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C O N F I R M A T I O N

on the examination of a
combustion products sensing device for CO/H_2 and O_2

Date: 2015-03-06

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Test Laboratory:	TÜV SÜD Industrie Service GmbH Abteilung Feuerungs- und Wärmetechnik DIN-/DVGW-Prüfstelle
Subject of Test:	Combustion products sensing device for CO/H_2 and O_2, consisting of Lambda Transmitter: **LT3F** Flue gas sensor (CPSE): **KS1D / KS1D-HT**
Ordering Company:	LAMTEC Meß- und Regeltechnik für Feuerungen GmbH & Co KG D-69190 Walldorf
Basis of Test:	DIN EN 16340:2014-10, DIN EN 61508:2011-02, parts 1 – 7 (**SIL 2**)
Test Report:	No. C 1490-03/14 dated 2015-03-06

The tests have been performed with positive results.
The results in detail, the evaluation of the results and the conclusions out of the results are described in the above mentioned test report.
Excerpts from this test report are printed on the reverse.

The document consists of 2 pages

The test results refer exclusively to the units under test.

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The following flue gas sensors (CPSE) can be used:

Model			**KS1D**	**KS1D-HT**
Type		656R2000	656R2010	656R2015
Maximum flue gas temperature	°C	300	300	1200
Maximum flue gas speed	m/s	6	2	10

Measurement range of the CPSD	O_2:	0 … 21 Vol.%
	CO_e:	0 … 1000 ppm (equivalent CO value)
Accuracy of measurement	O_2:	± 5 % of the measured value, ≥ 0,3 Vol.%
	CO_e:	0 … 1000 ppm, ≥ 20 ppm

Under consideration of the conditions listed below the combustion products sensing device fulfils the requirements of DIN EN 16340:2014-10 and is capable to fulfil the applicable requirements of DIN EN 61508:2011-02 parts 1-7 (2nd ed.), for safety functions up to safety integrity level **SIL 2**.

In combination with burner management systems and/or fuel/air ratio control systems, e.g. type Etamatic, FMS, VMS, Burnertronic BT300, the combustion products sensing device is suitable to perform O_2 / CO control functions for gas and oil burning appliances.

For a combination of the Lambda Transmitter type LT3F with the flue gas sensor type KS1D / KS1D-HT the following safety parameters have been determined according to DIN EN 61508:

Probability of a dangerous failure (high demand / continuous mode)	**PFH_D**	**$1{,}16 \cdot 10^{-7}$ 1/h**
Probability of a dangerous failure (low demand mode)	**PFD_{AVG}**	**$2{,}85 \cdot 10^{-3}$**
Safe failure fraction	**SFF**	**94,4 %**
Average diagnostic coverage	**DC_{AVG}**	**91,1 %**

These parameters have been calculated under the assumption of a Mean Time to Restoration MTTR= 8 hours, a Diagnostic Test Interval T_2= 0,5 hours, and of the following Proof Test Intervals T_1 which are equivalent to the specified life time of the system components: LT3F: T_1 = 10 years,
KS1D/KS1D-HT: T_1 = 3 years.

The failure rate of the safety related LSB communication (interference free O_2 transmission in two logical channels) can be neglected for calculating the total failure rate for the complete combustion control functions (including the burner management system or fuel/air ratio control system).

The following conditions shall be considered:

1. For the integration of the combustion products sensing device into the complete combustion control system the conditions and rules of document "LT3F_Verwendungsregeln.doc" shall be considered.
2. Safety-related parameters shall be set in accordance with all requirements applicable to the controlled combustion system. Safety-related parameters shall be checked after commissioning by appropriate verification and validation measures.
3. In order to achieve a degree of protection IP54 for the enclosure of the combustion products sensing device appropriate cable glands shall be used.
4. Only devices which provide protective separation from hazardous live parts according to DIN EN 61140, e.g. by double or reinforced insulation according to DIN EN 60730-1 or DIN EN 61010-1 or DIN EN 60950-1, shall be connected to the CAN bus interface (terminals 71 … 75, 77 and 78).
5. Adequate information about proper location, mounting, installation, putting into service, operation and maintenance of the combustion products sensing device shall be included into the installation and operating instructions of the appliance or combustion system in an official language of the country in which it is to be used.