Technical Data Combination Probe KS1D-BF



Fig. 1 Combination Probe KS1D-BF

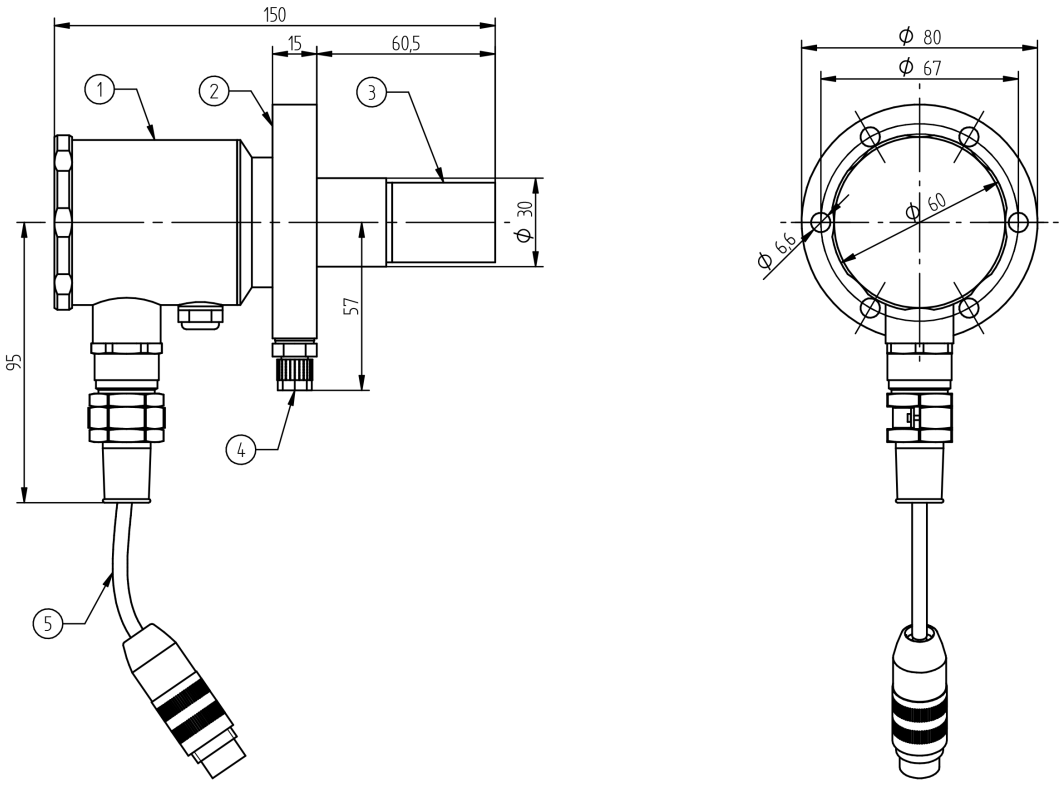
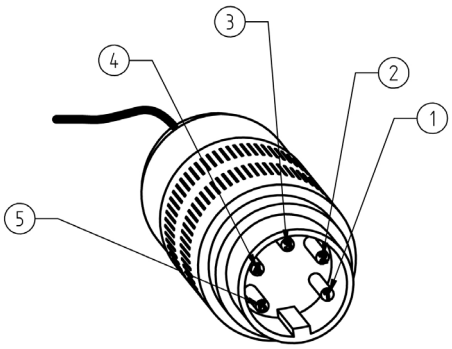


Fig. 2 Dimensional drawing Combination Probe KS1D-BF (dimensions in mm)

1	Junction box
2	Mounting flange
3	Max. measuring gas temperature at sintered metal filter
4	Hose connection
5	Connecting cable

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1 = (+) probe signal O_2/ CO_e (black)
2 = (-) probe signal CO_e (grey)
3 = probe heating (white)
4 = probe heating (white)
5 = (-) probe signal O_2 (red or blue)

Fig. 3 Pin assignment for plug

Technical data	
Measuring range	**O_2:** 0 - 21 % O_2
	CO_e: 0 - 1,000 ppm (0 - 10,000 ppm upon request)
Measuring precision	**O_2:** ± 5 % of measured value - not better than ± 0.3 vol. %
	CO_e: ± 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_2:** -30 ... +150 mV
	CO_e: -30 ... +800 mV
Response time	**O_2:** t_{60}: < 3 s t_{90}: < 9 s
	CO_e: t_{60}: < 3 s (electronically filtered at the factory < 9 s) t_{90}: < 4 s (electronically filtered at the factory < 13 s)
Relaxation time (measurement readiness after overload)	**O_2:** t_{90}: < 8 s
	CO_e: t_{90}: < 9 s
Offset to environment	**O_2**: < 0.3 vol. %
	CO_e: < 2 ppm
Repeating precision	**O_2**: < 0.1 % deviation from measured value
	CO_e: < 0.7 % deviation from measured value
Drift	**O_2**: < 1.7 % from measured value (after 1000 h of operation in EL light fuel oil and 1004 switching cycles ON/OFF)
	CO_e: < 18.4 % from measured value (after 1000 h of operation in EL light fuel oil and 1004 switching cycles ON/OFF)

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Technical data	
Cross sensitivity	**O_2:** to CO_2 (15 vol. %) < 0.1 vol. % **O_2:** to CO (874 ppm) < 0.1 vol. % **O_2:** to CH_4 (76 ppm) < 0.1 vol. % **O_2:** to SO_2 (76 ppm) < 0.1 vol. % **O_2:** to NO (245 ppm) < 0.1 vol. % (Information assumes an operating gas composition of 5 vol. % O_2, rest is N2)
	CO_e: to CO_2 (15 vol. %) < 26 ppm **CO_e:** to O_2 (1 vol. %) < 38 ppm (Information assumes an operating gas composition of 5 vol. % O_2, 333 ppm CO_e, rest is N2 (333 ppm CO_e = 166.5 ppm H2 + 166.5 ppm CO))
Heating consumption	10 ... 25 W (at T_{gas} 350 °C | 662 °F approx. 18 W) (according to design, measuring gas temperature, and measuring speed)
Weight	1,300 g | 2.86 lb
Material of probe housing	1.4571
Material of connection housing	Aluminium
Material of connecting line	Nickel-plated copper strand FEP insulation
Measuring principle	Zirconium dioxide cell (ZrO_2) potentiometric (voltage probe)

Operating Condition	
Lifetime	> 3 years (in case of light fuel oil and natural gas)
Heating time	10 min until operating temperature is reached
Operating temperature of the measuring cell (sensor) at 13 V heating voltage in the air (20 °C | 68 °F)	650 °C | 1,202 °F
Mounting / measuring gas extraction device	Directly in exhaust gas channel / in situ
Seal tightness	$q_L \leq 100\ cm^3/h$ (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, heavy fuel oil (HFO), lignite and coal, biomass (according to design)

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Operating Condition	
Ideal measuring gas speed	Without GED: – 1 m/s ≤ X ≤ 6 m/s | 3.28 ft/s ≤ X ≤ 19.69 ft/s with GED BASE: – T< 100 °C1 m/s ≤ X ≤ 10 m/s | 212 °F 3.28 ft/s ≤ X ≤ 32.81 ft/s – T> 100 °C 1 m/s ≤ X ≤ 20 m/s | 212 °F 3.28 ft/s ≤ X ≤. 65.67 ft/s with GED FLEX: – 0.1 m/s ≤ X depending on version | 0.328 ft/s ≤ X depending on version (Higher measuring gas speed increases the measurement error. Measured at measuring gas temperature 25 °C | 77 °F. In case of smaller measuring gas temperatures it might be necessary to protect the probe from the incident flow.) **Attention:** For lengths of GED FLEX > 1 m | 3.28 ft, a higher measuring gas speed (> 30 m/s | 98.42 ft/s) can lead to flutter and vibration of GED.
Reference air supply	Not required
Flange adapter	Depending on the selected GED

Environmental Conditions		
Probe head	permissible flue gas temperature	< 450 °C | 842 °F
Operation	permissible temperature	< 100 °C | 212 °F on cable gland < 100 °C | 212 °F on connection cable
Transport	permissible temperature	-20 ... +70 °C | -4 ... +158 °F
Storage	permissible temperature	-20 ... +70 °C | -4 ... +158 °F
Degree of protection	according DIN EN 40050	IP65

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

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Order Information

Combination Probe KS1D-BF for simultaneous measurement of oxygen (O_2) and unburnt residue (CO/H_2) in combination with GED FLEX or GED BASE
with connecting cable and connector

Description / Type	Order no.
Combination Probe KS1D-BF, cable length 2 m / 6.56 ft, IP65	656R2115

Additional required:

For measurements without purge operation, without fully automatic calibration
- Lambda Transmitter LT3-F, order no. 657R50 / … or
- Lambda Transmitter LT3, configured for KS1D, order no. 657R51 / …
- Gas extraction device GED BASE or GED FLEX

For measurements with purge operation (cyclic triggering)
- Lambda Transmitter LT2, configured for KS1D in application "purge operation" Order no. 657R102 / KS1D / 3A /…
- Gas extraction device GED FLEX, T-adapter for purge operation
- Dedusting / purge unit, IP65, for T-adapter GED FLEX, order no. 657R0934

For measurements with purge operation (manual triggering)
- Lambda Transmitter LT3-F, order no. 657R50 / … or
- Lambda Transmitter LT3, configured for KS1D, order no. 657R51 / …
- Gas extraction device GED FLEX, T-adapter for purge operation
- Dedusting / purge unit, IP65, for T-adapter GED FLEX, order no. 657R0934

For measurements with fully automatic calibration
- Lambda Transmitter LT2, configured for KS1D in application "fully automatic calibration" Order no. 657R102 / KS1D / V /…
- Gas extraction device GED BASE or GED FLEX
- Dedusting / purge unit, IP65, for T-adapter GED FLEX, order no. 657R0934
- Fully automatic calibration system, order no. 657R0940

For measurements with purge operation (cyclic triggering) and fully automatic calibration
- Lambda Transmitter LT2, configured for KS1D in application "fully automatic calibration and purging" Order no. 657R102 / KS1D / VA /…
- Gas extraction device GED FLEX, T-adapter for purge operation
- Dedusting / purge unit, IP65, for T-adapter GED FLEX, order no. 657R0934
- Fully automatic calibration system, order no. 657R0940

The information in this publication is subject to technical changes.

LAMTEC GmbH & Co. KG
Josef-Reiert-Straße 26
69190 Walldorf
GERMANY
Telefon: +49 (0) 6227 6052-0
Telefax: +49 (0) 6227 6052-57
info@lamtec.de
www.lamtec.de

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