

# Technical Data Combination Probe KS1D ECO



Fig. 1 Combination probe KS1D ECO with gas extraction device GED ECO and probe installation fitting (PIF)

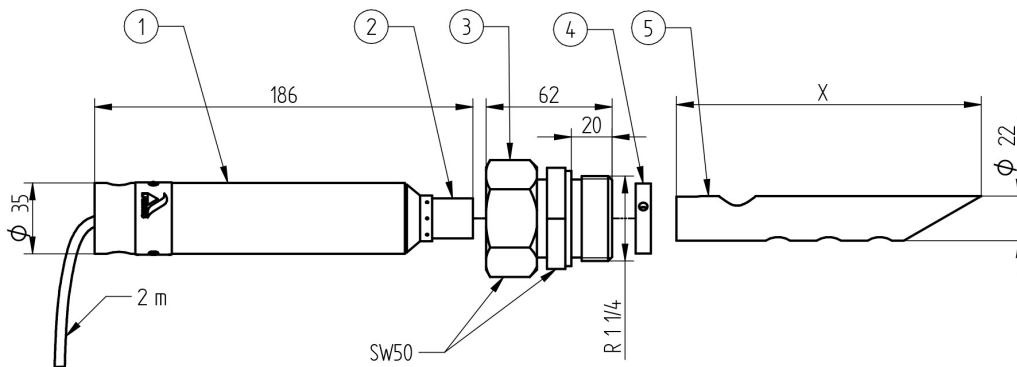


Fig. 2 Combination Probe KS1D ECO including probe installation fitting and gas extraction device GED ECO

No.	Description	Order no.
1	Combination Probe KS1D ECO	656R2000
2	Probe head	
3	Probe installation fitting 1 1/4"	655R1010
4	Locking ring for GED ECO	655R1021
5	Gas extraction device GED ECO length X = 150 mm / 5.91" in	655R1001
	Gas extraction device GED ECO length X = 300 mm / 11.81" in	655R1002
	Gas extraction device GED ECO length X = 450 mm / 17.72" in	655R1003

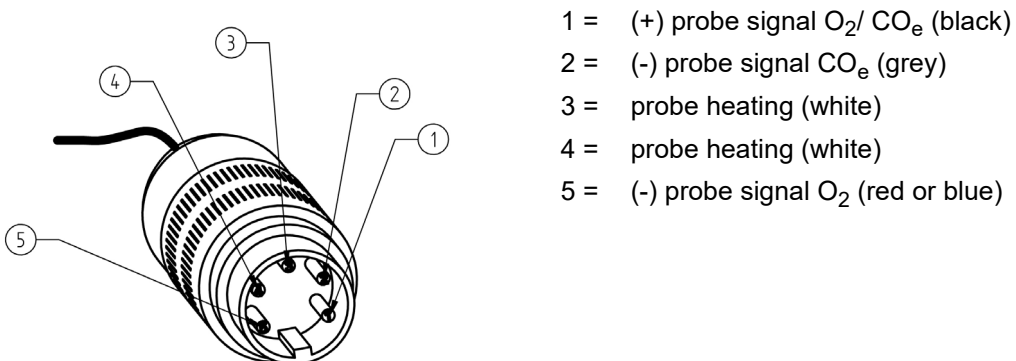


Fig. 3 Pin assignment for plug

## Technical Data Combination Probe KS1D ECO

Technical data*	
Measuring range	<b>O<sub>2</sub></b> : 0 ... 21 % O <sub>2</sub> <b>CO<sub>e</sub></b> : 0 ... 1,000 ppm (0 ... 10,000 ppm upon request)
Measuring precision	<b>O<sub>2</sub></b> : ± 5 % of measured value - not better than ± 0.3 vol. % <b>CO<sub>e</sub></b> : ± 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	<b>O<sub>2</sub></b> : -30 ... +150 mV <b>CO<sub>e</sub></b> : -30 ... +800 mV
Response time	<b>O<sub>2</sub></b> : t <sub>60</sub> : < 3 s t <sub>90</sub> : < 9 s <b>CO<sub>e</sub></b> : 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)	<b>O<sub>2</sub></b> : t <sub>90</sub> : < 8 s <b>CO<sub>e</sub></b> : t <sub>90</sub> : < 9 s
Offset in ambient air	<b>O<sub>2</sub></b> : < 0.3 vol. % <b>CO<sub>e</sub></b> : < 2 ppm
Repeat accuracy	<b>O<sub>2</sub></b> : < 0.1 % deviation from measured value <b>CO<sub>e</sub></b> : < 0.7 % deviation from measured value
Drift	<b>O<sub>2</sub></b> : < 1.7 % from measured value (after 1000 h of operation in EL light fuel oil and 1004 switching cycles on/off) <b>CO<sub>e</sub></b> : < 18.4 % from measured value (after 1000 h of operation in EL light fuel oil and 1004 switching cycles on/off)
Cross sensitivity**	<b>O<sub>2</sub></b> : to CO <sub>2</sub> (15 vol. %) < 0.1 vol. % <b>O<sub>2</sub></b> : to CO (874 ppm) < 0.1 vol. % <b>O<sub>2</sub></b> : to CH <sub>4</sub> (76 ppm) < 0.1 vol. % <b>O<sub>2</sub></b> : to SO <sub>2</sub> (76 ppm) < 0.1 vol. % <b>O<sub>2</sub></b> : to NO (245 ppm) < 0.1 vol. % <b>CO<sub>e</sub></b> : to CO <sub>2</sub> (15 vol %) < 26 ppm <b>CO<sub>e</sub></b> : 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	$q_L \leq 100 \text{ cm}^3/\text{h} / 6.10 \text{ in}^3/\text{h}^*$
Mounting position	horizontal to vertical
Permissible fuels	residue-free, gaseous hydrocarbons, light fuel oil **
Ideal measuring gas speed	without GED: $1 \text{ m/s} \leq X \leq 4 \text{ m/s}$ with GED ECO: $1 \text{ m/s} \leq X \leq 6 \text{ m/s}$  (Higher measuring gas speed increases the measurement error. Measured at measuring gas temperature $25 \text{ }^\circ\text{C} / 77 \text{ }^\circ\text{F}$ . In case of smaller measuring gas temperatures it might be necessary to protect the probe from the incident flow.)
Reference air supply	not required
Flange adapter	Male coupling G1¼"

### Environmental Conditions

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

\* According to DIN V 18160-1:2006-01, seal tightness towards environment through housing and fastening.

\*\* EN 16340:2014 D approval (in connection with LT3-F) only with gaseous and liquid fuels.

### 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

## Gas extraction device (GED ECO)

Description / Type	Type
Gas extraction device (GED ECO), length 150 mm / 5.91" in	655R1001
Gas extraction device (GED ECO), length 300 mm / 11.81" in	655R1002
Gas extraction device (GED ECO), length 450 mm / 17.72" in	655R1003

## Probe installation fitting (PIF)

Description / Type	Type
Probe installation fitting (PIF), screw-in joint R1 1/4 ", material: steel	655R1010
Probe installation fitting (PIF) - screw-in joint R 1 1/4 ", material: stainless steel 1.4571	655R1016
Half sleeve fitting, tube threaded connection R 1 1/4 ", DIN 2986 for PIF type 655R1010 / R0016, material: steel	655R1012
Half sleeve fitting, tube threaded connection R 1 1/4 ", DIN 2986 for PIF type 655R1010 / R0016, material: stainless steel 1.4571	655R1015

The information in this publication is subject to technical changes.



**LAMTEC Meß- und Regeltechnik  
für Feuerungen GmbH & Co. KG**

Josef-Reiert-Straße 26

D-69190 Walldorf

Telefon: +49 (0) 6227 6052-0

Telefax: +49 (0) 6227 6052-57

[info@lamtec.de](mailto:info@lamtec.de)

[www.lamtec.de](http://www.lamtec.de)

