



## System overview

**LT1 Lambda Transmitter**  
**LS1 Lambda Probe**



Sensors and systems for combustion technology

[www.lamtec.de](http://www.lamtec.de)

# O<sub>2</sub> measurement at the highest level - the LT1 Lambda Transmitter.

LAMTEC supplies leading technology for measuring exhaust gas in combusting systems. Our range of O<sub>2</sub> 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 O<sub>2</sub> measurement instrument for direct measurement of the O<sub>2</sub> concentration of gases in the superstoichiometric range ( $\lambda > 1$ ) in combination with the LS1 Lambda probe.

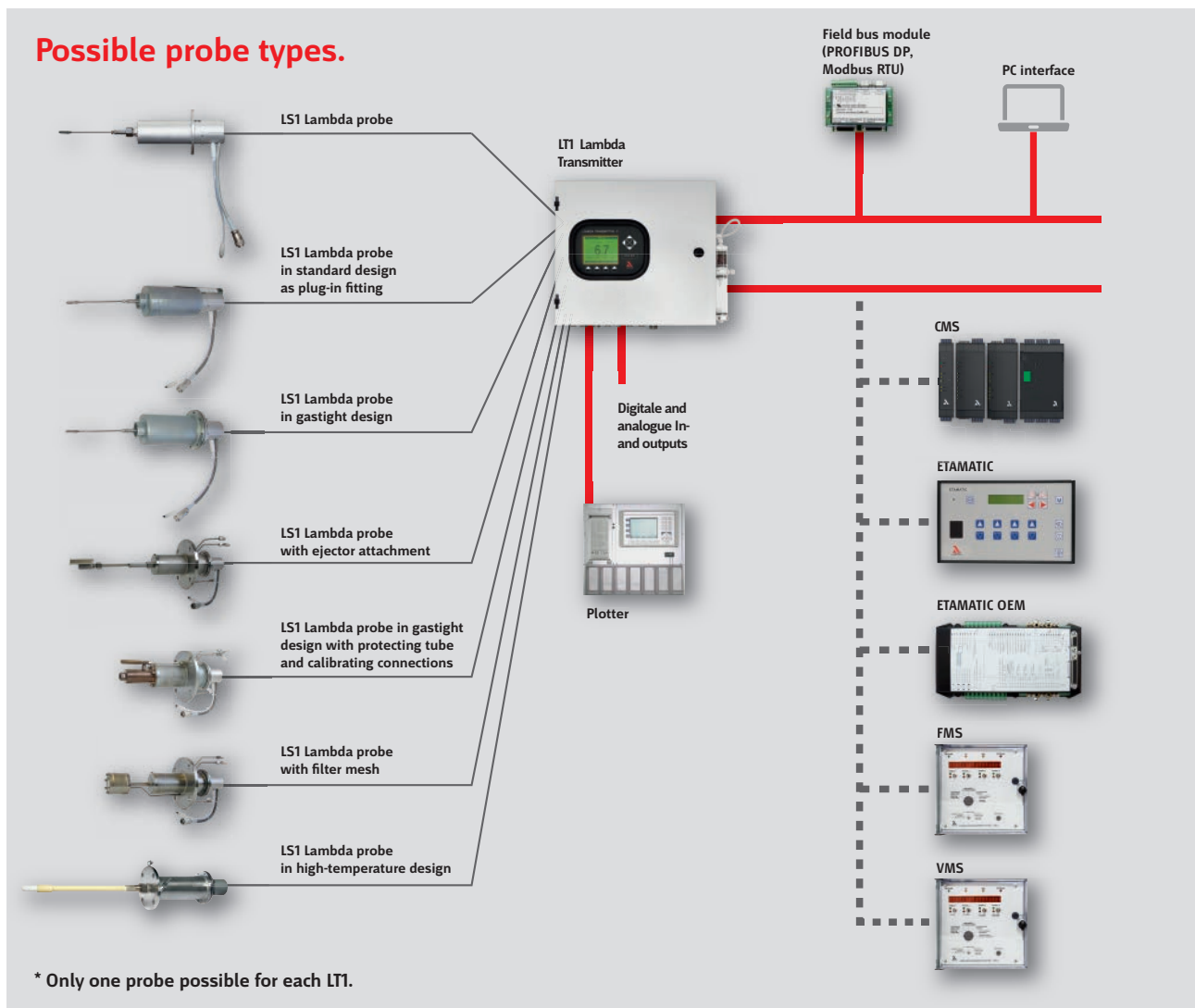
- in combustion flue gases
- in industrial flue gases
- in furnace atmospheres
- in process gases

The measurement of the O<sub>2</sub> 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 micro-processor technology in the LT1 Lambda Transmitter.

The following components are available for the output of the measurement values and operating states:

- a monitor output 0 ... 2.55 VDC 0 ... 25.5 vol. % O<sub>2</sub>
- 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. % O<sub>2</sub>)
- Automatic ageing compensation of the ZrO<sub>2</sub> measuring cell to determine the cell internal resistance and heating power adaptation.
- 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/ETAMATIC for O<sub>2</sub> optimisation.
- As an alternative to the LAMTEC SYSTEM BUS, an RS 422 interface is also available for coupling to customer devices.
- Optional RS 232 interface for remote control via PC - only in combination with the remote display software (option).

### 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. % O<sub>2</sub>)
- Measurement accuracy greater than 0.2 vol. % O<sub>2</sub> across the entire measuring range 0 ... 21 vol. % O<sub>2</sub>, 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 ZrO<sub>2</sub> measuring cell required
- Automatic adaptation of the cell temperature to the cell internal resistance (ageing compensation)
- Measuring gas temperature up to 800 °C with metal removal
- up to 1500 °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

**Measuring principle.**

On the hot sensor, fitted into a measurement chamber, the oxygen is ionised and "pumped" from the external electrode to the internal electrode by applying voltage

(figure 1). This means that a current flows (0 ... 21 vol. % O<sub>2</sub> corresponds to around 0 ... 500 mA) that is proportional to the oxygen content in the measuring gas (figure 2).

**Characteristic curve for current probe measuring principle LT1/LS1.**

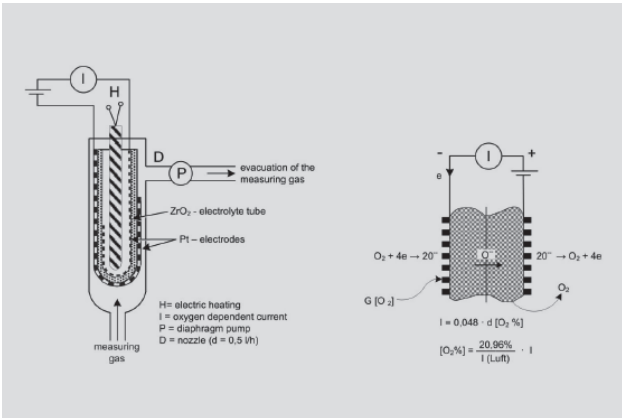


Figure 1.

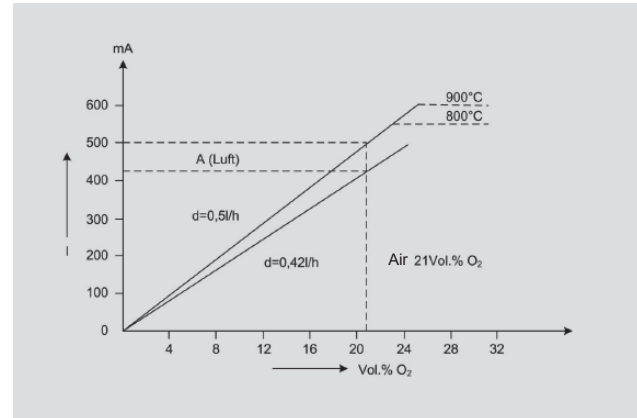
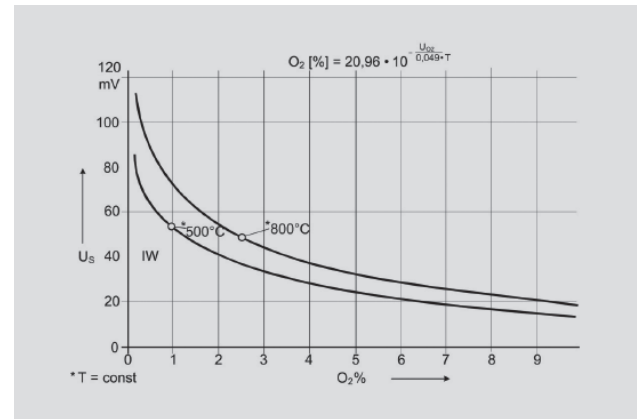
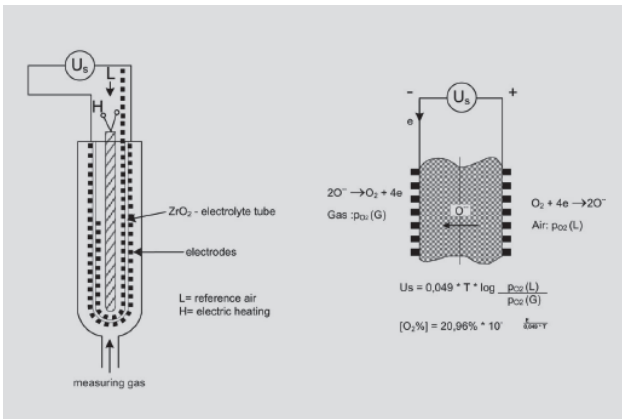
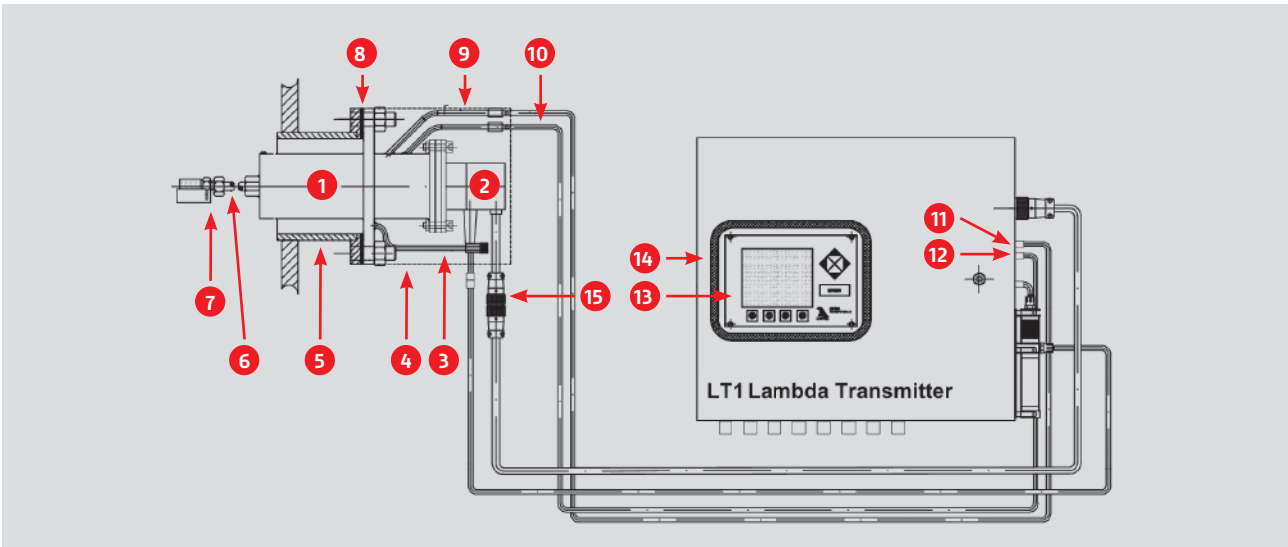


Figure 2.

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



# System components.



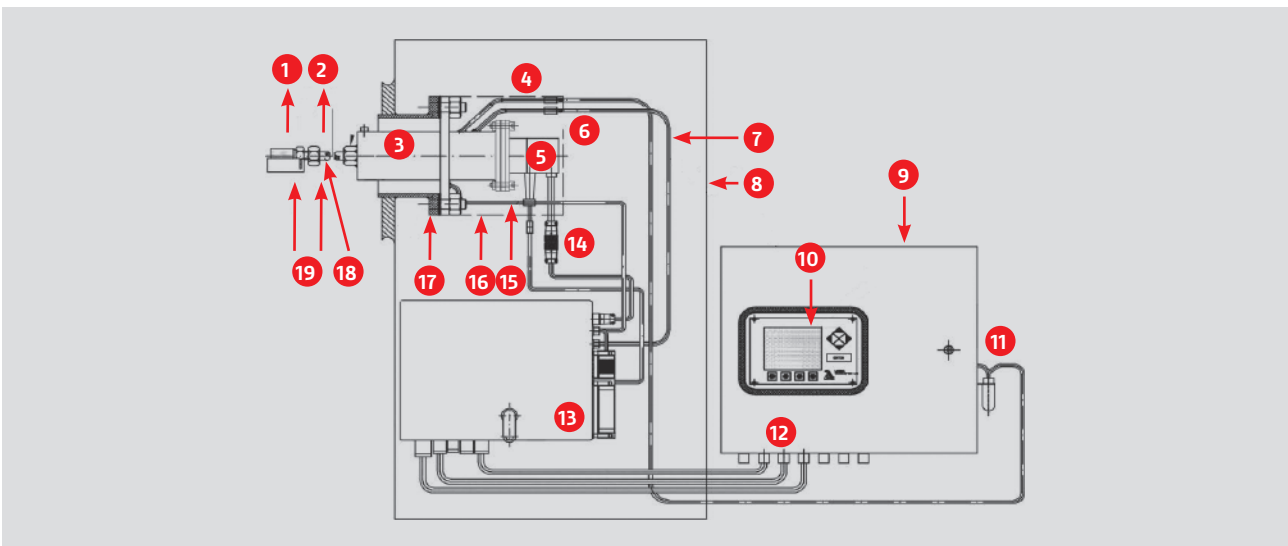
Design principle with integrated measuring gas pump and calibration system for installation under cover.

1 Probe installation fitting (PIF). 2 LS1 Lambda probe. 3 Measuring gas feedback with sealing via blind plug. 4 Insulation for LS1. 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).

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.

At a distance between LS1 Lambda probes and LT1 of 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 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.

## Basic system.



LT1 in IP65 wall-mounting housing.



19" rack.

The LT1 Lambda Transmitter is available in four 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 reference air pump, optional display and control unit IP65.
- On mounting plate for installation in a control cabinet, optional display and control unit IP00.
- 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



*Properties:*

- Probe for oxygen measurement in gases, installation fittings required.

### LS1 Lambda probe in standard design as plug-in fitting



*Properties:*

- Measurement directly in the moist flue gas up to 600 °C
- Cannot be used with negative boiler pressure (infiltrated air).
- IP42 protection class.

*Applications:*

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



### LS1 Lambda probe in gastight design



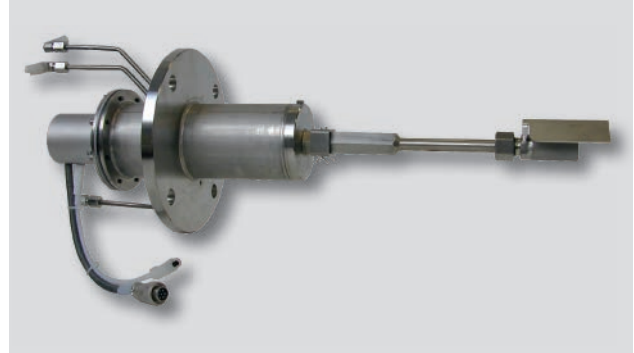
#### Properties:

- Measurement directly in the moist flue gas up to 600 °C
- Can be used with negative boiler pressure, gastight design.
- IP42 protection class.

#### Applications:

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

### LS1 Lambda probe in gastight design with protecting tube and calibrating connections



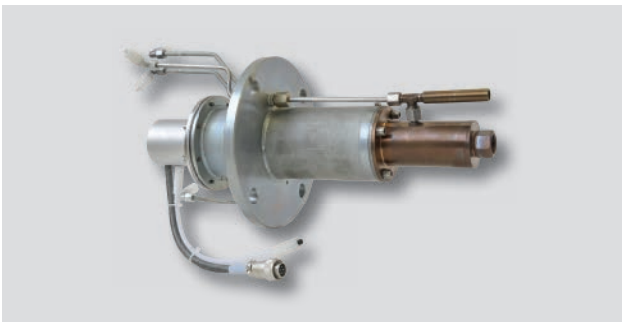
#### Properties:

- Measurement directly in the moist flue 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 with ejector attachment



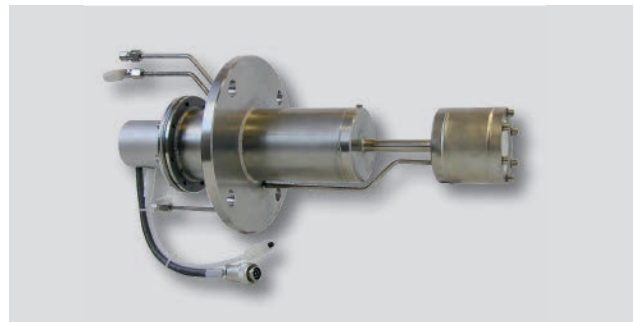
#### Properties:

- Measurement directly in the moist flue gas up to 1400 °C
- Gastight design with option for automatic calibration and ejector pre-stage for flue gas extraction.
- IP42 protection class.

#### Applications:

- Special fuels, specifically developed for crematoria.

### LS1 Lambda probe with filter mesh



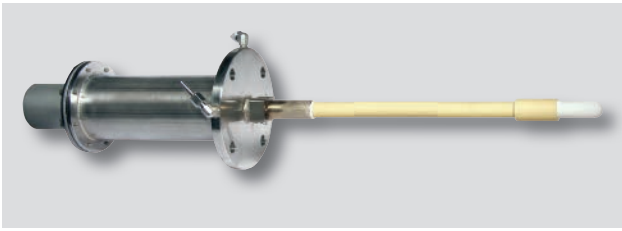
#### Properties:

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

#### Applications:

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

**LS1 Lambda Probe in high-temperature design**



*Properties:*

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

*Applications:*

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

## Optional components.

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



# Inputs.

# Outputs.

<b>LT1 Lambda Transmitter</b>		
→	LS1 Lambda Probe	
→	Display and operating unit	→
→	Calibrating unit	→
→	LAMTEC SYSTEM BUS	→
→	RS 232 operation and servicing	→
	Operating mode/service display	→
→	Multi-function pushbutton	
→	Maintenance switch	
→	PROFIBUS DP, CANopen, Modbus RTU, Ethernet	→
→	Pressure sensor	
	Monitor output 0 ... 2.55 VDC	→
→	Test gas connection	
	Housing heating	→
	PIF filter heating	→
	GED heating system	→
	4 analogue outputs: 1 x standard, 3 x optional configurable as required	→
	7 digital relay outputs: 1 x standard, 3 x optional	→
→	8 digital inputs: configurable as required	

# Order information.

<b>LT1 - IP54 / IP65 wall mounting housing without display and operating unit - no probe</b>	
LT1 Lambda Transmitter, grey RAL 7032, IP 54 with internal measuring gas pump	6557R0025
LT1 Lambda Transmitter, grey RAL 7032, IP 65, probe connection via terminal bar, with internal measuring gas pump	657R0025IP65
LT1 Lambda Transmitter, external measuring gas pump, grey RAL 7032, IP 65	657R0026
<b>LT1 - IP00 mounting plate without display and operating unit - no probe</b>	
LT1 Lambda Transmitter, on mounting plate for control cabinet installation, external measuring gas pump	6557R0028
LT1 Lambda Transmitter, on mounting plate for control cabinet installation, with internal measuring gas pump	657R0029
<b>LT1 - 19" with display and operating unit - no probe</b>	
LT Lambda Transmitter - 19", with internal measuring gas pump	657R0045
LT Lambda Transmitter - 19" external measuring gas pump	657R0046
<b>Display and operation</b>	
Display and operating unit installed in LT1	657R0830
Display and operating unit in the panel installation housing 3HU/50DU (cable length 1.5 m)	657R0030T
O <sub>2</sub> remote display 0...25.5 vol.%, 96x48x135 mm (WxHxL), 230 V AC	657R1830
O <sub>2</sub> remote display 0...25.5 vol.%, 96x48x135 mm (WxHxL), 24 V AC	657R1831
Remote display software incl. interface module 663P0600	657R1101
RS422 interface module instead of RS232 interface module - additional cost	663R9002
RS 422/485 interface module on terminals	663R0503
Serial connection line, 9-pole, Sub-D, socket/socket, 10 m long	663R0100
Extension for serial connection line, 9-pole, Sub-D, socket/socket, 10 m long (extend to max. 40 m in total) for the PC connection in combination with remote display software	663R0101
USB to serial, adapter for WIN2000/XP	663R9003
<b>Fully automated calibration</b>	
Fully automated calibration system via ambient air	657R0800
Fully automated calibration system via compressed air supply provided by customer	657R0801
Optional pressure relief during calibration, integrated into LT1 (required for ceramic GED)	657R0809
Optional test gas connection (1 test gas)*	657R0810
Optional test gas connection (2 test gas)*	657R0811

\* Only possible in combination with a fully automatic calibration system type 657R0800/0801 or PCB with calibration system type 657R0010/0013/0015/0016

Measuring gas extraction device (GED)	
GED with extraction filter 50 mm long	655R0090
GED with extraction filter 80 mm long	655R0151
GED with extraction filter 250 mm long	655R0120
GED with extraction filter 250 mm long (reinforced)	655R0121
GED with extraction filter 350 mm long	655R0026
GED with extraction filter 450 mm long	655R0022
GED with extraction filter 600 mm long	655R0149
GED with extraction filter 800 mm long	655R0030
GED with extraction filter 1000 mm long	655R0027
GED with extraction filter 1200 mm long	655R0122
GED with extraction filter 1400 mm long	655R0123
GED with extraction filter 1600 mm long	655R0148
GED with extraction filter 1800 mm long	655R0124
GED with extraction filter, custom length	655R0023
GED without extraction filter 50 mm long	655R0052
GED without extraction filter 80 mm long	655R0150
GED without extraction filter 350 mm long	655R0048
GED without extraction filter 450 mm long	655R0049
GED without extraction filter 1000 mm long	655R0112
GED without extraction filter, custom length	655R0050
Extraction filter with protecting tube, material 1.4762	655R0031
Ceramic measuring gas extraction 450 mm long	655R0025
Ceramic measuring gas extraction 1000 mm long	655R0024
Ceramic measuring gas extraction, custom length up to 1000 mm	655R0029
Ceramic measuring gas extraction and filter wadding 450 mm long	655R0206
Ceramic measuring gas extraction and filter wadding 1000 mm long	655R0205
Ceramic measuring gas extraction with filter wadding, custom length up to 1000 mm	655R0207
Extension for probe connecting cable	
Extension for probe connecting cable, 2 m long, shielded	655R0010
Extension for probe connecting cable, 5 m long, shielded	655R0011
Extension for probe connecting cable, 10 m long, shielded	655R0012
Extension for probe connecting cable with single-sided wire end sleeves, 2 m long, shielded*	655R0043
Extension for probe connecting cable with single-sided wire end sleeves, 5 m long, shielded*	655R0044
Extension for probe connecting cable with single-sided wire end sleeves, 10 m long, shielded*	655R0045

\* For connection to LT1 - type 657R0025IP65 and 657R0045

Probe installation fitting (PIF)	
PIF gastight, recessed design with test gas connection, material: Stainless steel 1.4571 (V4A), without GED protecting tube	655R0083
PIF gastight, recessed design with test gas connection, material: Stainless steel 1.4571 (V4A), without GED protecting tube	655R1183
PIF gastight, with test gas connection, material: Stainless steel 1.4571 (V4A), without GED protecting tube	655R0037
PIF gastight, with test gas connection, material: Steel, without GED protecting tube	655R1137
GED protecting tube, material: Stainless steel 1.4571 (V4A) with sintered metal prefilter up to 700 °C, for GED length 350 mm	655R0597
GED protecting tube, material: Stainless steel 1.4571 (V4A) with sintered metal prefilter up to 700 °C, for GED length 340 mm	655R0624
GED protecting tube, material: Stainless steel 1.4571 (V4A) with sintered metal prefilter up to 700 °C, for GED length 1000 mm	655R0620
GED protecting tube, material: Stainless steel 1.4571 (V4A) with sintered metal prefilter up to 700 °C, for GED length 1400 mm	655R0622
GED protecting tube, material: Stainless steel 1.4571 (V4A) with sintered metal prefilter up to 700 °C, for GED length 1800 mm	655R0623
GED protecting tube with CU core and 20 µm sintered metal prefilter up to 700 °C, for GED length 350 mm	655R0596
GED protecting tube with CU core and 20 µm sintered metal prefilter up to 700 °C, for GED length 450 mm	655R0606
GED protecting tube with CU core and 20 µm sintered metal prefilter up to 700 °C, for GED length 1000 mm	655R0608
GED protecting tube with CU core and 20 µm sintered metal prefilter up to 700 °C, for GED length 1400 mm	655R0610
GED protecting tube with CU core and 20 µm sintered metal prefilter up to 700 °C, for GED length 1800 mm	655R0611
GED protecting tube with CU core and 20 µm sintered metal prefilter up to 700 °C, GED custom length up to 1800 mm	655R0612
GED protecting tube, material: Inconell 600 for measuring gas temperatures up to 950 °C, with sintered metal prefilter, for GED length 450 mm	655R0654
GED protecting tube, material: Inconell 600 for measuring gas temperatures up to 950 °C, with sintered metal prefilter, for GED length 1000 mm	655R0650
GED protecting tube, material: Inconell 600 for measuring gas temperatures up to 950 °C, with sintered metal prefilter, for GED length 1400 mm	655R0655
GED protecting tube, material: Inconell 600 for measuring gas temperatures up to 950 °C, with sintered metal prefilter, for GED length 1800 mm	655R0656
GED protecting tube, material: Inconell 600 for measuring gas temperatures up to 950 °C, with sintered metal prefilter, for GED custom length <1000 mm	655R0652
GED protecting tube, material: Inconell 600 for measuring gas temperatures up to 950 °C, with sintered metal prefilter, for GED custom length >1000 mm	655R0653
GED bracing, material: Stainless steel 1.4571 (V4A)	655R0614
Ceramic protecting tube with filter up to 1400 °C, for GED length 450 mm	655R0102
Ceramic protecting tube with filter up to 1400 °C, for GED length 1000 mm	655R0103
Metal/ceramic protecting tube with filter up to 1400 °C, for GED length <800 mm	655R0139
Metal/ceramic protecting tube with filter up to 1400 °C, for GED length ≤1000 mm	655R0129
Kanthal protecting tube, material: Kanthal APM up to 1200 °C, Ø 60 mm, for GED length 1000 mm	655R0642
ISC protecting tube, material: Silicon carbide (Halsic-I) up to 1400 °C, Ø 60 mm, for GED length 450 mm	655R0641
ISC protecting tube, material: Silicon carbide (Halsic-I) up to 1400 °C, Ø 60 mm, for GED length 1000 mm	655R0619

Probe installation fitting (PIF)	
Intermediate flange DN 100 PN 16, for ISC protecting tube or Al2O3, with stud on both sides, material: Zinc-plated galvanised steel	655R0617
Intermediate flange DN 100 PN 16, for ISC protecting tube or Al2O3, with through holes, material: Zinc-plated galvanised steel	655R0616
PIF (screw-on tube R1 1/4")	655R0032
PIF (screw-on tube R1 1/4"), material: Zinc-plated steel	655R0041
PIF gastight, flange fastening, material: Zinc-plated steel	655R0042
External insulation 230 mm for PIF 655R0037 and LS1 650R0031	655R0056
External insulation 330 mm for PIF 655R0037 and LS1 650R0031	655R0057
External insulation 200 mm for PIF 655R0039/0042 and LS1 650R0031	655R0058
External insulation for PIF 650R0083/1183 and LS1 650R0031/0034	657P0100
External insulation 230 mm for SEA 655R0032/0041 and LS1 650R0001/0004	655R0154
Sintered metal prefilter for PIF (655R0037/0083/1183) 2 µm instead of 20 µm - additional cost	655R1209
Sintered metal prefilter for PIF (655R0037/0083/1183) 10 µm instead of 20 µm - additional cost	655R1211
Sintered metal prefilter for PIF (655R0037/0083/1183) 40 µm instead of 20 µm - additional cost	655R1210
Sintered metal prefilter for filter heating 2 µm instead of 20 µm - additional cost	655R1215
Sintered metal prefilter for filter heating 10 µm instead of 20 µm - additional cost	655R1214
Sintered metal prefilter for filter heating 40 µm instead of 20 µm - additional cost	655R1216
Transmitter protective housing made from GRP, for outdoor installation, with electric heating	655R0087
Protective cage with handle for LS1 Lambda probe	655R0055
Protective cage with screw-on mounts for LS1 Lambda probe	655R0155
Counterflange for PIF 655R0083/1183, with holder for transmitter protective housing, material: Stainless steel, 1.4571 (V4A), Ø 140 mm	655R0187
Counterflange for PIF 655R0083/1183, with holder for transmitter protective housing, material: Steel, black cathodic dip coating	655R0190
Counterflange for PIF 655R0037, with holder for transmitter protective housing, material: Steel, black cathodic dip coating, Ø 65 mm	655R0196
Counterflange for PIF 655R0037, with holder for transmitter protective housing, material: Stainless steel 1.4571 (V4A)	655R0197
Counterflange DN 65 PN 6, material: Stainless steel 1.4571 (V4A)	655R0137
Counterflange DN 65 PN 6, material: Steel, black cathodic dip coating	655R0138
Counterflange for PIF 655R0083/1183, material: Stainless steel 1.4571 (V4A), Ø 140 mm	655R0183
Counterflange for PIF 655R0083/1183, material: Steel, black cathodic dip coating	655R0185
Counterflange, custom length	655R0xxx/S
Flange seal for counterflange DN 65, 3 mm graphite	655 P 4211
Flange seal for counterflange DN 100, 3 mm graphite	655 P 4213
Flange seal for counterflange DN 100, 3 mm BAS green	655 P 4207
Blind flange PIF / LS 1. 8 hole	657 P 0445

Gas extraction heating for $T_{max}$ 450°C incl. power pack	
Gas extraction device heating incl. power pack, for GED length 600 mm, material: Stainless steel 1.4571 (V4A)	657R1151
Gas extraction device heating incl. power pack, for GED length 800 mm, material: Stainless steel 1.4571 (V4A)	657R1152
Gas extraction device heating incl. power pack, for GED length 1200 mm, material: Stainless steel 1.4571 (V4A)	657R1153
Gas extraction device heating incl. power pack, for GED length 1600 mm, material: Stainless steel 1.4571 (V4A)	657R1154
Gas extraction device heating with filter heating incl. power pack, for GED length 600 mm, material: Stainless steel 1.4571 (V4A)	657R1161
Gas extraction device heating with filter heating incl. power pack, for GED length 800 mm, material: Stainless steel 1.4571 (V4A)	657R1162
Gas extraction device heating with filter heating incl. power pack, for GED length 1200 mm, material: Stainless steel 1.4571 (V4A)	657R1163
Gas extraction device heating with filter heating incl. power pack, for GED length 1600 mm, material: Stainless steel 1.4571 (V4A)	657R1164

**Options**

Flue gas temperature measurement and efficiency calculation	
Calculation of the combustion efficiency incl. 2 temperature inputs for PT100 temperature sensor	657R0895
Calculation of the combustion efficiency incl. 2 temperature inputs, 2 PT100 temperature sensor 150 and 250 mm and 2 analogue outputs 0/4 ... 20 mA	657R0917
Temperature input for PT100, e.g. for measuring the flue gas temperature	657R0890
Temperature sensor PT100, 150 mm long	657R0897
Temperature sensor PT100, 250 mm long	657R0891
CO <sub>2</sub> calculation	
Calculation of the CO <sub>2</sub> concentration	657R0895
Limit values	
Firing-rate-dependend and fuel-specific limit curves/limit values incl. analogue input module 657R0052 and 1 relay module 660R0017 for LT1 wall mounting housing IP 54 - 657R0020 ... 0029*	657R0923
Firing-rate-dependend and fuel-specific limit curves/limit values incl. analogue input module 657R0052 and 1 relay module 660R0017-LT1 for LT1 19" design - 657R0045 ... 0046*	657R0924
Relay module with 6 signal relays (1 changeover switch) for the output of status messages for LT1-19" design	657R0856/19
Relay module with 6 signal relays (1 changeover switch) for the output of operating and status messages, for installation into LT1 type 657R0022 ... 0029	657R0856

\* Please specify the following when ordering: PO = for potentiometer input / ST = for current input

O <sub>2</sub> /CO speed control	
Integrated PID-O <sub>2</sub> controller	657R0120
Software expansion CO control for LT in connection with ETAMATIC or FMS/VMS	657R0602
Software update LT (CO control retrofitting) incl. 657R0602	657R1110
Firing-rate-dependend configurable analogue output for activation of an FC for speed control, incl. module for speed recording without pick-up sensor	657R0123



Field bus connection	
BUS connection for PROFIBUS DP	663R0401LT
BUS connection for Modbus (RTU)	663R0403LT
Options and accessories	
Pressure compensation of the measurement value	657R0866
Temperature compensation of the measurement value	657R0864
Extension cable for temperature sensor (optional temperature compensation type 657R0864), 10 m long (please specify other lengths when ordering)	657R0405
Analogue output module 0/4 ... 20 mA, 0 ... 10 V	657R0050
Additional analogue output module 0/4 ... 20 mA, 0 ... 10 V, floating, max. potential difference $\pm 20$ V *	657R0051
Additional cost for electrical isolation for analogue output 0/4 ... 20 mA, 0 ... 10 V	657R0053
Additional cost for floating analogue output 1, max. potential difference $\pm 20$ V	657R0054
Potentiometer analogue input module	657R6000
Analogue input module 0/4 ... 20 mA	657R6001
Analogue input module 0/4 ... 20 mA with supply +24 VDC for transmitter	657R6002
Analogue input module 0/2 ... 10 V	657R6005
Diaphragm intake pump 12 VDC for corrosive measuring gases	657R0835
Ejector measuring gas pump instead of diaphragm intake pump, material: Steel **	657R0868
Ejector measuring gas pump instead of diaphragm intake pump, for corrosive measuring gases, material: Stainless steel 1.4571 (V4A) **	657R0902
Software update LT1 on CD (flash programming PC with RS232 interface required)	657R1111
2-way ball valve, material: PP for condensate drain LT1 657R0000/0009	657R0898
Small parts assortment box for LT1	657R0305
Negative pressure gauge 0 ... 1 bar	657R0230
Probe simulator OS4 for specifying O <sub>2</sub> values	657R0300
Electric housing heating 320 W/230 VAC with thermostat for compact design IP65, for ambient temperatures to -25 °C	657R0825
Electric housing heating 500 W/230 VAC with thermostat and additional housing insulation for compact design IP65, for ambient temperatures to -40 °C	657R0826

\* For coupling with VMS/FMS configuration 4 ... 20 mA/0 ... 25 vol. % O<sub>2</sub> required - the suffix "REG" must be quoted after the order number

\*\* Required pre-pressure > 5 bar, air consumption ~ 2 Nm<sup>3</sup>/h at 5 bar



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