

# Technical Data LS2 Lambda Probe



Fig. 1-1 Lambda Probe LS2 in housing with gas extraction device (GED) and probe installation fitting (PIF)

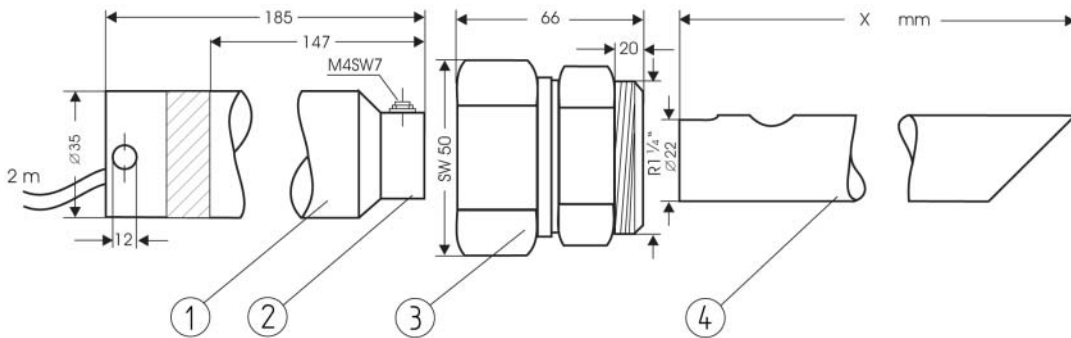
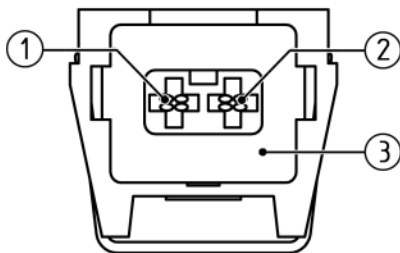


Fig. 1-2 Lambda Probe LS2 in housing with gas extraction device (GED) and probe installation fitting (PIF)

1	LS2 Probe in housing	650R1000 / 650R1007
2	Probe heat	
3	Probe installation fitting 1 1/4"	655R1010
4	Gas extraction device length X = 150 mm/5.91" in	655R1001
	Gas extraction device length X = 300 mm/11.81" in	655R1002
	Gas extraction device length X = 450 mm/17.72" in	655R1003
	Gas extraction device length X = 1,000 mm/39.37" in	655R1004



- 1 = (-) Probe signal (grey) (PCB/LT2 term. 33)
- 2 = (+) Probe signal (black) (PCB/LT2 term. 34)
- 3 = Socket sensor signal
- 4 = Probe heater (white) (PCB/LT2 term. 35)
- 5 = Plug probe heater
- 6 = Probe heater (white) (PCB/LT2 term. 36)

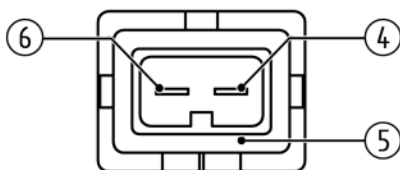


Fig. 1-3 Terminal assignment probe connection plug

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Characteristics *	
Measurement range	O <sub>2</sub> : 0 ... 21 % O <sub>2</sub>
Measuring precision	O <sub>2</sub> : ± 5 % of measured value - not better than ± 0,3 Vol. %
Sensor signal	O <sub>2</sub> : -15 ... +150 mV (0,01 ... 21 Vol. % O <sub>2</sub> )
Response time	O <sub>2</sub> : t <sub>60</sub> : < 3 s t <sub>90</sub> : < 9 s
Relaxation time (measurement readiness after overload)	O <sub>2</sub> : t <sub>90</sub> : < 8 s
Offset in ambient air	O <sub>2</sub> < 0,3 Vol. %
Hysteresis	O <sub>2</sub> < 1 % from measured value
Linearity	O <sub>2</sub> < 1 % from measured value
Repeat accuracy	O <sub>2</sub> < 0,1 % deviation from measured value
Ambient pressure dependency	O <sub>2</sub> < 0,1 % from measured value (of normal pressure at sea level in comparison with pressure at altitude 200 m/656,17 ft i.e. op = -200 mbar/-2,9 psi)
Differential pressure dependency	O <sub>2</sub> < -1,8 mV U <sub>O<sub>2</sub></sub> pro 100 mbar (1.45 psi) overpressure in the measuring chamber in comparison with environment
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)
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. %
Influence of humidity	O <sub>2</sub> : < 2,3% from measured value
Influence of the measuring gas	Change of -1,6 mV/100 mbar
Internal resistance of probe	15 ... 30 Ω (ZrO <sub>2</sub> -measuring cell in the air in case of 22 W heating output)
Probe voltage in air	0 ... -15 mV (ZrO <sub>2</sub> -measuring cell in the air in new condition in case of 17 W heating output)
Heating consumption	16 ... 22 W (according to design, measuring gas temperature, and measuring speed)
Power supply voltage heating	Polarity is changed cyclically if P <sub>H</sub> 18 VA → 11,4 V if P <sub>H</sub> 20 VA → 12,34 V if P <sub>H</sub> 25 VA → 14,8 V
Heating power for T = 350 °C (662 °F)	approx. 17 W
heating current for P <sub>H</sub> 20 VA	approx. 1,6 A approx. 5 A short-term during heating PTC characteristic
Insulation resistance	> 30 MΩ (between heating and probe connections)
Useful life	> 3 years (for fuel oil and natural gas)
Weight	600 g (1.32 lb) with housing 290 g (0.64 lb) without housing
Material probe housing	1.4571/1.4301

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Characteristics *	
Material connecting pipework	cooper strand nickel-plated Insulation FEP
Measurement principle	zirconium dioxide cell (ZrO <sub>2</sub> ) potentiometric (voltage probe)
Heating time	10 min up to operation temperature

\* Information accordance 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>

Conditions for use	
Mounting position	Horizontal to vertical
Mounting / measuring gas extraction device	Directly in exhaust gas channel / in situ
Seal tightness	$q_L \leq 100 \text{ cm}^3/\text{h}^*$
Permissible fuels	Residue-free, gaseous hydrocarbons, light fuel oil, lignite and coal, biomass (according to design)

Environmental Conditions	
Permissible flue gas temperature on probe head	< 450 °C (842 °F)
Permissible operating temperature	< 205 °C (401 °F) on connecting cable, up to 230 °C (446 °F) short termed
Permissible storage temperature	-20 ... +70 °C (-4 °F ... +158 °F)
Permissible measuring gas speed	< 6 m/s (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)
degree of protection	IP42 (according to DIN 40050)

\* In accordance with 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.

# Technical Data LS2 Lambda Probe

## Order Information

**Lambda Probe LS2 for measurement of oxygen (O<sub>2</sub>), for flue gas temperatures up to 300 °C (572 °F) with connecting cable**

Description / Type	Order no.
Lambda Probe LS2 in housing (standard), cable length 2 m (6.6 ft.), IP42*	650R1000
Lambda Probe LS2 in housing (standard), cable length 5 m (16.4 ft.), IP42*	650R1007
Lambda sensor LS2, cable length 2 m (6.6 ft.), screw-in thread M18 x1,5**	650R1004
Lambda sensor LS2, cable length 2 m (6.6 ft.), screw-in thread M18 x1,5 for ejector gas extraction device***	650R1006

* Additional required:	Lambda Transmitter LT2, conf. for LS2 in type "Standard", Order no. 657R102/LS2/1S/... or Lambda Transmitter LT3, conf. for LS2, Order no. 657R51/.../LS2/... Gas extraction device (GED), order no. 655R1001 / R1002 / R1003 / R1004 Probe installation fitting (PIF), order no. 655R1010 or R1016
** Additional required:	Lambda Transmitter LT2, conf. for LS2 in type "Standard" Order no. 657R102/LS2/S/... or Lambda Transmitter LT3, conf. for LS2, Order no. 657R51/.../LS2/... None GED, none PIF
*** Additional required:	Lambda Transmitter LT2, conf. for LS2 in type "Ejector" Order no. 657R102/LS2/E/... None GED, none PIF

The information in this publication is subject to technical changes.



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