



System overview

Lambda Transmitter LT2
Lambda Probe LS2
Combination Probe KS1D



Sensors and systems for combustion engineering

www.lamtec.de

The LAMTEC LT2 Lambda Transmitters: Modular O₂, H₂/CO Measuring System for All Applications.

The LAMTEC Lambda Transmitter LT2 in combination with the LAMTEC Combination Probe KS1D is a universally applicable measuring device. This transmitter was specially designed for the simultaneous measurement and detection of O₂ concentration and oxidising gas components CO_e (CO/H₂) in flue gases of combustion plants in the more than stoichiometric range ($\lambda > 1$). The measured CO_e (e = equivalent) value represents a sum signal of all oxidising exhaust gas components such as CO and H₂. Alternatively, the LAMTEC Probe LS2 can be used for pure oxygen measurement (O₂). In its standard configuration, the LT2 meets the safety requirement level SIL 1.



The LT2 evaluates the voltage values of two measuring electrodes U_{O₂} (oxygen characteristic curve) and mixed potential (U_{O₂} + U_{CO/H₂}). The formation of the mixed potential takes place very quickly, with increasing content of unburnt material, this behaviour leads to a rapidly increasing dynamic of the sensor signal. This makes the simultaneous measurement and detection of CO_e (CO/H₂) and O₂ with the LAMTEC Lambda Transmitter LT3 clearly superior to simple O₂ measurement. In terms of sensitivity and speed, the LAMTEC Lambda Transmitter LT3 provides first-class basic values for downstream control of air and fuel supply.

The Lambda Transmitter LT2 system is modular so that the different probes with the different options can be different options can be combined without can be combined. The advantage is the individual adaptation of the system to different measuring tasks.

The Measuring Principle

The LAMTEC Combination Probe KS1D is based on a heated electrochemical measuring cell made of zirconium dioxide ceramic (ZrO₂).

It has 3 electrodes:

- O₂ electrode (platinum)
- CO_e electrode (platinum/precious metal)
- Reference electrode (platinum)

The zirconium dioxide ceramic, designed as a tube closed on one side, protrudes into the flue gas duct of the combustion system and separates the reference gas chamber (ambient) from the measuring gas chamber (flue gas duct) in a gas-tight manner.

Advantages:

- Direct measurement of oxygen (O₂) and combustible flue gas components (CO/H₂) even in flue gas up to 1,400 °C
- O₂ measuring range 0 to 21 vol.
- CO_e measuring range 0 to 10,000 ppm
- Infiltration air independent (CO_e)
- No gas conditioning required; measurement takes place in-situ in moist flue gas
- Setting time to 60 % value (T₆₀)
 - O₂ < 3 seconds (unfiltered)
 - CO_e < 3 seconds (unfiltered)
- Low heat output
- Certified flame arrester
- Universally applicable
- Easy handling - probe connection via plug
- Low maintenance
- Also available in Ex (Zone IB or IIB)
- SIL 1 in standard version
- Optional calculation of the combustion efficiency
- Optional calculation and display of the CO₂ concentration
- Optional load-dependent and fuel-specific limit curves/limit values
- Optional PID/O₂ controller

Basic System.



LT2 in wall mounting IP65 housing (also available in EX).



LT2 with integrated reference air pump.

The Lambda Transmitter LT2 is available in two basic versions:

- LT2: Surface-mounting housing made of sheet steel, locking door at the front, impact-resistant viewing window. IP65.
- LT2 with integrated measuring gas pump: Surface-mounting housing made of sheet steel, locking door at the front, impact-resistant viewing window with integrated reference air pump. IP65.

Probes.

The LAMTEC probes enable a pure O₂ measurement (Lambda probe LS2) or a combined measurement (combination probe KS1D) of O₂ concentration and combustible flue gas components (CO/H₂) and displayed as CO_e (CO equivalent).

Lambda Sonde LS2 / Kombi-Sonde KS1D



Lambda Probe LS2 / Combination Probe KS1D

Properties:

- Ideal flue gas velocity: 1 - 4 m/s
- Flue gas temperature: ≤ 450 °C (for LT3-F: ≤ 300 °C)
- Protection class: IP42 - for outdoor installation the probe must be protected from water, snow, etc.

Application:

- Natural gas, EL heating oil

Lambda Probe LS2 ECO / Combination Probe KS1D ECO



Lambda Probe LS2 ECO / Combination Probe KS1D ECO

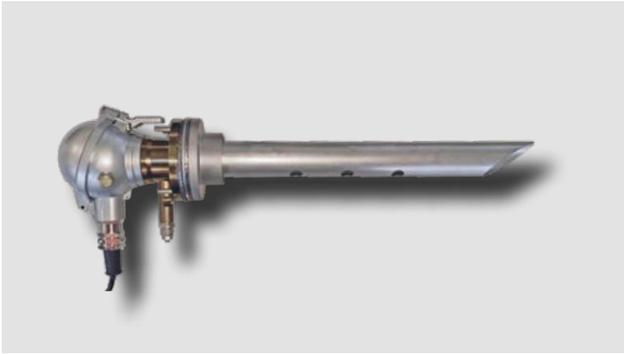
Properties:

- Ideal flue gas velocity:
 - At gas temperatures < 100 °C: 1 < x < 6 m/s
 - At gas temperatures > 100 °C: 1 < x < 12 m/s
- Flue gas temperature: ≤ 300 °C
- Dust concentration: ≤ 100 mg/m³
- Protection class: IP42 - for outdoor installation the probe must be protected from water, snow, etc.

Application:

- Natural gas, EL heating oil

Lambda Probe LS2 / Combination Probe KS1D with GED BASE HT



Properties:

- Ideal flue gas velocity:
At gas temperatures < 100 °C: $1 < x < 10$ m/s
At gas temperatures > 100 °C: $1 < x < 20$ m/s
- Flue gas temperature: ≤ 550 °C (for LT3-F ≤ 300 °C)
- Dust concentration: ≤ 200 mg /m³
- Adjustment during operation possible via test gas.
- Protection class: IP65.

Application:

- Natural gas, EL heating oil

Lambda Probe LS2-HT / Combination Probe KS1D-HT



Properties:

- Ideal flue gas velocity: 0.1 - 30 m/s
- Flue gas temperature depending on material:
 ≤ 1400 °C (for LT3-F: ≤ 300 °C)
- Dust concentration: ≤ 1000 mg/m³
- Adjustment during operation possible via test gas
- Immersion depth can be adjusted variably
- Using a suitable T-adapter, the GED FLEX can be purged or equipped with an ejector.
- Protection class: IP65.

Application:

- Natural gas, EL heating oil, heavy heating oil, coal, special fuels

Lambda Probe LS2-Ex / Combination Probe KS1D-Ex with GED FLEX



Properties:

- Ideal flue gas velocity: 0.1 - 30 m/s
- Flue gas temperature depending on material:
 ≤ 1400 °C
- Dust concentration: ≤ 1000 mg/m³
- Adjustment during operation possible via test gas.
- Immersion depth can be adjusted variably
- Using a suitable T-adapter, the GED FLEX can be purged or fitted with an ejector.
- Protection class: IP65.
- Atex: E II 2 G Ex d IIB+H2 T3 Gb (-20 to +60 °C)

Application:

- Natural gas, EL heating oil, heavy heating oil, coal, special fuels.

**Lambda Probe LS2-KAF with Purging and Filter Fleece
Combination Probe KS1D-KAF with Purging and Filter Fleece**



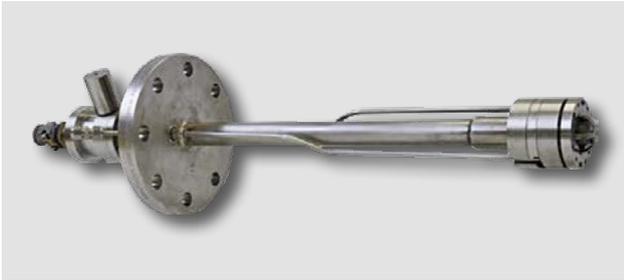
Properties:

- Measurements directly in moist flue gas up to 450 °C
- Reference air connection available on site (instrument air)
- Semi-automatic adjustment during operation possible via test gas
- Protection class: IP65.
- Incl. high dust protection pipe with cleaning prefilter and additional filter fleece

Application:

- Natural gas, EL heating oil, heavy heating oil, pulverised coal firing, biomass, special fuels
- High dust combustion gas

Lambda Probe LS2-EX / IB + IIB
Combination Probe KS1D-EX / IB + IIB

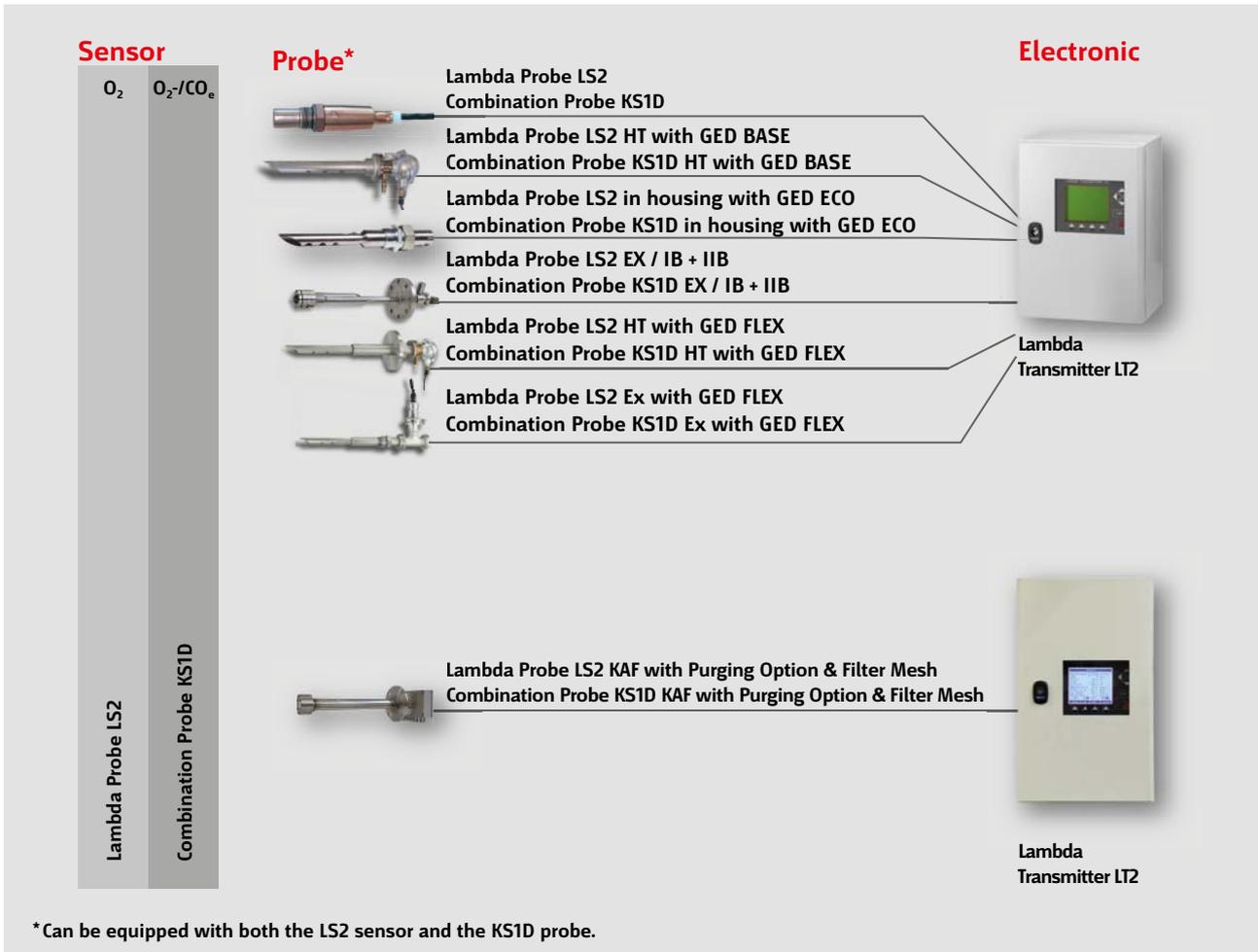


Properties:

- Measurement directly in moist flue gas up to 500 °C
- Reference air connection available on site (instrument air)
- Semi-automatic adjustment during operation possible via test gas
- Protection class: IP65.
- Certified according to Atex: II 2G EEx D IIB + H2T3, zone 1

Application:

- Natural gas, EL heating oil, heavy heating oil, coal, special fuels



Functions in the LT2 with KS1D/LS2.

Optional components.

- Display and control unit
- Remote display software
- Measurement of flue gas and intake air temperature
- Calculation of combustion efficiency
- Calculation and display of the CO₂ concentration calculated fuel-specifically from the measured O₂ value and the CO₂ max. value
- Load-dependent and fuel-specific limit values/limit curves
- Integrated PID-O₂ controller
- 4 potential-free analogue outputs (output 1 & 2) max. potential difference 20 V arbitrarily configurable, direct current 0/4 to 20 mA, load 0 to 600 Ohm
- 6 digital outputs in conjunction with relay module 657R0857
- Fieldbus connection
- Housing heating
- Purging unit

Options for LAMTEC probes

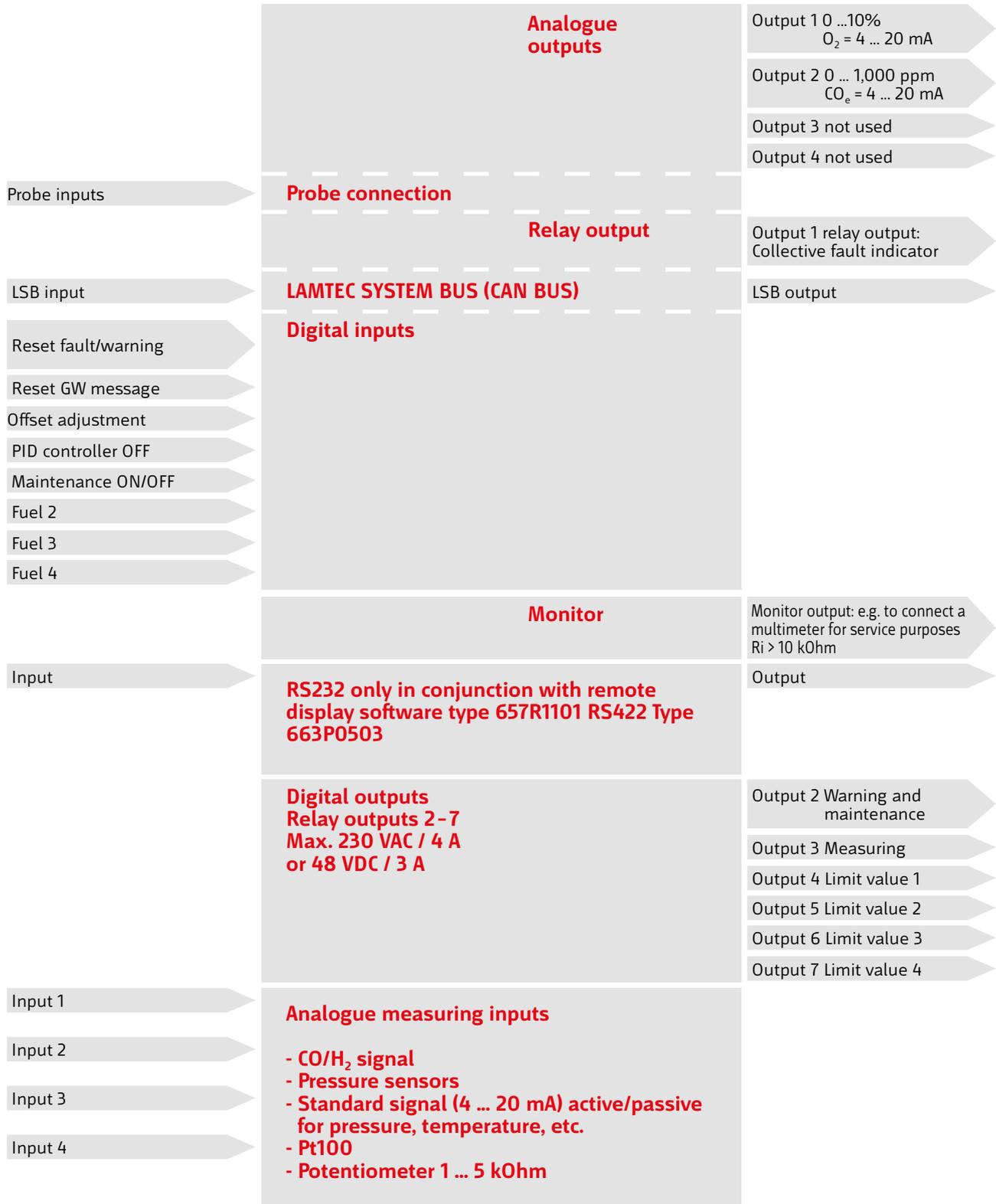
- Semi-automatic adjustment (available for probes with the attribute "KAF")
- Fully automatic adjustment
- Reference air pump (available for probes with the attribute "KAF" and "Ex / I+IIB")
- Purging unit
- Purging of the pre-filter (available for KS1D-KAF and LS2-KAF)
- Automatic regeneration of the ZrO₂ measuring cell with short application of air for biomass

Equipment

- Counter flange
- Flange seal
- Probes in different lengths

Inputs.

Outputs.





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