / measuring gas extraction device	Directly in exhaust gas channel / in situ	
Seal tightness	$q_L \leq 100 \text{ cm}^3/\text{h} / 6.10 \text{ in}^3/\text{h}$ (According to DIN V 18160-1:2006-01, seal tightness towards environment through housing and fastening.)	
Mounting position	Horizontal to vertical	
Permissible fuels	Residue-free, gaseous hydrocarbons, light fuel oil (EN 16340:2014 D approval (in connection with LT3-F) only with gaseous and liquid fuels.)	
Ideal measuring gas speed	Without GED	$1 \text{ m/s} \leq X \leq 4 \text{ m/s}$
	With GED ECO	$< 100 \text{ }^\circ\text{C}: 1 \dots 6 \text{ m/s}$ $> 100 \text{ }^\circ\text{C}: 1 \dots 12 \text{ m/s}$ $< 212 \text{ }^\circ\text{F}: 3.28 \dots 19.69 \text{ ft/s}$ $> 212 \text{ }^\circ\text{F}: 3.28 \dots 39.37 \text{ ft/s}$
Reference air supply	Not required	
Flange adapter	Male coupling G1¼"	

### Environmental Conditions

<b>Probe head</b>	permissible flue gas temperature	$\leq 300 \text{ }^\circ\text{C} \mid 572 \text{ }^\circ\text{F}$
<b>Operation</b>	permissible temperature	$\leq 260 \text{ }^\circ\text{C} \mid 500 \text{ }^\circ\text{F}$ at connecting cable
<b>Transport</b>	permissible temperature	$-20 \dots +70 \text{ }^\circ\text{C} \mid -4 \text{ }^\circ\text{F} \dots +158 \text{ }^\circ\text{F}$
<b>Storage</b>	permissible temperature	$-20 \dots +70 \text{ }^\circ\text{C} \mid -4 \text{ }^\circ\text{F} \dots +158 \text{ }^\circ\text{F}$
<b>Degree of protection</b>	DIN EN 40050	IP42

### NOTICE

The limits of the technical data must be strictly adhered to.

# Technical Data Combination Probe KS1D ECO

## Order Information

**Combination Probe KS1D for simultaneous measurement of oxygen (O<sub>2</sub>) and unburnt residue (CO/H<sub>2</sub>)**  
with connecting cable and connector

Description / Type	Type
Combination Probe KS1D ECO (in standard housing) with PTFE-connecting cable up to 300 °C   572 °F, cable length 2 m   6.56 ft, IP42	656R2000
Combination Probe KS1D ECO (in standard housing) with PTFE-connecting cable up to 300 °C   572 °F, cable length 5 m   16.40 ft, IP42	656R2002

Additional required:

- Lambda-Transmitter LT3-F in wall mounting housing (for CO/O<sub>2</sub>- control)  
Order no. 657R50
- or
- Lambda-Transmitter LT3 in wall mounting housing (for CO/O<sub>2</sub>- monitoring)  
Order no. 657R51
- Gas extraction device (GED ECO), order no. 655R1001 / R1002 / R1003
- Probe installation fitting (PIF), order no. 655R1010 or R1016

The information in this publication is subject to technical changes.



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