System Overview

Lambda Transmitter LT3
Lambda Probe LS2
Combination Probe KS1D

LAMTEC

Sensors and systems for combustion engineering

www.lamtec.de

LAMTEC Measuring System LT3 with LS2 or KS1D.

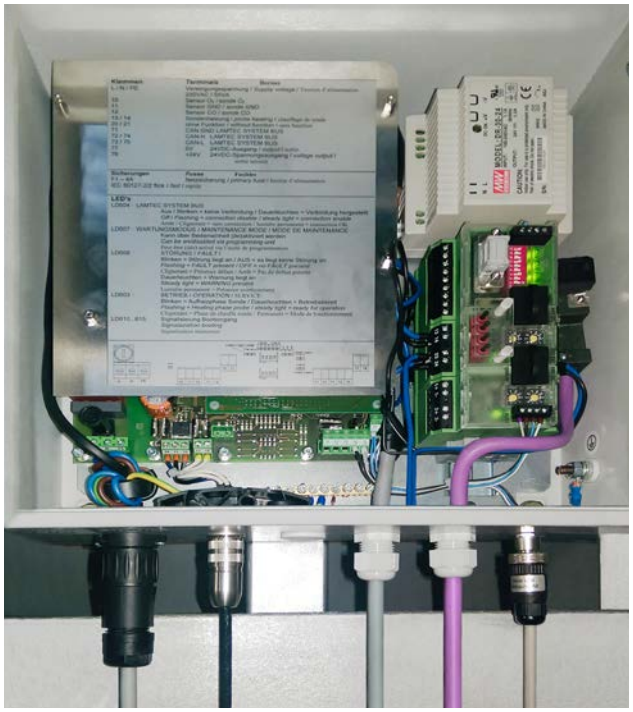
The cost-effective package for simultaneous $CO_e/H_2/O_2$ measurement or pure O_2 measurement.

With the LT3 Lambda Transmitter, LAMTEC provides customers with a simple, cost-effective device for the simultaneous measurement of oxygen (O_2) and oxidising gas components (CO_e), or for simple oxygen (O_2) measurement.

When used with LAMTEC's KS1D combination probe, the LAMTEC LT3 is a universal measuring device based on microprocessor technology. The transmitter has been specifically developed for the simultaneous measurement and detection of O_2 concentration and oxidising components CO_e (CO/H_2) in flue gas emissions from combustion systems in the super-stoichiometric range ($\lambda > 1$). The measurement value CO_e (e = equivalent) is the sum signal of all oxidisable- emission components such as CO and H_2. Alternatively, the LAMTEC Probe LS2 can be used to only measure oxygen (O_2). In its basic configuration LT3 is certified against Safety Integrity Level SIL1.

The LT3 evaluates the voltage values of two measurement electrodes U_{O2} (oxygen characteristic) and the mixed potential ($U_{O2} + U_{CO/H2}$). The KS1D's outputs for O_2 and CO_e measurement are dynamic with fast responses.

This makes simultaneous measurement and detection of CO_e (CO/H_2) and O_2 using the LAMTEC Transmitter LT3 is therefore is superior against O_2 measurement alone in insensitivity and reaction time and provides first-class basic for control of fuel and air afterwards.



Advantages:

- In-situ measurement of oxygen (O_2) and detection of oxidising exhaust gas components CO_e (CO/H_2) in the flue gas up to a temperature of 1,400 °C
- Pure O_2 measurement range: 0 to 21 vol. %
- CO_e measurement range: 0 to 10,000 ppm
- Not affected by ingress/tramp air (CO_e)
- No sample gas conditioning required, measurement directly in the moist flue gas
- Response time to 60 % (T_{60})
  O_2 < 3 seconds (unfiltered)
  CO_e < 3 seconds (unfiltered)
- Low heating power depending on the exhaust gas temperature
- Certified flame arrester
- Simple to use – probe connection using plug-in socket
- Low-maintenance
- Approved according to DIN EN 16340
- Basic configuration certified against SIL1

Measurement Principle

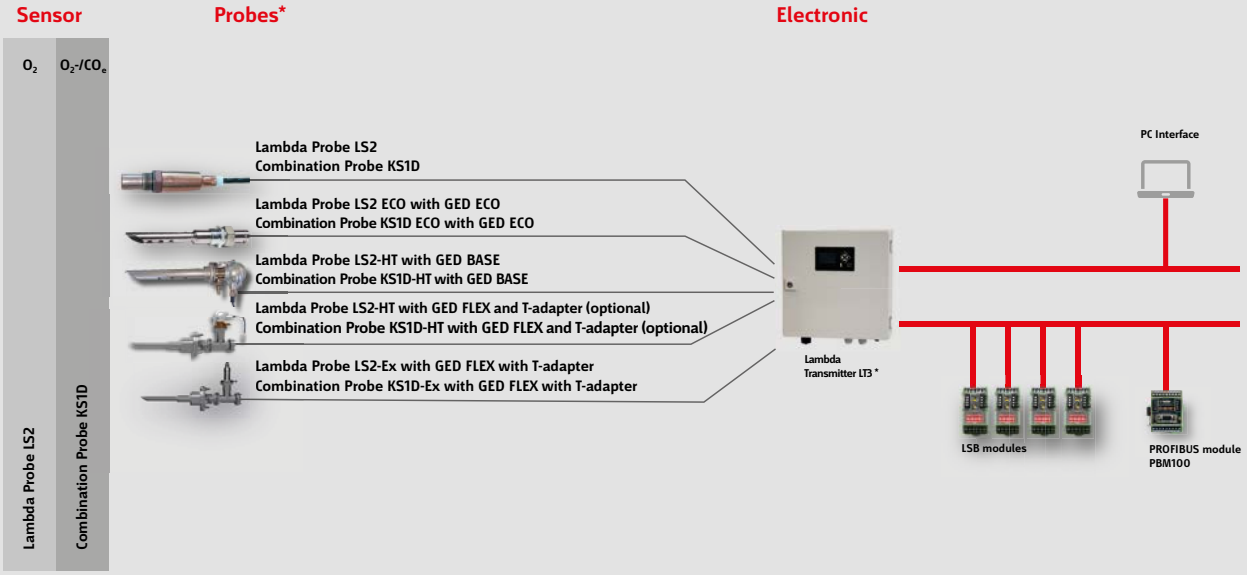
The LAMTEC KS1D Combination Probe is based on a heated electrochemical measuring cell made from zirconium dioxide ceramic (ZrO_2).
It has 3 electrodes:

- O_2 electrode (platinum)
- CO_e electrode (platinum/noble metal)
- Reference electrode (platinum)

The Lambda Sonde LS2 is missing the CO^e-Elektrode.
The one designed as a tube closed on one side Zirconium dioxide ceramic protrudes into the exhaust ductof the firing system and separates the reference gas space (surroundings) gas-tight from the measuring gas space (exhaust gas duct).

System overview.

Various probe designs.



*** Only one probe possible for each LT3.**

Functions of the LT3 with LS2 | KS1D.

Basic System.

LT3 with user interface.

Lambda Transmitter LT3

The LAMTEC Lambda Transmitter LT3 comes with a user interface (UI). The user interface is attached to the front door and is equipped with the following functions:

- Readings for O_2 and CO_e measuring values
- Information on the probe, fuel, warnings, faults, software version, CRC and serial number
- Calibration of measurements
- Settings for maintenance, filter time, analogue output, replacing of probes, display, and more functions and parameter settings.

The following connections are located on the underside of the device:

- Power supply
- Probe connector (probe signal/probe heater)
- External LSB connector for the computers (use of LAMTEC remote software)
- Cable bushing for connection to LAMTEC SYSTEM BUS
- Cable bushing for connection to LSB modules

The Stainless Steel Housing

Lambda Transmitter LT3 in stainless steel housing

The Lambda Transmitter LT3 and the LT3-F are optionally available in stainless steel housing which prevents corrosion when in contact with water or salt. Moreover, the steel housing makes both suitable for use in areas with high hygienical requirements such as the food industry.

Lambda Transmitter LT3-F

LT3 connections on the bottom side.

The Lambda Transmitter LT3-F is, in contrast to the standard LT3, equipped with a monitoring processor. In combination with the LAMTEC burner control units such as ETAMATIC, BurnerTronic or CMS, a SIL2 specific control is made possible.

Lambda Transmitter LT3-Ex

The LT3-Ex Lambda Transmitter is used in combination with an Ex probe, a measuring system for the continuous measurement of the concentration of O_2 and oxidizing components (CO/H_2). The LT3-Ex is used in potentially explosive areas.

LT3-F

Probes.

The LAMTEC probes support both O_2 measurement (LS2 Lambda Probe) and simultaneous measurement (KS1D Combination Probe) of O_2 concentration and combustible oxidising gas components (CO/H_2), displayed as CO_e (CO equivalent).

Lambda Sonde LS2 / Combination Probe KS1D

Lambda Sonde LS2 / Combination Probe KS1D

Properties:

- Ideal flue gas speed: 1-4 m/sec
- Flue gas temperature: ≤ 450 °C (LT3-F: ≤ 300 °C)
- Protection class: IP42, if installed outdoors the probe has to be protected against water

Applications:

- Natural gas, heating oil (extra light).

Lambda Probe LS2 / Combination KS1D

in standard housing with GED ECO

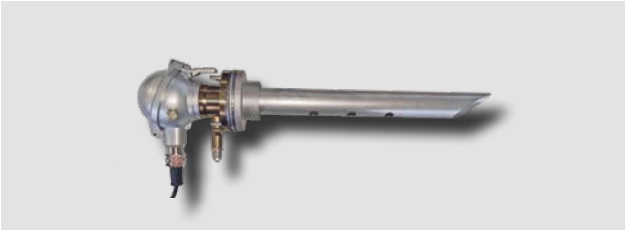
Properties:

- Ideal flue gas velocity:
  At gas tempatures < 100 °C: 1 < x < 6 m/s
  At gas tempatures > 100 °C: 1 < x < 12 m/s
- Flue gas temperature: ≤ 300 °C
- Dust concentration: ≤ 100 mg/m³
- Protection class : IP42, if installed outdoors the probe has to be protected against water, snow etc.

Applications:

- Natural gas, heating oil (extra light)

Lambda Probe LS2-HT / Combination KS1D-HT with GED



BASE

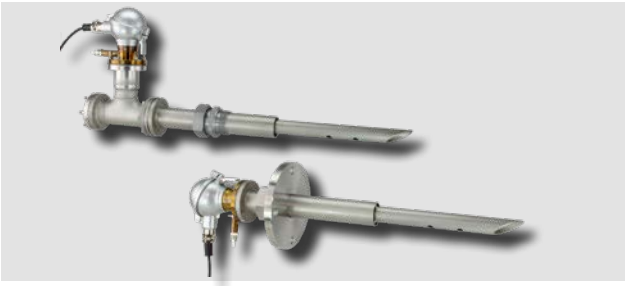
Properties:

- Ideal flue gas velocity:
  At gas tempatures < 100 °C: 1 < x < 10 m/s
  At gas tempatures > 100 °C: 1 < x < 20 m/s
- Flue gas temperature: ≤ 550 °C (LT3-F ≤ 300 °C)
- Dust concentration: ≤ 200 mg /m³
- Option for semi-automatic calibration during operation with test gas
- Protection class : IP65

Applications:

- Natural gas, heating oil (extra light)

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



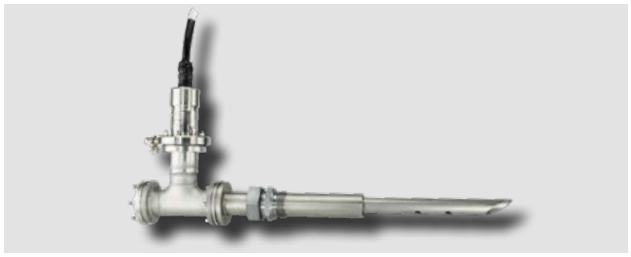
Properties:

- Ideal flue gas speed: 0,1 - 30 m/sec
- Flue gas temperature depeding on material:
  ≤ 1400 °C
- Dust concentration: ≤ 1000 mg/m³
- Option for semi-automatic calibration during operation with test gas
- Immersion depth can be adjusted variably
- Via a suitable T-adapter, the GED FLEX can be blown out or equipped with an ejector
- Protection class: IP65

Applications:

- Natural gas, heating oil (extra light), HFO, coal, special fuels.

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



Properties:

- Ideal flue gas speed: 0,1 - 30 m/sec
- Flue gas temperature depending on the material:
  ≤ 1400 °C
- Dust concentration: ≤ 1000 mg/m³
- Option for calibration during operation with test gas
- Immersion depth can be adjusted variably
- Via a suitable T-adapter, the GED FLEX can be blown out or equipped with an ejector
- Protection class : IP65
- Atex: Ex II 2 G Ex d IIB+H2 T3 Gb (-20 from +60 °C)

Applications:

- Natural gas, heating oil (extra light), HFO, coal, special fuels.

Optional Components.

LSB modules

The LSB modules are universally compatible input and output modules that can be controlled via the LAMTEC SYSTEM BUS. In order to function in this way, the module is configured by an adjustable address. The relay outputs are activated manually using switches.

Analogue Outputs:

There are two different modules for analogue outputs:

- Power module with 4 analogue outputs 0/4 to 20 mA
- Voltage module with 4 analogue outputs 0/2 to 10 VDC

Digital Outputs:

The digital LSB module is equipped with 4 outputs.

Digital Input:

The digital LSB module is equipped with 4 inputs. Using a strapping plug, two modules can be wired quickly which increases the number of inputs to 8.

LSB module for calculating combustion efficiency:

The efficiency module has following properties:

- Two PT100 temperature inputs to record the flue gas temperature and exterior temperature
- Two analogue outputs 0/4 to 20 mA to emit the flue gas temperature and its efficiency
- Power supply 24 VDC / 50 mA

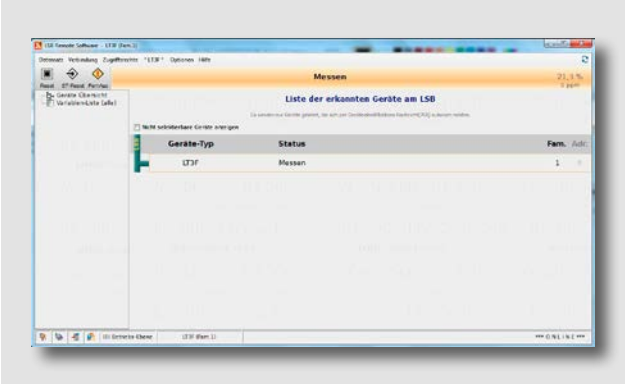
Communication via PROFIBUS:

The Fieldbus modules are connected via the LSB. Regarding the integration into a parent process and building management system, PROFIBUS communication offers many advantages.

- Either installed straight onto the LT3 or externally, e.g. on the switch board
- Fast and precise transmission of processor values
- Immediate reading of inputs and outputs possible
- Remote diagnosis through a readout of the fault history

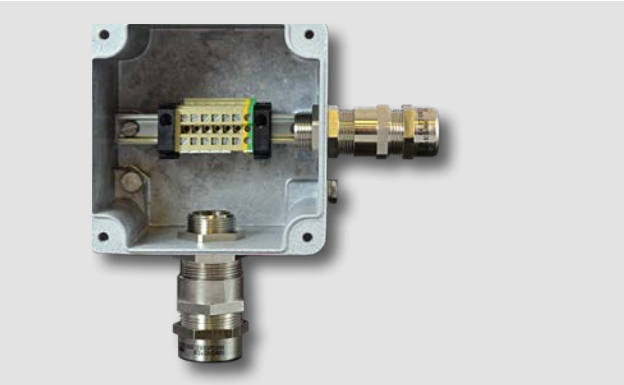
LSB Remote Software

The LSB USB module and the PC interface make working with the LT3 Lambda Transmitter even easier: The device can be operated remotely using a laptop to set configurations and archive cure data. In this way, back up data can easily and quickly be created and, in the event of an emergency, re-imported which makes the device ready for service in just a few minutes. Using the LSB Remote Software enables users to retrieve and monitor data from the LAMTEC Lambda Transmitter from an office without needing to be present on site.



PCB Probe Connection Box

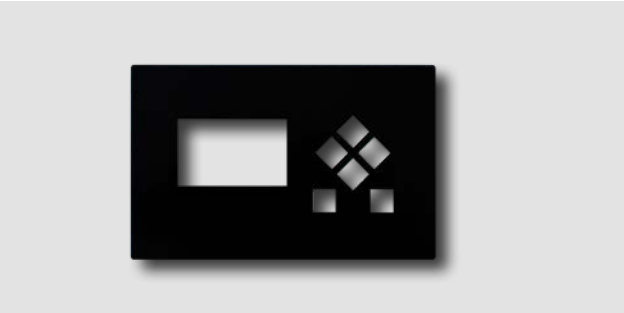
The LAMTEC PCB Probe Connection Box has been designed to bridge longer distances between the LT3 and the probe without the need for an extension cable (> 2m). Here, the probe connection jack and the blank cover replace the standard screwed cable gland. The PCB contains a terminal strip and implementations for probe plugs.



Cover IP65

Cover for UI300-LT3-V2, delivery includes fixing nuts.

- Cover to achieve protection class IP65



Additional IP65 cover for user interface

Inputs.

Outputs.

LSB module Analogue outputs

- 1 O_2 measurement value
- 2 CO_e measurement value
- 3 Not assigned
- 4 Not assigned

LSB module Digital inputs

- 1 Resolve offset calibration
- 2 Reset fault
- 3 Changeover to CO_e curve fuel 1
- 4 Deactivation limit value 1 to 4
- 5 Reset limit value 1 to 4
- 6 Changeover to CO_e curve fuel 3
- 7 Changeover to CO_e curve fuel 4
- 8 Deactivation calibration

LSB module Digital outputs

- 1 Fault
- 2 Warning
- 3 Limit value 1
- 4 Limit value 1

LSB module for calculating combustion efficiency

- 1 Recording of flue gas temperature
- 2 Recording of exterior temperature
- 3 Flue gas temperature
- 4 Efficiency

Communication via PROFIBUS

- 1, 2 Fault/ warning reset
- 3 ID of the digital module 1 to 16
- 4 Coding to set digital outputs
- 1, 2 CO_e actual value
- 3, 4 CO_e actual value status
- 5, 6 O_2 actual value
- 7, 8 CO sensor voltage rough
- 9, 10 O_2 sensor voltage rough
- 11, 12 Probe voltage U_{CO_e}
- 13, 14 LT3 status
- 15, 16 Warning value 1
- 17, 18 Warning value 2
- 19, 20 Fault value 1
- 21, 22 Fault value 2

Lambda Transmitter LT3

- Power supply 230 VDC

Notes.

Notes.

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