

# Technical Data Combination Probe KS1D-Ex

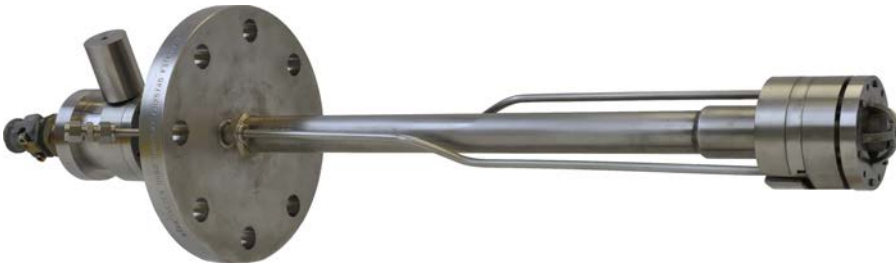


Fig. 1 Combination probe KS1D-Ex

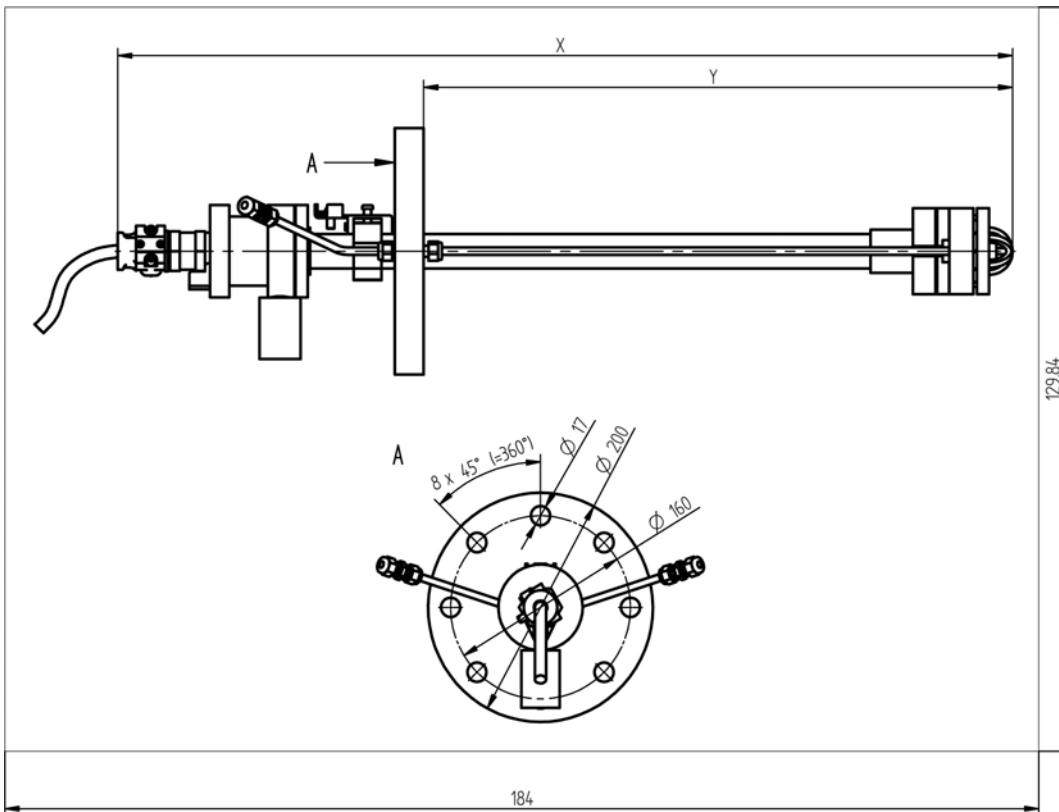


Fig. 2 Dimensional drawing combination probe KS1D-Ex

## Length

x 770 / 1130 mm / 30.3" / 44.5" in

y 500 / 860 mm / 19.7" / 33.9" in (immersion depth)

## Technical Data Combination Probe KS1D-Ex

Technical Data KS1D-Ex	
Measuring range	<b>O<sub>2</sub></b> : 0 ... 21 vol. % O <sub>2</sub>
	<b>CO<sub>e</sub></b> : 0 ... 1,000 ppm CO <sub>e</sub> (0 ... 10,000 ppm upon request)
Measurement accuracy	<b>O<sub>2</sub></b> : ± 5 % of the measured value - not better than ± 0.3 vol. %
	<b>CO<sub>e</sub></b> : ± 25 % of the measured value - no more precise than ± 10 ppm on natural gas combustion, after previous calibration under operating plant conditions with a CO-reference measurement in measuring range 0 ... 100 ppm
Sensor signal	<b>O<sub>2</sub></b> : -30 ... + 150 mV
	<b>CO<sub>e</sub></b> : -30 ... + 800 mV
Response time t <sub>60</sub> (60 % of end value)	<b>O<sub>2</sub></b> : ≤ 20 s
	<b>CO</b> : ≤ 10 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 to environment	<b>O<sub>2</sub></b> : < 0.3 vol. %
	<b>CO<sub>e</sub></b> : < 2 ppm
Repeating precision	<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	
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 power consumption	10 ... 25 W – depending on measuring gas temperature (at T <sub>Gas</sub> 350 °C/ 662 °F approx. 18 W)
Durability	≥ 3 years by using natural gas
Weight	10.8 kg / 23.8 lb to 500 mm / 19.69 °in length 13 kg / 28.6 lb to 860 mm / 33.86 °in
Material of probe housing	1.4571
Operating temperature of the measuring cell (sensor) at 13 V heating voltage in the air (20 °C / 68 °F)	650 °C / 1,202 °F
Measurement principle	zirconium dioxide cell (ZrO <sub>2</sub> ) potentiometric (voltage probe)
Heating-up time	20 min up to operating temperature



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### Operating condition

Mounting / measuring-gas extraction device	directly in exhaust gas channel / in situ
Seal tightness	$q_L \leq 100 \text{ cm}^3/\text{h}^*$
Mounting position	horizontal via vertical
Permissible fuels	residue-free, gaseous hydrocarbons, light fuel oil, heavy fuel oil, coal, wood direct measurements in fuel gases are not possible
Ideal measuring speed	$1 \text{ m/s} \leq X \leq 16 \text{ m/s}$
Reference air supply	via instrument air on site approx. 80 l/h
Flange adapter	DN80 PN40

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

### Environmental conditions

<b>Probe head</b>	permissible flue gas temperature	$\leq 500 \text{ °C} / 932 \text{ °F}$
<b>Operation</b>	permissible temperature range	$-20 \dots +60 \text{ °C} / -4 \dots +140 \text{ °F}$
<b>Transport</b>	permissible temperature range	$-20 \dots +60 \text{ °C} / -4 \dots +140 \text{ °F}$
<b>Storage</b>	permissible temperature range	$-20 \dots +60 \text{ °C} / -4 \dots +140 \text{ °F}$
<b>Degree of protection</b>	DIN EN 60529	IP65
<b>Type of protection</b>	Ex-zone 1	 II 2 G Ex db IIB + H2 T3 (160 °C) Gb (probe) II 2 G (temperature shut-down)
	Ex-zone 2	 II 3 G Ex db IIB + H2 T3 (160 °C) Gb (probe)

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## Order Information

**Combination Probe KS1D-Ex for simultaneous measurement of oxygen (O<sub>2</sub>) and unburnt residue (CO/H<sub>2</sub>) for flue gas temperatures up to 500 °C / 932 °F, response time t<sub>(60)</sub> O<sub>2</sub>: < 20 s , CO<sub>e</sub>: < 10 s**  
with test gas connector, IP65

Description / Type	Order no.
Combination Probe KS1D-Ex, for Ex zone 1, type of protection II 2G EEx d IIB + H2T3 immersion depth from flange 500 mm / 19.7 "in., cable length 2 m / 6.6 ft. flange sealing 650R4052 for counter flange DN80 PN40; Klinger Sil C-4400, 3 mm thickness	656R4000
Combination Probe KS1D-Ex , for Ex-Zone 1, type of protection II 2G EEx d IIB + H2T3 immersion depth from flange 860 mm / 33.8 "in., cable length 2 m / 6.6 ft. flange sealing 650R4052 for counter flange DN80 PN40; Klinger Sil C-4400, 3 mm thickness	656R4005
Combination Probe KS1D-Ex, for Ex zone 2, type of protection II 3G EEx nc IIB+ H2T3 immersion depth from flange 500 mm / 19.7 "in., cable length 2 m / 6.6 ft. flange sealing 650R4052 for counter flange DN80 PN40; Klinger Sil C-4400, 3 mm thickness	656R4010
Combination Probe KS1D-Ex, for Ex zone 2, type of protection II 3G EEx nc IIB+ H2T3 immersion depth from flange 500 mm, cable length 5 m / 16.4 ft flange sealing 650R4052 for counter flange DN80 PN40; Klinger Sil C-4400, 3 mm thickness	656R4010/5
Combination Probe KS1D-Ex, for Ex zone 2, type of protection II 3G EEx nc IIB+ H2T3 immersion depth from flange 860 mm / 33.8 "in., cable length 2 m / 6.6 ft. flange sealing 650R4052 for counter flange DN80 PN40; Klinger Sil C-4400, 3 mm thickness	656R4015

Additional required:

- Lambda Transmitter LT2, configuration for KS1D in type 'EX1' or 'EX2' (for mounting in non Ex-area)  
Order no. 657R102/KS1D/7EX1/... or 657R102/KS1D/8EX2/...
- Counter flange, order no. 650R4050 / R4051
- Probe connection unit, order no. 657R1071



The information in this publication is subject to technical changes.

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