



LT1 Lambda Transmitter

LS1 Lambda Probe



O₂ measurement at the highest level – the LT1 Lambda Transmitter.

LAMTEC supplies leading technology for measuring exhaust gas in combusting systems. Our range of O₂ probes and measuring transducers can be combined to meet specific requirements and are easy to integrate into control systems.

LT1/LS2 system:

The LT1 Lambda Transmitter is a universal application O₂ measurement instrument for direct measurement of the O₂ concentration of gases in the superstoichiometric range ($\lambda > 1$) in combination with the LS1 Lambda Probe.

- in combustion flue gases
- in industrial flue gases
- in furnace atmospheres
- in process gases

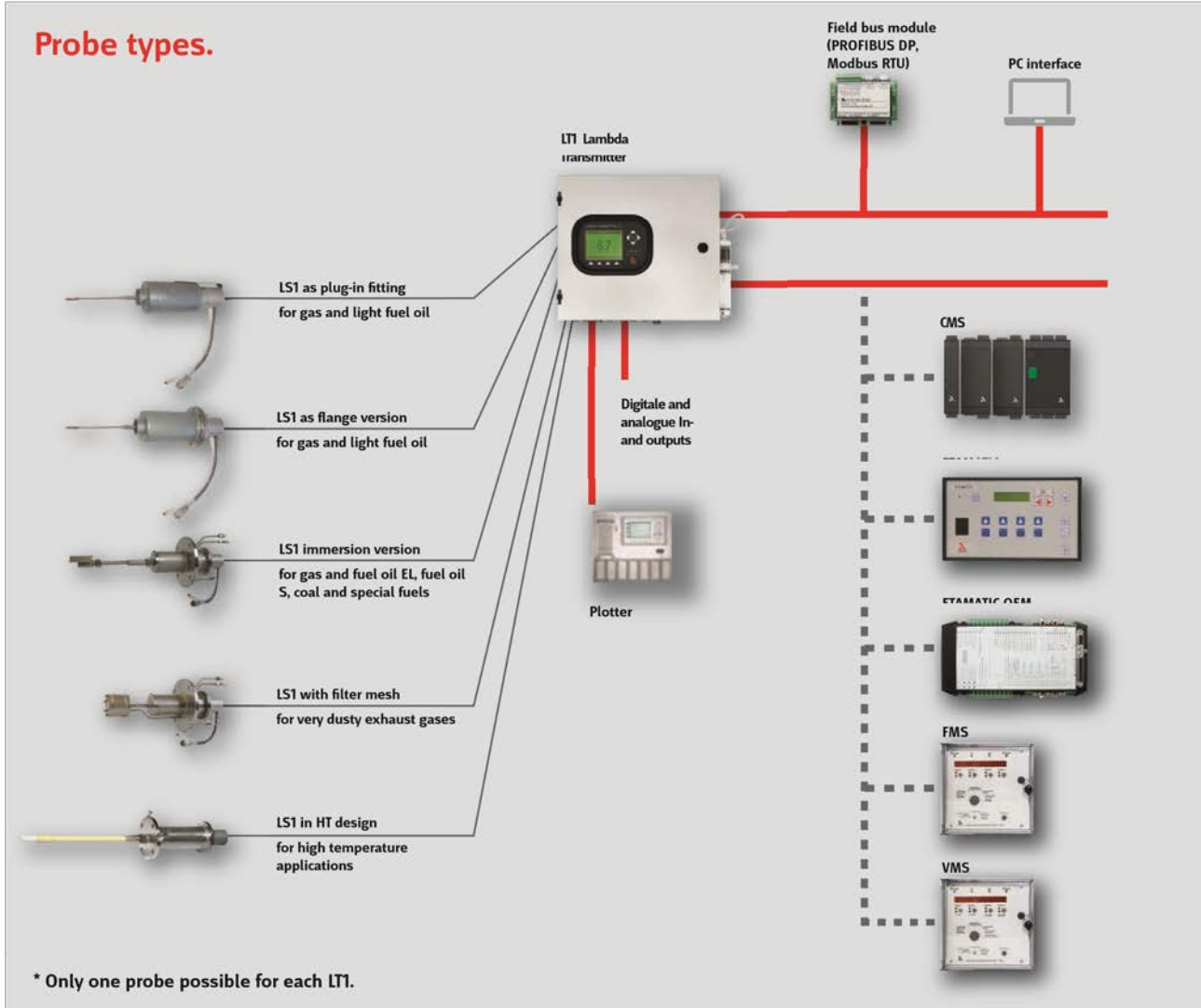
The measurement of the O₂ concentration is continuous with the LS1 Lambda Probe. A small quantity of gas (approx. 0.5 l/h) is extracted directly from the measuring gas via a capillary tube. A 7-wire cable with plug, as well as a Teflon hose, connect the LS1 Lambda Probe to the

LT1. The probe signal is evaluated using the latest microprocessor technology in the LT1 Lambda Transmitter.

Output of the measurement values via:

- a monitor output 0 ... 2.55 VDC 0 ... 25.5 vol. % O₂
- up to 4 analogue outputs 0/4 ... 20 mA, 0 ... 10 V
- up to 7 digital outputs

Internal LEDs provide information on the operation and indicate any system errors detected in the diagnostics.



The LT1 has the following functions:

- Automatic check and calibration of the LS1 Lambda Probe with ambient air (20.96 vol. % O₂)
- Automatic ageing compensation of the ZrO₂ cell to determine the cell internal resistance. As an alternative to the LAMTEC SYSTEM BUS, compensation of the effect of the gas composition on the measuring gas flow with heavily imbalanced measuring gases such as flue gas after wet scrubbers or in exhaust vapours due to deviating sound velocity and density, compared to the calibration conditions (air).
- Intermittent measuring gas pump with automatic determination of the optimal pump runtime. Long-life mode with restricted measurement accuracy can be selected.
- Automatic cold start delay 5 ... 120 min.
- Integrated maintenance switch.
- LAMTEC SYSTEM BUS for direct coupling to the LAMTEC burner control units VMS/FMS/CMS/BT300/ measuring cell internal ETAMATIC for O₂ optimisation. resistance and heating power adaptation.
- As an alternative to the LAMTEC SYSTEM BUS, an RS 422 interface is also available for coupling on the measuring gas flow with heavily imbalanced measuring gases such as flue gas after wet scrubbers or in exhaust vapours due to deviating sound velocity and density, compared to the calibration conditions (air).
- Optional RS 232 interface for remote control via PC – only in combination with the remote display software (option). calibration conditions (air).

Advantages:

- Linear probe signal (direct current [mA]) with fixed physical zero point
- No special test gases required, automatic calibration with ambient air (20.96 vol. % O₂)
- Measurement accuracy greater than 0.2 vol. % O₂ across the entire measuring range 0 ... 21 vol. % O₂, following calibration 0.1 vol. %.
- No gas preparation required
- No reference gas required
- Adjustment time <15 s to 90 % value (T90) with gas extraction device, 450 mm long
- No effect of the measuring gas temperature on the measurement accuracy
- No temperature control of the ZrO₂ measuring cell required
- Automatic adaptation of the cell temperature to the cell internal resistance (ageing compensation)
- SIL 1 confirmation
- Up to 1400 °C with ceramic removal
- Does not represent a source of ignition in the flue gas duct. Confirmation from TÜV is available.
- Intermittently operated measuring gas pump with determination of the optimal pump runtime
- Easy operation
- Low-maintenance

On the hot sensor, installed into a measurement chamber, the oxygen in the measuring gas is ionised and a current flows (0 ... 21 vol. % O₂ corresponds to around "pumped" from the external electrode to the internal 0 ... 500 mA) that is proportional to the oxygen content in **Characteristic curve for current probe measuring principle LT1/LS1.**

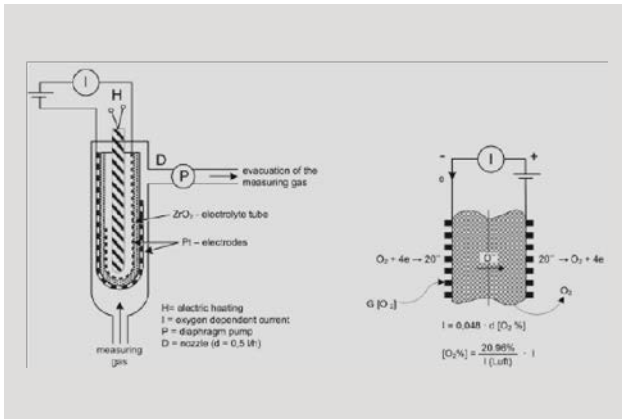


Figure 1.

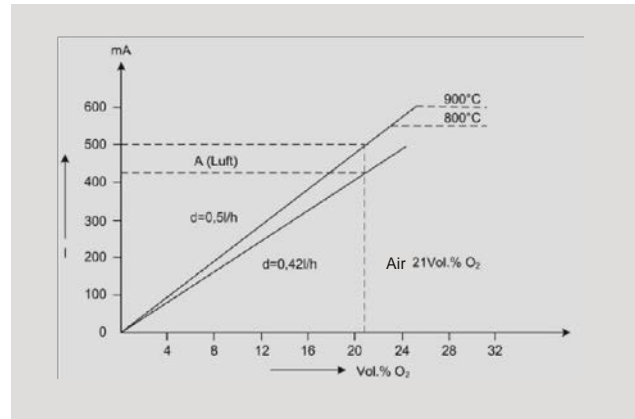
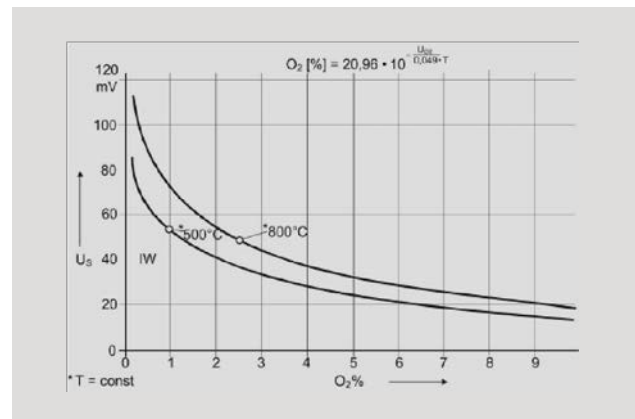
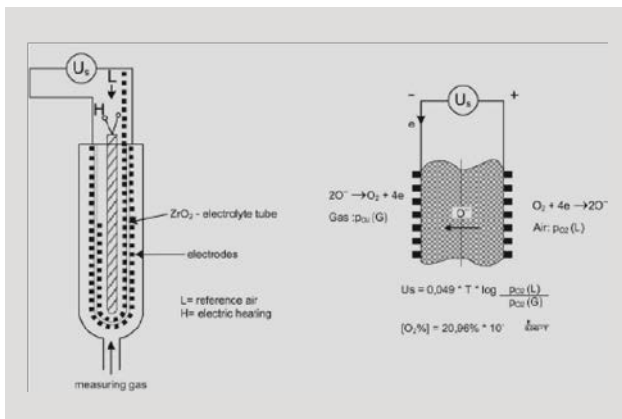
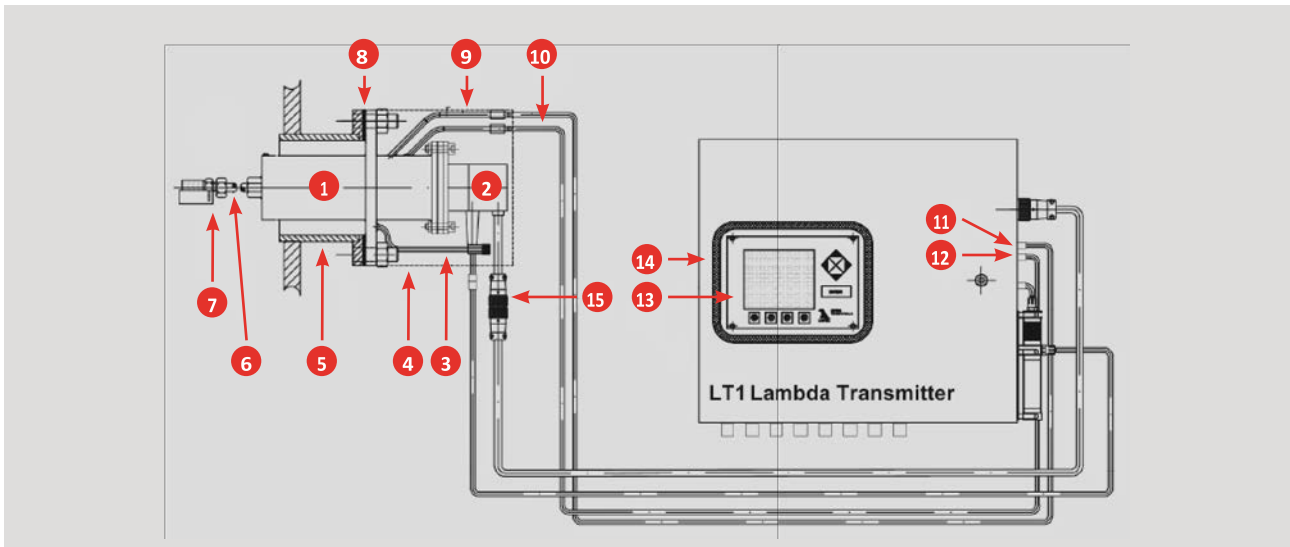


Figure 2.

For comparison: Voltage probe measuring principle, e.g. LT2/LS2.



System components.



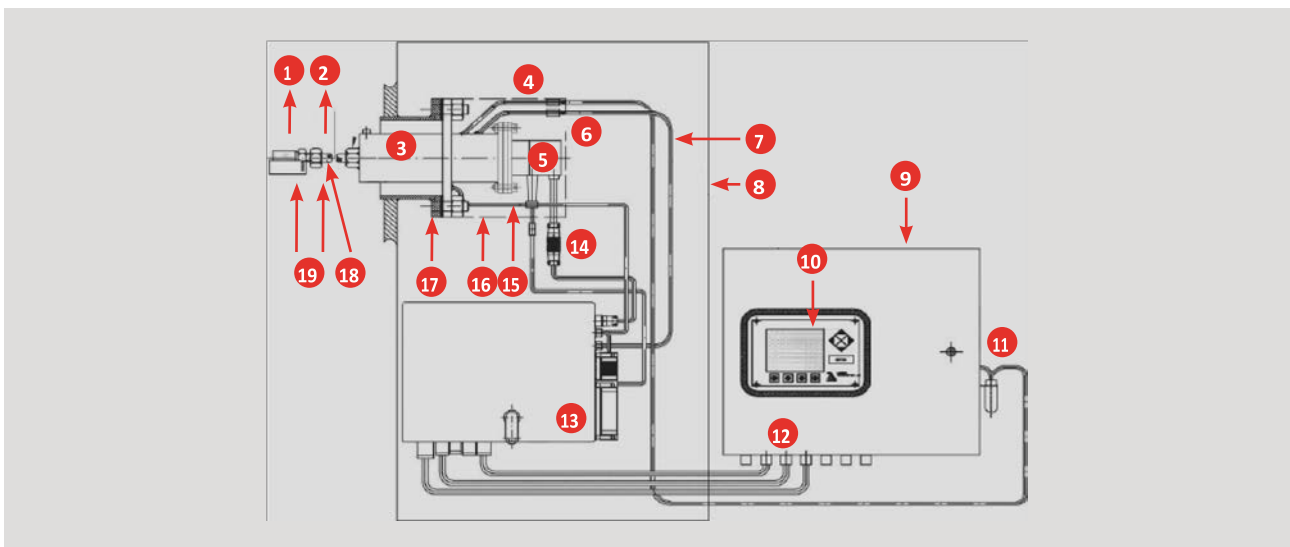
Design principle with integrated measuring gas pump and calibration system for installation under cover.

- 1 Probe installation fitting (PIF). 2 LS1 Lambda Probe.
- 3 Measuring gas feedback sealed via blind plug.
- 4 Outside Insulation. 5 Counterflange. 6 Gas extraction device (GED) with extraction filter. 7 Measuring gas.
- 8 Flange seal. 9 Pressure sensor connection (PIF). 10 Calibrating gas connection (PIF).

If the distance between LS1 Lambda Probes and LT1 Lambda Transmitter is greater than 10 m, we recommend that you fit a probe connection box (PCB) to the measuring gas pump and where appropriate the automatic calibration

- 11 Pressure sensor. 12 Calibrating gas connection LT. 13 Display and operating unit (optional). 14 LT1 Lambda Transmitter with integrated measuring gas pump and automatic calibration system (optional).
- 15 Electrical connection with plug.

system (optional) close to the probe. For outdoor installation a protective transmitter box is also required as weather protection.



Design principle with external measuring gas pump and calibration system.

1 Flue gas duct. 2 Measuring gas temperature. 3 Probe installation fitting (PIF). 4 Pressure sensor connection. 5 LS1 Lambda Probe type 655R0031/0034. 6 Calibrating gas connection. 7 Calibrating gas output. 8 Protective transmitter box. 9 LT1 Lambda Transmitter, external measuring gas pump. 10 Display and operating unit (optional). 11 Condensate trap/pressure sensor connection LT. 12 LT1 Lambda Transmitter, electrical connection. 13 Probe connection box with measuring gas pump and calibration system. 14 Electrical connection with plug. 15 Measuring gas

feedback. 16 Insulation for LS1 and PIF. 17 Counterflange. 18 Gas extraction device (GED) and protecting tube with sintered metal prefilter. 19 Measuring gas.

- Cannot be used with negative boiler pressure (infiltrated air).
- IP42 protection class.

Applications:

- Natural gas, heating oil (extra-light), boiler flame tube.
- Can be used with negative boiler pressure, gastight

Basic system.



LT1 in IP65 wall-mounting housing.



19" rack.

The LT1 Lambda Transmitter is available in three basic versions:

- Sheet steel housing, lockable door at the front, impact-resistant inspection window, optional display and control unit IP65.
- Sheet steel housing, lockable door at the front, impact-resistant inspection window, with integrated air pump for automatic calibration with ambient air, optional display and control unit IP65.

- Panel-mounted housing (3HU/50DU) for installation in a control cabinet door or 19" rack. Display and control unit included as standard IP20, front IP40.

Probes.

LS1 Lambda Probe as plug-in fitting



LS1 Lambda Probe as flange version



Properties:

- Measurement directly in the moist flue gas up to 600 °C

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design.

- IP42 protection class.

Applications:

- Natural gas, heating oil (extra light), boiler fl ame tube.

LS1 Lambda Probe immersion version

Properties:

- Measurement directly in the moist fl ue gas up to 600 °C with Inconell protecting tube up to 900 °C.
- Gastight design with option for automatic calibration. ■ IP42 protection class.

Applications:

- Natural gas, heating oil (extra-light), heating oil (heavy), coal, biomass, non-standard fuels

LS1 Lambda Probe in HT design

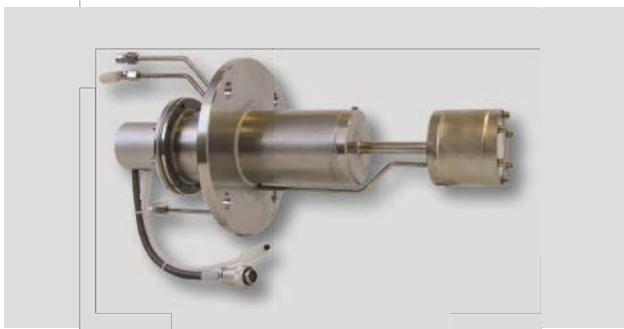
Properties:

- Measurement directly in the moist fl ue gas up to 1400 °C
- Gastight design with option for automatic calibration. ■ IP42 protection class.

Applications:

- Measurement with very high fl ue gas temperatures, fuel, natural gas, extra-light heating oil, heavy heating oil, coal, biomass, special fuels.

LS1 Lambda Probe with fi lter mesh

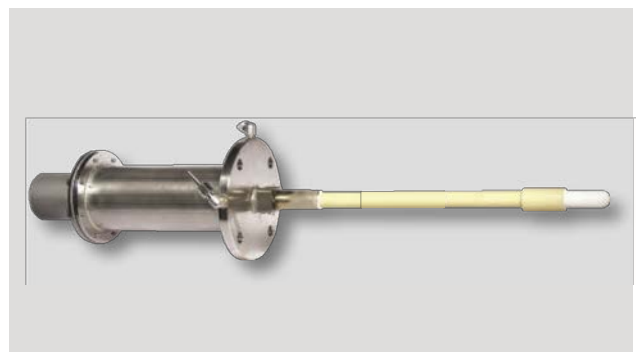
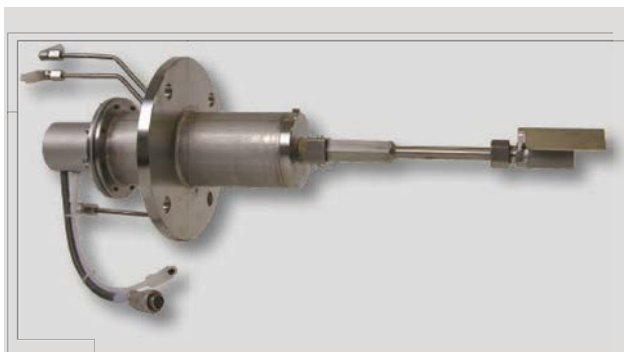


Properties:

- Measurement directly in the moist fl ue gas up to 200 °C
- Gastight design with option for automatic calibration, purge function and fi lter mesh. ■ IP42 protection class.

Applications:

- Flue gases with very high dust proportion, e.g. pulverised lignite combustion, biomass.



Optional components.

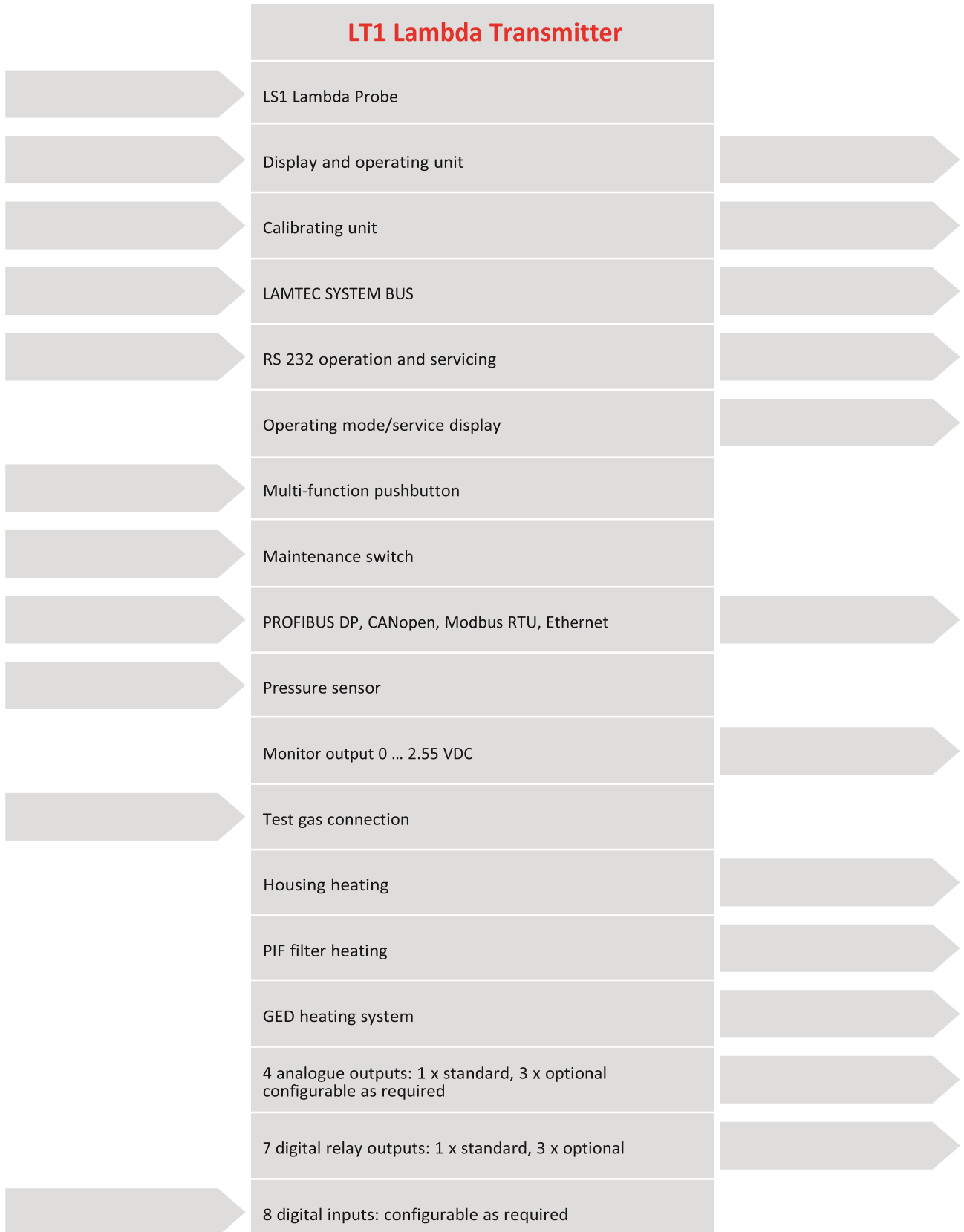
- Display and operating unit ■ Electrically isolated analogue outputs
- Automatic calibrating unit for fully automated ■ Relay module for digital outputs with 6 relays check and calibration of LS1 Lambda Probe in (1 changeover switch) for the output of operating, installed status for operating the system with ■ Status and limit value messages, ambient air; or alternatively via integrated air switching capacity 230 VAC, 4 A pump or compressed air ■ 1 ... 4 analogue inputs via measurement cards can be configured as required, 2 of which are floating, ing
- Test gas connection (1 ... 4 test gases) for monitor- the calibration (EPA standard) potential difference
- Purge unit ■ 20 V, e.g. for connecting temperature sensors,
- Pressure compensation of the measurement value; other pressure sensors, norm signals, etc. pressure range 800 ... 1200 mbar ■ Bus interface for
- Temperature compensation of the measurement ■ PROFIBUS DP value ■ Modbus RTU
- Measurement of fl ue gas and suction air tempera- ■ Ethernet tures and calculation of combustion effi ciency ■ Remote display soft ware for PC on Windows
- Calculation of CO₂ concentration, calculated for ■ Measuring gas pump 12 VDC for corrosive measurspecific fuel from the measured O₂ value and the ing gases max. CO₂ value ■ Measuring gas extraction via ejector
- Load-dependent and fuel-specific limit values/limit ■ Electric housing heating for ambient temperature curves below -10 °C and -25 °C
- Electric heating of the gas extraction device and the sintered metal preliminary fi lter
- Up to 4 additional analogue outputs, max. 2 floating (outputs 1 and 2) max. potential difference 20 V. Range and physical size confi gurable
- Direct current 0/4 ... 20 mA, load 0 ... 600 Ω ■ Direct voltage 0 ... 10 V, load > 10 Ω

Approvals

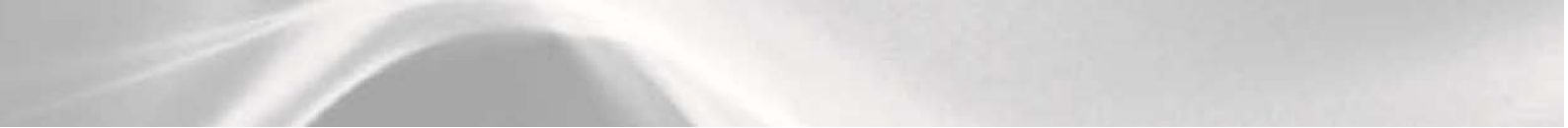
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Inputs.

Outputs.



Notes.



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