

Technical Data Combination Probe KS1D-Ex (Type ZPF2)



Fig. 1 Combination Probe KS1D-Ex (type ZFP2)

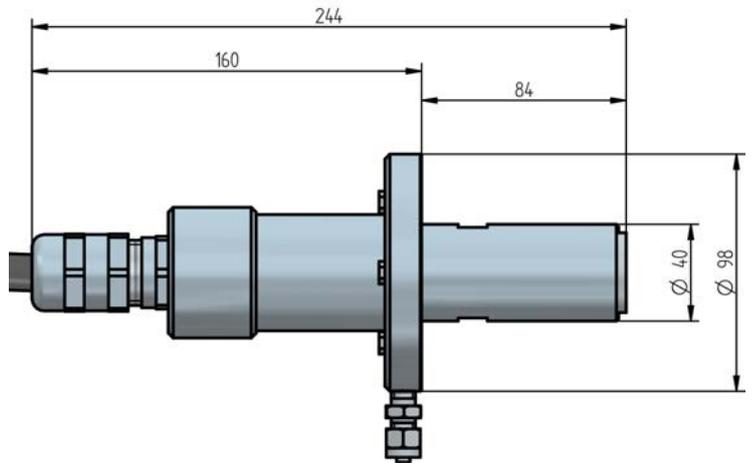


Fig. 2 Dimensional drawing Combination Probe KS1D-Ex (type ZFP2)



Fig. 3 Combination Probe KS1D-Ex (type ZFP2) with gas extraction device GED FLEX and T adapter

Application:

- Flue gas temperatures: depending on material up to 1.400 °C / 2,552 °F at the GED FLEX
450 °C / 842 °F at probe head for LT2/LT3
- Flow velocities: 0,1 ... 30 m/s / 0.33 ... 98.43 ft/s
- Dust exposure: $\leq 1.000 \text{ mg/m}^3$

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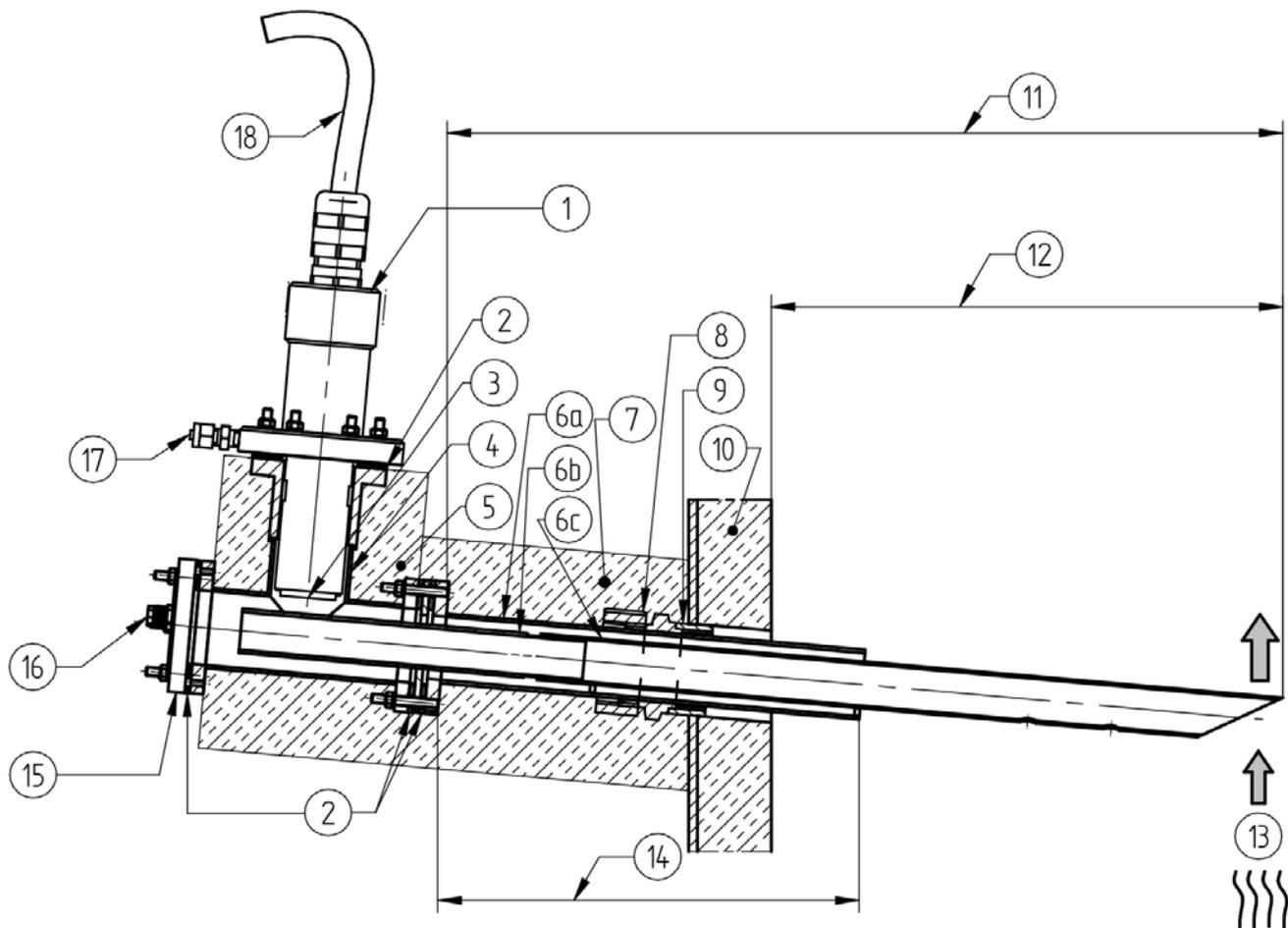


Fig. 4 Ex Probe with GED FLEX made of Inconel or stainless steel with T-adapter

- | | |
|---|---|
| 1 Ex probe | 10 Boiler wall (in this case with inner insulation) |
| 2 Graphite sealing type 656P0263 | 11 Length GED FLEX |
| 3 Maximum measuring gas temperature at probe head:
300 °C / 572 °F in connection with LT3-F
450 °C / 842 °F in connection with LT2/LT3 and NT1 | 12 Immersion depth GED FLEX |
| 4 T-adapter for the probe holder type 655R1565 ... 68 | 13 Flow direction measuring gas |
| 5 Insulation T-Adapter type 655R1569
(option, depending on the measuring gas temperature) | 14 Variable range immersion depth |
| 6a GED FLEX outer tube | 15 Sealing flange/cleaning flange with pneumatic connections |
| 6b GED FLEX extension inner tube (655R1574/
655R1575) | – For T-adapter type 655R1565:
blind flange |
| 6c GED FLEX inner tube | – For T-adapter type 655R1566:
cleaning flange with pneumatic connections (2x 12/10 mm / (0.47/0.39" in) |
| 7 Insulation GED FLEX, on site (depending on the measuring gas temperature) | – For T-adapter type 655R1567:
Ejector flange with pneumatic connection (6/4mm / 0.16/0.24" in) |
| 8 Screw-in connection | – For T-adapter type 655R1568:
Flange with all pneumatic connections |
| 9 Half sleeve | 16 Pneumatic connection |
| | 17 Hose connection 4/6 mm / 0.16/0.24" in for calibrating gas |
| | 18 Connecting cable, length 2 m / 6.6 ft |

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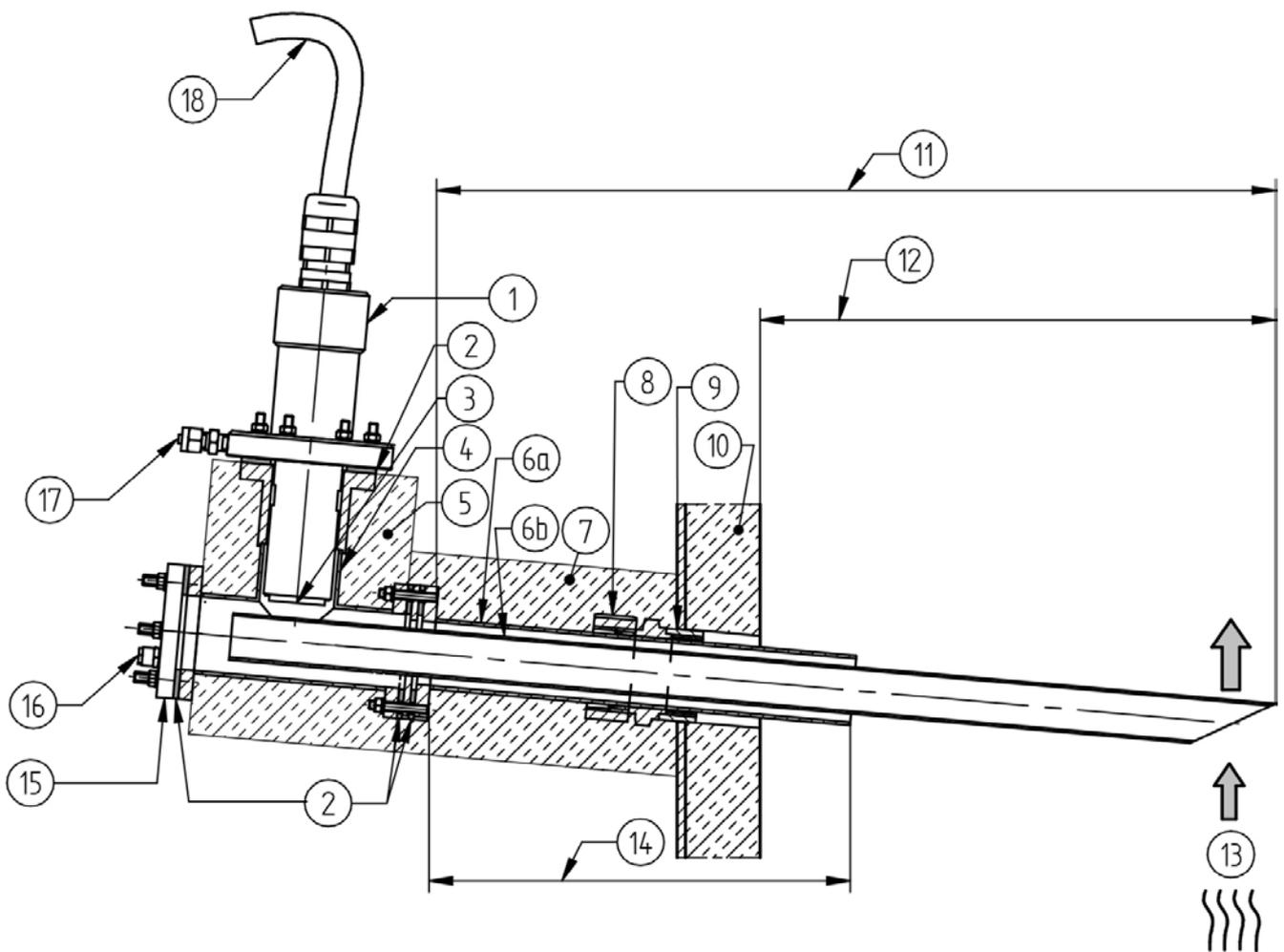


Fig. 5 Ex Probe with GED FLEX made of Kanthal or AL203 with T-adapter

- | | |
|---|--|
| 1 Ex probe | 12 Immersion depth of GED FLEX |
| 2 Graphite seal type 656P0263 | 13 Flow direction of measuring gas |
| 3 Max. measuring gas temperature on probe head:
300 °C / 572°F in combination with LT3-F
450 °C / 842 °F in combination with LT2/LT3 | 14 Variable range of immersion depth |
| 4 T-adapter for probe mount
for Injector Acceleration type 655R1565 ...68 | 15 Sealing flange/cleaning flange with pneumatic connections |
| 5 Insulation of T-adapter type 655R1569
(optional, depending on the measuring gas temperature) | End flange |
| 6a GED FLEX outer tube | – For T-adapter type 655R1565: blind flange |
| 6b GED FLEX inner tube | – For T-adapter type 655R1566:
cleaning flange with pneumatic connections (2x 12/10 mm / 0.47/0.39" in) |
| 7 Insulation of GED FLEX, provided by customer
(depending on the measuring gas temperature) | – For T-adapter type 655R1567:
Ejector flange with pneumatic connection (6/4 mm / (0.16/0.24" in) |
| 8 Male coupling | – For T-adapter type 655R1568:
Flange with all pneumatic connections |
| 9 Half collar | |
| 10 Boiler wall (in this case with inner insulation) | 16 Pneumatic connection |
| 11 Length GED FLEX | 17 Hose connection 4/6 mm (0.16/0.24" in) for calibration gas |
| | 18 Connection cable |

Technical Data Combination Probe KS1D-Ex (Type ZPF2)

Technical data*	
Measuring range	O₂ : 0 ... 21 % O ₂ CO_e : 0 ... 1,000 ppm (0 - 10,000 ppm upon request)
Measuring precision	O₂ : ± 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	O₂ : -30 ... +150 mV CO_e : -30 ... +800 mV
Response time	O₂ : t ₆₀ : < 50 s t ₉₀ : < 130 s CO_e : t ₆₀ : < 60 s t ₉₀ : < 140 s
Offset to environment	O₂ : < 0.3 vol. % CO_e : < 2 ppm
Repeating precision	O₂ : < 0.1 % deviation from measured value CO_e : < 0.7 % deviation from measured value
Drift	O₂ : < 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)
Cross sensitivity**	O₂ : to CO ₂ (15 vol. %) < 0.1 vol. % O₂ : to CO (874 ppm) < 0.1 vol. % O₂ : to CH ₄ (76 ppm) < 0.1 vol. % O₂ : to SO ₂ (76 ppm) < 0.1 vol. % O₂ : to NO (245 ppm) < 0.1 vol. % CO_e : to CO ₂ (15 vol. %) < 26 ppm CO_e : to O ₂ (1 vol. %) < 38 ppm
Heating consumption	10 ... 25 W (at T _{gas} 350 °C / 662 °F approx. 18 W) (according to design, measuring gas temperature, and measuring speed)
Lifetime	> 3 years (in natural gas)
Weight	3,500 g / 7,72 lb
Material of probe housing	1.4401 (SS316L)
Material of connecting line	Nickel-plated copper strand insulation polyester, reinforced and shielded 2 m / 6.56 ft
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 ₂) potentiometric (voltage probe)
Heating time	30 min until operating temperature is reached

* Information according to EN 16340:2014 D

** O₂: Information assumes an operating gas composition of 5 vol. % O₂, rest is N₂
CO_e: Information assumes an operating gas composition of 5 vol. % O₂, 333 ppm CO_e, rest is N₂
(333 ppm CO_e = 166.5 ppm H₂ + 166.5 ppm CO)

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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 to vertical
Permissible fuels	residue-free, gaseous hydrocarbons, light fuel oil, heavy fuel oil (HFO), lignite and coal, biomass (according to design)
Ideal measuring gas speed	<p>without GED: $1 \text{ m/s} \leq X \leq 6 \text{ m/s}$ $3.28 \text{ ft/s} \leq X \leq 19.69 \text{ ft/s}$</p> <p>with GED FLEX: $0.1 \text{ m/s} \leq X$ depending on version $0.328 \text{ ft/s} \leq X$</p> <p>(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.)</p> <p>Attention: For lengths of GED FLEX > 1 m, a higher measuring gas speed (> $30 \text{ m/s} / 98.42 \text{ ft/s}$) can lead to flutter and vibration of GED.</p>
Reference air supply	not required
Flange adapter	depending on the selected GED

Environmental Conditions

Probe head	permissible flue gas temperature	< $450 \text{ }^\circ\text{C} / 842 \text{ }^\circ\text{F}$
Operation	permissible temperature	< $100 \text{ }^\circ\text{C} / 212 \text{ }^\circ\text{F}$ on cable gland < $100 \text{ }^\circ\text{C} / 212 \text{ }^\circ\text{F}$ on connection cable
Transport	permissible temperature	$-20 \dots +70 \text{ }^\circ\text{C} / -4 \dots +158 \text{ }^\circ\text{F}$
Storage	permissible temperature	$-20 \dots +70 \text{ }^\circ\text{C} // -4 \dots +158 \text{ }^\circ\text{F}$
Degree of protection	according DIN EN 40050	IP65
Type of protection	 II2G Ex d IIB+H2 T3 Gb ($-20 \text{ }^\circ\text{C} \leq T_a \leq +60 \text{ }^\circ\text{C}$) LCIE 13 ATEX 3045X IECEx LCIE 13.0027X	

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

NOTICE

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

NOTICE

LT3-Ex Lambda Transmitter, in combination with the Combination Probe cannot be used for LAMTEC CO/O₂ control.

Technical Data Combination Probe KS1D-Ex (Type ZPF2)

Order Information

Combination Probe KS1D-Ex for simultaneous measurement of oxygen (O₂) und unburnt residue (CO/H₂), for flue gas temperatures up to 1,400 °C/ 2,552 °F, in combination with GED FLEX, response time t₆₀ O₂: < 50 s, CO_g: < 60 s with test gas connector, IP67

Description / Type	Order no.
Combination Probe KS1D-Ex, cable length 2 m / 6.56 ft	656R2021

Additional required:

- Lambda Transmitter LT3-Ex, conf. for LS2, order no.657R5160 / ... / KS1D
- Gas extraction device GED FLEX possible
- Dedusting / purge unit, IP65, for T-Adapter GED FLEX, order no. 657R0934

Accessories

Description / Type	Order no.
ATEX connection cable for Combination Probe KS1D-Ex / Lambda Probe LS2-Ex	656R2025
Probe connection box for Combination Probe KS1D- Ex / Lambda Probe LS2-Ex Housing for Ex zone 1 in accordance to ATEX, IP66 Material: stainless steel 1.4301 230 x 150 x 81 mm / 9.06 x 5.91 x 3.19" in	650R4029
Filter attachment for high sulphur exhaust gases to protect the probe KS1D-Ex / LS2-Ex	656R2028

Spare Parts

Description / Type	Order no.
Maintenance-Set (dust protection filter, graphite gasket) for probe KS1D-Ex / LS2-Ex	656R2027
Maintenance-Set for Filter attachment 656R2028	656R2029
Gasket for connecting head, Novaphit SSTC	656P0263

GED FLEX

Application up to 750 °C / 1382 °F, inner tube material 1.4571, outer tube material 1.4571

Designation / Type	Order no.
GED FLEX for HT/EX applications up to 750 °C / 1382 °F, stainless steel 1.4571 material, L 500 mm / 19.69 "in	655R1520
GED FLEX for HT/EX applications up to 750 °C / 1382 °F, stainless steel 1.4571 material, L 1000 mm / 39.37 "in	655R1521
GED FLEX for HT/EX applications up to 750 °C / 1382 °F, 1.4571 stainless steel material, L 1500 mm / 59.06 "in	655R1522
GED FLEX for HT/EX applications up to 750 °C / 1382 °F, 1.4571 stainless steel material, L 2000 mm / 78.74 "n	655R1523

Application up to 950 °C / 1742 °F, inner tube material INCONEL, outer tube material INCONEL

Designation / Type	Order no.
Measuring flue gas extraction tube flue gas extraction tube for HT/EX applications up to 950 °C / 1742 °F, INCONEL material, L 500 mm / 19.69 "in	655R1530
GED FLEX for HT/EX applications up to 950 °C / 1742 °F, INCONEL material, L 1000 mm / 39.37 "in	655R1531
GED FLEX for HT/EX applications up to 950 °C / 1742 °F, INCONEL material, L 1500 mm / 59.06 "in	655R1532
GED FLEX for HT/EX applications up to 950 °C / 1742 °F, INCONEL material, L 2000 mm / 78.74" in	655R1533

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Application up to 1200 °C / 2192 °F, inner tube material KANTHAL, outer tube material INCONEL

Designation / Type	Order no.
GED FLEX for HT/EX applications up to 1200 °C / 2192 °F, KANTHAL material, L 500 mm / 19.69 "in	655R1540
GED FLEX for HT/EX applications up to 1200 °C / 2192 °F, KANTHAL material, L 1000 mm / 39.37 "in	655R1541
GED FLEX for HT/EX applications up to 1200 °C / 2192 °F, KANTHAL material, L 1500 mm / 59.06 "in	655R1542
GED FLEX for HT/EX applications up to 1200 °C / 2192 °F, KANTHAL material, L 2000 mm / 78.74" in	655R1543

Application up to 1400°C / 2552 °F, inner tube material Al₂O₃, outer tube material INCONEL

Designation / Type	Order no.
GED FLEX for HT/EX applications up to 1400 °C / 2552 °F, aluminium oxide material Al ₂ O ₃ , L 500 mm / 19.69 "in	655R1550
GED FLEXGED FLEX for HT/EX applications up to 1400 °C / 2552 °F, aluminium oxide material Al ₂ O ₃ , L 1000 mm / 39.37 "in	655R1551
GED FLEX for HT/EX applications up to 1400 °C / 2552 °F, aluminium oxide material Al ₂ O ₃ , L 1500 mm / 59.06 "in	655R1552

The information in this publication is subject to technical changes.



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