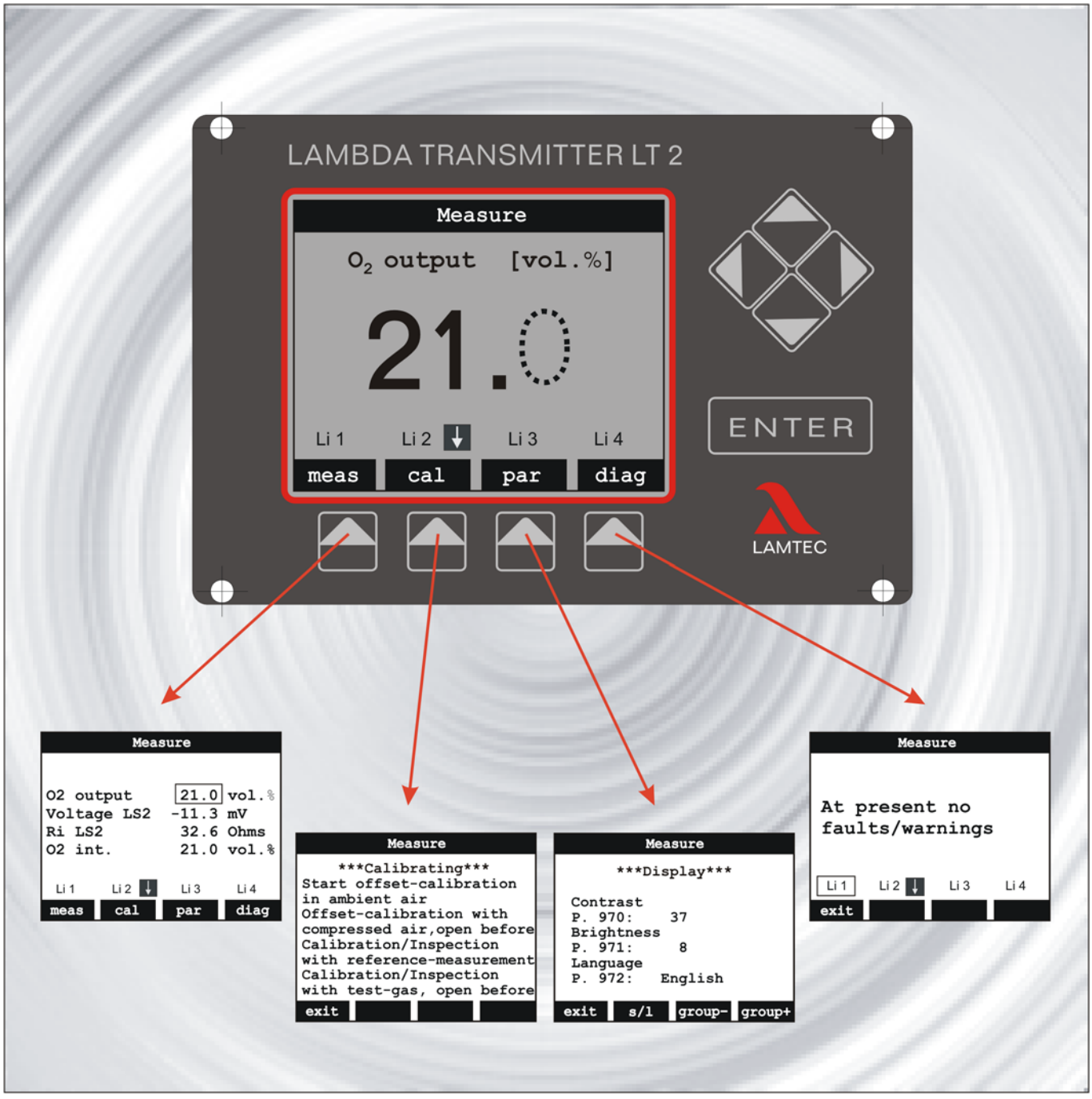
Supplement to the operating instructions for the optional Display and Control unit

LT 2 Lambda Transmitter



Sensors and Systems for Combustion Engineering

LAMTEC

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1 Safety Notes

The following symbols are used in these operating instructions as important safety notes for the user. They appear within each chapter where the information is required. The safety notes, in particular the warnings, must always be observed and followed.

WARNING
Identifies possible hazards to personnel, especially through electric power.

WARNING

Indicates possible hazards to personnel caused by improper handling of system parts.

ATTENTION!
Indicates risk to system parts or a possible adverse effect on functions.

NOTE:
Contains important additional information for the user about the system or system parts, and offers further tips.

Appears in texts containing instructions for carrying out an action.

In this context the user is urged to observe the statutory accident prevention measures during all works, and to do everything in accordance with the situation to prevent damage to persons and property.

2 Introduction

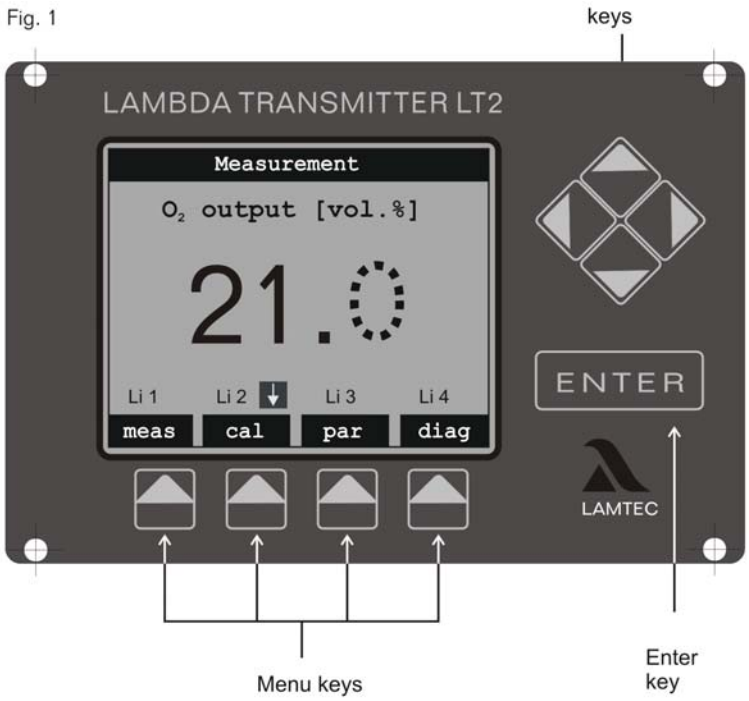
These operating instructions describe how to use the optional display and control unit for the lambda transmitter LT 2; they do not replace the operating instructions for the LT 2 transmitter.

Fig. 1 shows the display and control unit for the lambda transmitter LT 2. It consists of an LCD display, the cursor keys, the Enter key and the menu keys.

- The cursor keys serve to select measured values, parameters or functions within the display readout. The keys also position the cursor for Input and for Editing (amendments).
- The Enter key activates the editing mode and confirms and ends
- The menu keys correspond to the menu item shown above them.

In Fig. 1, the menu keys have the following functions, from left to right: Measurement [meas], Calibration [cal], Parameter setup [par], Diagnostics [diag].

Fig. 1



The menu keys are identified by the LT 2 lambda transmitter's functions, in abbreviated English form:

measurement, calibration, parameter setup, diagnostics

NOTE:
The limit values are only displayed if they were activated via parameters 930 / 940 / 950 / 960 ("Service" - level). See also chapter 5.

3 Display

The display divides into three ranges (fig. 2):

1. The status line at the top margin. It shows:
   - On the left side, if the maintenance mode is activated.
   - In the center the current operating condition.
   - On the right side, if warnings or faults are present.
   - Faults are indicated to the status line additionally by flashing.
2. The measured value representation in the center of the normal range.
3. The menu line, whose entry is assigned to the menu key present under it.

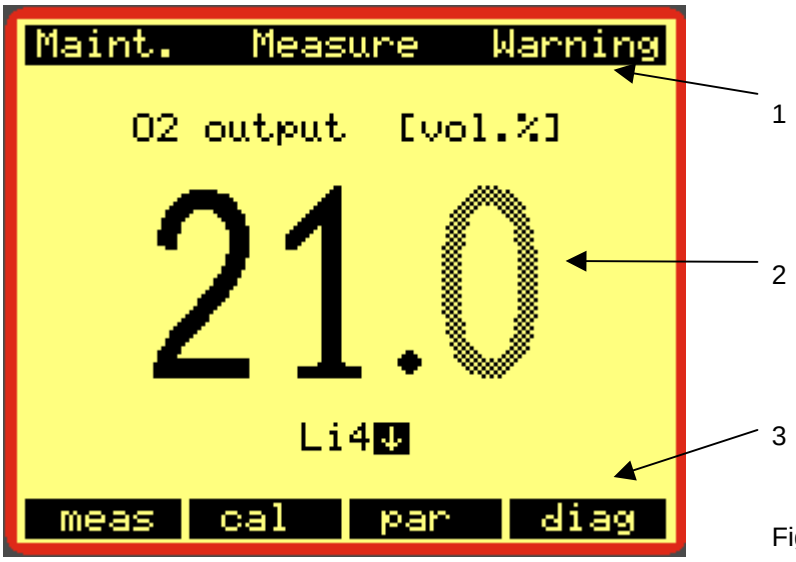


Figure 2

3.1 Menu function meas

Pressing the [meas] key switches the display to a large representation of the value selected via the up/down cursor keys. Pressing the [meas] key repeatedly switches the display back to a listing of all the measured values.

3.2 Menu function cal

By pressing the [cal] menu key calibration starts is shown on the display. After activating the calibration, 4 calibration functions are available (see Fig. 1):

- Start the offset-calibration on ambient air
- Start the offset-calibration with compressed air (during semi-automatic calibration, open stop valve in the SAK)
- Start the calibration via comparative measurement (during manual calibration function) only if the O_2 value is under 18 %.
- Start the calibration with test gas (during semi-automatic calibration, open stop valve in the SAK)

The required calibration function is selected via the up/down cursor keys. The ENTER key confirms the selected function and triggers this calibration procedure.

The automatic calibration modes can be interrupted via the menu function Interrupt calibration, return to measurement function.

During manual calibration, the calibrated value can be changed via the menu function Change calibrated value (Fig. 2).

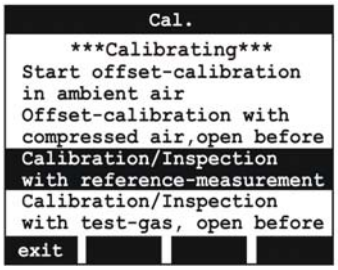


Fig. 1

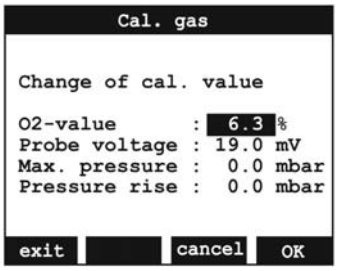


Fig. 2

After calling up this menu function, the amendment procedure in the displayed submenu can be terminated with the [cancel] key. Alternatively, the amended O_2 value can be accepted with the [OK] key.

Manual calibration is interrupted or ended with End calibration, return to measurement function (the amended O_2 value is preserved).

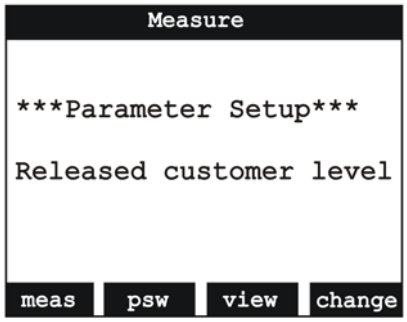
NOTE:

The Manual calibration mode remains active for a maximum of 15 minutes (this is the factory setting). This is followed by switching back automatically to the measurement mode. The maximum manual calibration time can be changed via parameter 288 at service level.

A substitute O_2 value is displayed during calibration procedures. Measurement or display of a meaningful O_2 value is only possible in the operational mode, i.e. after completing the calibration.

3.3 Menu function par

After calling up the [par] menu, the menu opens up for the parameters.



Access to the parameter menu is divided into the following clearance levels:

- Operational level
- Customer level
- Service level
- Factory level

} (only accessible via password)

NOTE:
The customer level password can be set freely by the customer.

The current clearance level is shown on the display. The available menu functions are displayed in the menu bar:

- **[exit]** returns to start menu.
- **[psw]** allows changing the clearance level via password input.
- **[view]** displays the parameter settings. All the parameters are displayed, regardless of clearance level.
- **[change]** allows the changing of parameters: only the parameters accessible at the clearance level are displayed.

3.4 Menu function psw

[psw] calls up the password input menu. The operational clearance level* is displayed. The functions visible in the menu bar mean:

- **[exit]** returns to the [par] menu.
- **[clear]** resets the clearance level to operational level*
- **[----]** shifts to the alphabetically previous input letter.
- **[++++]** shifts to the alphabetically next input letter.

The up/down cursor keys act similarly to **[++++]** and **[----]**. Left/right move the input point along the password. Once the correct password is entered, the corresponding clearance level is displayed and is retained on leaving the menu with **[exit]**. If no key is pressed for some time, the clearance level is reset to the operational level.*

* If the customer clearance level is still at the factory setting, the customer level is set.

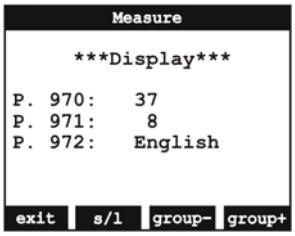
3.5 Menu function view

[view] opens the parameter menu. The menu bar is interpreted as follows:

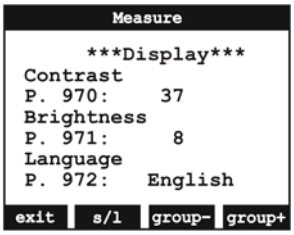
[exit] returns to the menu function [par]

[s/l] toggles between display formats:

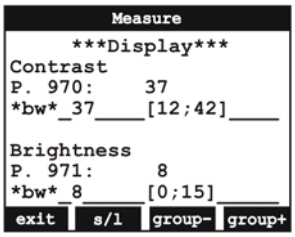
Short: only the parameter number and the current value are displayed.



Medium: the parameter number and the current value are accompanied by a short description.



Long: as Medium, but with an additional parameter status row displayed.



[group -] scrolls back one parameter group.

[group+] scrolls forward one parameter group.

All available parameter groups are summarised in the appendix. The left/right cursor keys correspond to the key-functions of:
[group -] and **[group+]** respectively.

If not all the parameters in a group are visible in the readout, this is indicated by flashing arrows in the right-hand margin. The up/down cursor keys can be used to shift the parameters and make them visible.

As an example, we explain below the status row shown in the Long format:

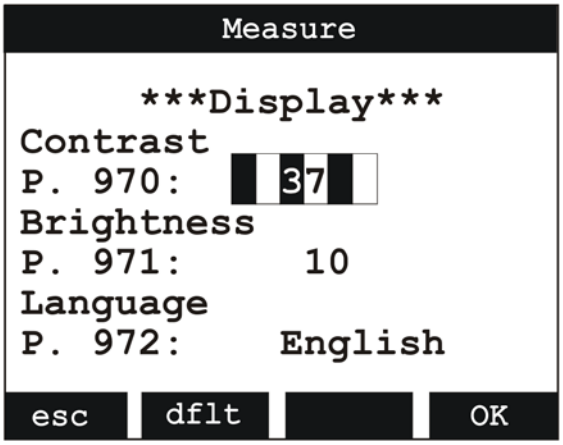
- *kw*_30_____[12 ; 42]_____
  The asterisks and underline characters (* and _) are fillers.
- K indicates the customer clearance level
  (b = operation, k = customer, s = service, f = manufacturing)
- W indicates the parameter type
  (write = revisable, read = read only).
- 30 is the default value (base value in EPROM)
- [12 ; 42] is the possible range within which the parameter can be changed

For some parameters there is no default value and interval!

3.6 Menu function change

[change] allows parameter values to be amended. The menu bar for the submenu is the same as the **[view]** menu.

However, here the parameter to be changed is shown inverted (light characters on a dark background). The required parameter can be selected via the up/down cursor keys. The edit mode for that parameter is activated with the [ENTER] key. The parameter's value flashes during editing.



Selected parameters are indicated in three ways:

1. Inverted representation → parameter can be changed
2. Outlined representation → parameter cannot be changes
3. Flashing representation → active editing mode (change mode)

The parameter can now be changed via the up/down cursor keys (and left/right for multidigit parameters). The menu bar functions are interpreted as follows:

- **[esc]** returns to the **[change]** menu without accepting the changed parameter.
- **[dflt]** sets the default value.
- **[OK]** accepts the changed value and returns to **[ENTER]** or **[change]** menu.

This procedure leads back to the [change] menu. Further parameters can be called up and changed.

3.7 Menu function diag

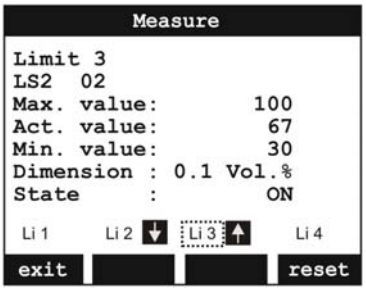
On pressing the **[diag]** key, the display switches to show warnings and faults. The up/down cursor keys can be used to select individual warnings or faults, or limit values.

NOTE:
Limit values are only displayed if they were activated via parameters 930/940/950/960 (Service level).

The selected warning or fault, shown in reverse video, can now be acknowledged or reset via the ENTER key.

NOTE:
Not all warnings or faults can be reset by means of an acknowledgement. The cause of the warning or fault may need to be rectified first.

If a limit value is selected and then the ENTER key pressed, the display switches to the limit value menu.



Explanation:Limit value 1 is parameterised to the O_2 measured value
Switching points: Crossing upwards 10.0 Vol.% O_2
Crossing downwards 3.0 Vol.% O_2
Current O_2 measured value 6.7 Vol.% O_2
Limit value is not set.

Li 2 ↓ - means: limit value 2 was triggered D to crossing downwards
LI 3 ↑ - means: limit value 3 was triggered D to crossing upwards

The right/left cursor keys can now be used to select each limit value in succession.

As soon as reset mode "Manual" or "Acknowledge" has been selected, the limit value can be reset via "Reset".

Use "Exit" to leave the limit value menu.

4 Display Parameter

4.1 Display Parameter 970 / 971 / 972

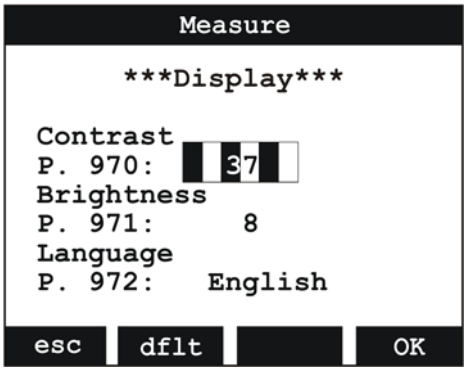
The parameter group ***Display*** controls the LT 2 lambda transmitter's Display and Control unit, with the following parameters:

- P. 970 Contrast

  This parameter serves to set the display contrast.
- P. 971 Brightness

  This parameter controls the display's background brightness.
- P. 972 Language

  The language of the output text (German, English) can be selected.



4.2 Brightness and contrast

Brightness and contrast can also be changed via the cursor keys, as follows:

Contrast + → Keys 1 & 2

Contrast - → Keys 3 & 4

Brightness + → Keys 1 & 4

Brightness - → Keys 2 & 3

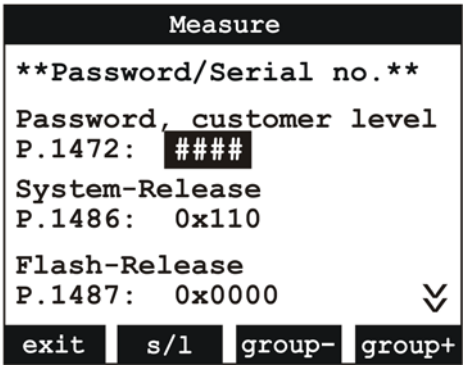
Press the appropriate two keys simultaneously

4.3 Customer password input

The password for the customer level can be selected individually by the customer. In order to enter a new password, at least the customer clearance level must be activated.

The new password must be entered as parameter 1472 (see Fig. below).

ATTENTION!
The password is accepted by the system a few seconds after input, and is displayed as "####". Thus, an entered password can never be read out.



NOTE:
The password is set to "0000" at the factory. Since this corresponds to the password input default setting, the customer level can be activated by switching briefly to password input and leaving it again without making any changes.

5 Limit values

Measured data can be monitored with the help of limit values. The LT 2 lambda transmitter comes with 4 fixed limit values as standard, that can be freely configured. Load-dependent limit curves and fuel-specific limit values are available as option 657R0920.

Monitoring takes place by comparing the current value with a lower limit (Min. comparison value) and with an upper limit (Max. comparison value).

If the monitored value falls outside the range (window), i.e. it is smaller than the Min. comparison value or greater than the Max. comparison value, the limit value output is set.
Parameters 910 to 914 indicate whether the limit value is set.
The limit values 1 - 4 can be used to switch the LT 2 transmitter's relay outputs. The settings that need to be made are described in the chapter about digital outputs (chapter 6). The limit value configurations, the display and resetting of limit values are described below. When using the display, these items can be found in the parameter groups limit value config. and limit values. The relevant parameter numbers are listed in the Appendix, table in chapter 8.2 following.

5.1 Limit value configuration

Each of the 4 limit values has seven parameters, used for configuration (e.g. for limit value 1):

1. Li 1 acts on (see 5.1.1)
2. 1: Max. comparison value (see 5.1.2)
3. 1: Min. comparison value (see 5.1.2)
4. 1: Const. Li Max. (see 5.1.1)
5. 1: Const. LiV Min. (see 5.1.3)
6. 1: Reset mode (see 5.1.4)
7. 1: Triggering delay (see 5.1.5)

The parameters are preceded by the number of their corresponding limit value.

5.1.1 Limit value 1 (2,3,4) acts on (Parameters 930/940/950/960)

This parameters specifies which value is to be monitored. The following values are available for monitoring:

- Off - the limit value is not in currently in use
- O_2 measured value
- Configurable values: one of 6 measured values definable by the user is being monitored.
- Probe's internal resistance
- Probe voltage

5.1.2 Max. comparison value (Par. 931/941/951/961) / min. comparison value (Par. 932/942/952/962)

Three possible settings are available for the upper and lower comparison values:

Off: The comparison value is not activated.

Constant value: A constant reference value is chosen to serve as a comparison value, see 5.1.1.

Calculated analogue value: A value calculated from the actual O_2 value or from an analogue input serves as a reference value. In the LT 2 lambda transmitter, one of 12 available reference values can be selected. Configuration of the analogue values to be calculated: see separate Instructions.

5.1.3 Constant Li max. (Par. 933/943/953/963) / Constant Li min (Par. 934/944/954/964)

If a constant value is selected to serve as the reference value, this constant is stored in Li Max. or Min. Please note that only integers can be entered. If the constant reference value is displayed with decimal places, it should be entered without the decimal point.

Example 1: The measured O_2 value needs to be monitored. The limit value output is set as follows:
If dropping below 5.5% or exceeding 15.6 vol.% O_2.
A constant value is specified for the Min. and Max. reference values:
- For the constant Li Max.: 156
- For the constant Li Min.: 55

NOTE:
If the measured value is to be monitored only for exceeding the maximum or only dropping below the minimum, only the constant Li-max. and Li-min. has to be set.

Example 2: The probe's voltage needs to be monitored. The voltage is shown on the display in mV. The limit values should be specified as integers in mV. An input of 100 corresponds to 100 mV.

5.1.4 Reset mode (Par. 935/945/955/965)

If the limit value is set as a result of the reference value being crossed (in either direction), this parameter describes the limit value's resetting mode. Three possibilities are available:

Automatic: If the monitored value is changed so that once again it lies within the Li Min. and Li Max. range, the limit value output is reset **automatically** to **off**.

Manual: The limit value output must be reset manually via the display, via one of the digital inputs or via the remote software(s. Limit values). In this resetting mode, limit values can only be reset if the monitored value lies within the acceptable range.

Acknowledge: The limit value output must be reset either manually via the display, via one of the digital inputs or via the remote software (s.Limit values). If the monitored reference value is still outside the acceptable range it is only acknowledged to begin with, and disappears on entering the acceptable range.

Each individual limit value can be deactivated now over the function “Deakt. GWx” over the digital inputs (x={1,2,3,4}).

5.1.5 Triggering delay (Par. 936/946/956/966)

This parameter can be used to set a triggering delay in the range 0 to 600 seconds. The limit value output is only set if the monitored reference value lies outside the Li Min. and Li Max. range for longer than the specified period. If the reference value is once again within the Li Min. and Li Max. limits, the time counter is reset. The triggering delay starts to count again from 0 when Li Min. or Li Max. is exceeded in the relevant direction.

5.1.6 Disable limits (Par. 967)

All limits can be disable together depently of the operating mode.

Selections: Limits are disabled when

- 0=never
- 1=cold start (default)
- 2=cold start + maintenance
- 3=not measure

5.2 Limit values display and resetting

The limit values' current status as well as resetting limit values, make use of the display in the limit values group; the relevant parameter numbers are shown in the Appendix, table in chapter 8.2.

Parameters 910 ... 914 The parameters limit value 1, limit value 2, limit value 3 and limit value 4 indicate the limit values' current settings and status. Off means that either the corresponding limit value is not in use, or the monitored reference value is within the limits Li Min. and Li Max. If a limit value is shown as "set", the monitored reference value is or was outside those limits.

Parameters 914 ... 917 Resetting the limit value output proceeds with the help of the parameters Reset Li 1, Reset Li 2, Reset Li 3 and Reset Li 4, provided that the manual or acknowledge reset mode was selected. In order to reset a limit value, "Reset" must be entered in the corresponding parameter. However, resetting in the manual mode is only possible if the monitored reference value is within the limits Li Min. and Li Max.

5.2.1 Display of the limit value crossing

Following activation of the limit value parameters 930/940/950/960 , "Service" clearance level, the display shows Li1, Li2, Li3, Li4 depending on which limit value has just been activated.

Crossing the limit value in either direction is shown as follows:

- Li 1 ↑ means limit value 1 has been crossed upwards
- Li 2 ↓ means limit value 2 has been crossed downwards

5.2.2 Calling up limit value settings

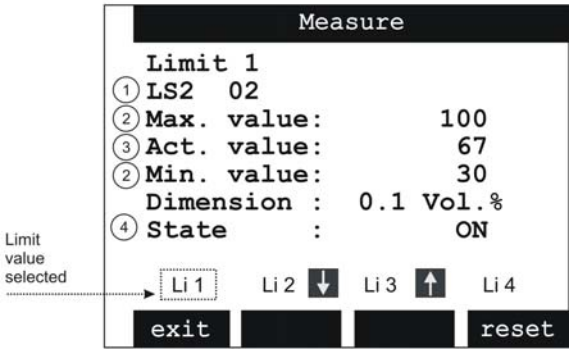
- Press the "diag" (Diagnostics) key value settings
  Use the cursor keys to select the appropriate limit value

The selected limit value is highlighted by a frame

Li 1 ↑ Li 2 ↓ Li 3 Li 4

Limit value selected

- Press the ENTER key
  The limit value's current setting appears on the display, see illustration.



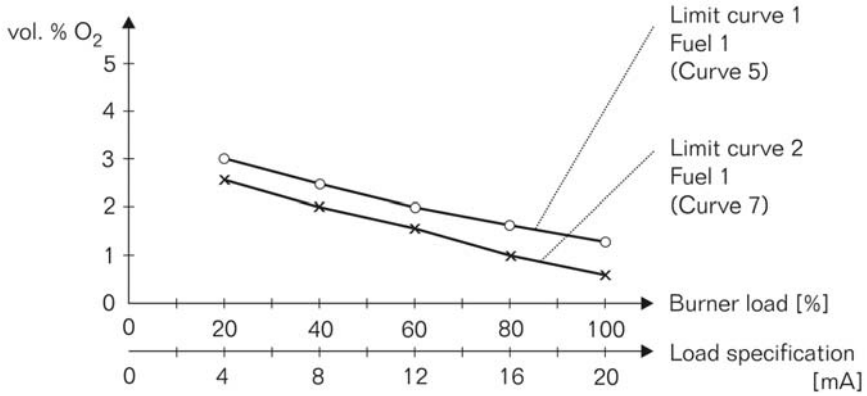
1. Limit value 1 is parameterised for the measured O_2 value
2. Switching points: Upward crossing 10.0 vol.% O_2
   Downward crossing 3.0 vol.% O_2
3. Currently measured O_2 value 6.7 Vol.% O_2
4. Limit value not set. Possible states:

- Set → Limit value was triggered
- Off → Measured value in acceptable range
- Acknowloedged → Limit value crossing has already been acknowledged

5.3 Load-dependent limit curves, fuel-specific limit values (option 657R0920)

Load-dependent limit curves,

The load value (burner load) or some other measured value is switched on via analogue input 4. Instead of fixed limit values, fuel-specific curves of 2 to a maximum of 8 checkpoints can be entered.



Limit curves (factory setting), with parameters set for crossing the lower threshold.

Possible combinations:

Either

- 2 fuels à 4 limit curves / limit values per fuel

or

- 4 fuels à 2 limit curves / limit values per fuel

5.3.1 2 fuels à 4 limit curves / limit values per fuel

Limit values 1 to 4 are used (Li 1 ... Li 4)

Allocation of limit curves / limit values

Curve	Function	Fuel	Calculated analogue value
5	LiC1/Li1	1	9
6	LiC1/Li1	2	9
7	LiC2/Li2	1	10
8	LiC2/Li2	2	10
9	LiC3/Li3	1	11
10	LiC3/Li3	2	11
11	LiC4/Li4	1	12
12	LiC4/Li4	2	12

LiC = limit curve

Li = limit value

NOTE:
The analogue values indicated in the table are parameterized in such a way that they calculate the monitoring threshold for the indicated limit value in dependence of the fuel and the burner load. If the load-dependent limit values are to be activated again e.g. for limit value 2, after meanwhile constant limit values were adjusted, parameter 942 (“reference value min.”) must be adjusted to the calculated analogue value 10, shown above in the table. In place of monitoring an under-usage and monitoring of an excess is wished, instead of parameter 942 parameter 941 must be adjusted (comparison value max) to the calculated analogue value.

5.3.2 4 fuels à 2 limit curves / limit values per fuel

Limit values 1 and 3 are used (Li 1 and Li 3)

Allocation of limit curves / limit values

Curve	Function	Fuel	Calculated analogue value
5	LiC1/Li1	1	9
6	LiC1/Li1	2	9
7	LiC2/Li2	3	9
8	LiC2/Li2	4	9
9	LiC3/Li3	1	11
10	LiC3/Li3	2	11
11	LiC4/Li4	3	11
12	LiC4/Li4	4	11

LiC = limit curve

Li = limit value

5.3.3 Parameter setup (factory settings)

5.3.3.1 Analogue input 4

Par. 602: "Analogue input 4"
Par. 603: "Curve 4"
Par. 604: 3,9 mA
Par. 605: 20,1 mA
Par. 606: "Off"
Par. 607: "Off"

Display of the load value via configurable measured value 6

Par. 800: "Calc. Analogue value 4"
Par. 801: "Burner load"
Par. 809 : "%"
Par. 812: "XXXX"
Par. 813: "0,4s"

Conversion 4...20 mA ^ 0...100% for load specification (burner load) via curve 4, as follows:

Parameter		Value
2150	X1	4000 [4 mA]
2151	Y1	20 [20 %]
2152	X2	20000 [20 mA]
2153	Y2	100 [100%]

5.3.3.2 Limit curves / Limit values

Parameter setup for the 4 limit curves takes place via the analogue calculations 9 to 12.

ATTENTION!
Fuel selection "Par. 836 Digital inputs" must be switched on.

Limit curve 1	Analogue calc. 9: Par. 652: "Calculates analogue val. 4" Par. 653: "Curve 5" Par. 654: "Off" Par. 657: "Curve +BS" (at manufacturing level)
Limit curve 2	Analogue calc. 10: Par. 662: "Calculates analogue val. 4" Par. 663: "Curve 7" Par. 664: "Off" Par. 667: "Curve +BS" (at manufacturing level)
Limit curve 3	Analogue calc. 11: Par. 672: "Calculates analogue val. 4" Par. 673: "Curve 9" Par. 674: "Off" Par. 677: "Curve +BS" (at manufacturing level)
Limit curve 4	Analogue calc. 12: Par. 682: "Calculates analogue val. 4" Par. 683: "Curve 11" Par. 684: "Off" Par. 687: "Curve +BS" (at manufacturing level)

If, instead of the limit curves, fixed limit values are to be specified, then parameters 930, 931, 940, 941, 950, 952, 960, 961 should be adjusted accordingly, see 4.1.1.2 and 4.1.1.3.

The following settings are made at the factory:

Limit value 1 / limit curve 1
Par. 930: "O_2 measured value" or some other measured value to be monitored
Par. 931: "Off" (upper limit value)
Par. 932: "Calc. analogue value 9"
Par. 935: Resetting mode "Automatic"
Par. 936: Triggering delay to 0 seconds

Limit value 2 / limit curve 2
Par. 940: "O_2 measured value" or some other measured value to be monitored
Par. 941: "Off" (upper limit value)
Par. 942: "Calc. analogue value 10"
Par. 945: Resetting mode "Automatic"
Par. 946: Triggering delay to 0 seconds

Limit value 3 / limit curve 3
Par. 950: "O_2 measured value" or some other measured value to be monitored
Par. 951: "Off" (upper limit value)
Par. 952: "Calc. analogue value 11"
Par. 955: "Automatic" resetting mode
Par. 956: Triggering delay to 0 seconds

Limit value 4 / limit curve 4
Par. 960: "O_2 measured value" or some other measured value to be monitored
Par. 961: "Off" (upper limit value)
Par. 962: "Calc. analogue value 12"
Par. 965: Resetting mode "Automatic"
Par. 966: Triggering delay to 60 seconds

NOTE:
If the limit value 4 / limit curve 4 should not be needed, it is recommended to re-parameterize these for the monitoring of the Lambda probe LS 2 on air value < -5 mV = ≥.16 % volume O_2.
For this the following parameter configuration has to be set:
Par.960: “LS2-voltage”
Par.961: “off“
Par.962: “constant value“
Par.964: -50 = -5 mV
Par. 965: “automatic“
Par. 966: Release delay 1 second

5.3.4 Input of limit values / limit curves

See also tables in 4.3.1 and 4.3.2

Factory settings - Direct triggering in the event of falling below these values after a delay of 0 seconds

Limit curve 1 / Fuel 1

x1 --- x5 Burner load

y1 --- y5 O_2 limit values (curves)

Max. 8 curve-points possible

Distribution can be freely chosen!

Parameter		Value
2200	X1	20 [20 %]
2201	Y1	30 [3.0 % O_2]
2202	X2	40 [40 %]
2203	Y2	25 [2.5 % O_2]
2204	X3	60 [60 %]
2205	Y3	20 [2,0 % O_2]
2206	X4	80 [80 %]
2207	Y4	18 [1,8 % O_2]
2208	X5	100 [100 %]
2209	Y5	15 [1,5 % O_2]

Limit value curve 2 / Fuel 1

Parameter		Value
2300	X1	20 [20 %]
2301	Y1	25 [2.5 % O_2]
2302	X2	40 [40 %]
2303	Y2	20 [20 % O_2]
2304	X3	60 [60 %]
2305	Y3	15 [1.5 % O_2]
2306	X4	80 [80 %]
2307	Y4	10 [1.0 % O_2]
2308	X5	100 [100 %]
2309	Y5	5 [0.5 % O_2]

6 Digital outputs (relays)

6.1 Digital outputs for the control of the relay-modules

Up to 7 digital outputs can be freely configured in the LT 2 Lambda Transmitter. The same parameters are available for the configuration of each digital output. These are:

- Idle state (see 5.1)
- Four functions that trigger a switching procedure; the four functions are OR-ed (see 5.2)
- Display of the current relay position (see 5.3)

Factory assignment of the digital outputs

Output 1 → Collecting faults
Output 2 → Warning / maintenance
Output 3 → Measurement
Output 4 → limit value 1
Output 5 → limit value 2
Output 6 → limit value 3
Output 7 → limit value 4

6.2 Idle state

This is where the idle state is set. This state is present if none of the four functions triggers a switching procedure. The setting Diagnostic operation allows the idle state to be changed via the parameter Position (see below).

Parameters: 1030/1040/1050/1060

- LOW (open circuit principle)
- HIGH (closed circuit principle)
- Diagnostic operation

6.3 Function A,B,C,D

Parameters: 1031 to 1034
1041 to 1044
1051 to 1054
1061 to 1064

The four functions are structured almost identically; an operational state can serve as a switching criterion. If a Limit value (Li 1-4) is selected as a switching criterion, the output switches if the limit value's output is set. Maintenance is chosen as a switching criterion, the output is not in the idle state during maintenance.

Each function (A, B, C, D) can have all operational states as the switching criterion; however, the allocation of limit values Li 1-4 and/or test gases is restricted to individual functions. **Limit value 1** and **Test gas 1** are only possible with **Function A**, analogously **Limit value 2** and **Test gas 2** with **Function B** etc. However, all combinations can be set by OR-ing the four functions.

The following operational states can be selected as switching criteria:

- Off
- Warning
- Fault
- Calibration
- Checking
- Cold start
- Measurement
- Standby
- Maintenance
- Limit values 1 – 4
- Probe 1
- No measurement

6.4 Position

Parameters:
1039/1049/1059/1069

This parameter indicates the current switching state. Manual switching of the output is possible by changing the parameter via diagnostic operation.

7 Digital inputs

8 digital inputs can be configured for the LT 2 Lambda Transmitter. The inputs switch position according to the applied voltage: **High** (applied voltage 24 V) or **Low** (input open or voltage 0 V).

Depending on this position, the LT 2 transmitter can carry out certain actions. All 8 digital inputs are identical with regard to structure and functionality. The inputs' configuration is controlled by the following parameters:

Factory assignment of the digital inputs

- Input 1 → Reset warning / fault
- Input 2 → Reset limit value message
- Input 3 → Offset calibration
- Input 4 → Not configured
- Input 5 → Not configured
- Input 6 → (1) Fuel 2 (gas)
- Input 7 → (1) Fuel 3
- Input 8 → (1) Fuel 4

(1) Parameter 836 Service level must be set to “Digital inputs” .

If no signal preset → Heating oil EL.

7.1 Idle state

Parameters:
1170/1180/1190/1200/
1210/1220/1230/1240

This is where the digital inputs idle state is set. If the position differs from that set here, the actions specified by the functions (A, B, C, D) is carried out. If **Diagnostic** operation is set here, the functions (A, B, C, D) can be triggered for the appropriate digital input via the parameter **Position**.

- LOW (open circuit principle)
- HIGH (closed circuit principle)
- Diagnostic operation

7.2 Function A,B,C,D

The four functions are structured almost identically. However, the allocation of limit values Li 1-4 and/or fuels is restricted to the individual functions

(A, B, C, D). Resetting of limit value 1 and Fuel 1 are only possible with function A; analogously, resetting of limit value 2 and test gas 2 only with function B, and so on.

The following actions are possible:

- None
- Offset calibration — triggers an offset calibration
- Fault rese — acknowledges present faults
- Warning reset — acknowledges present warnings
- Reset Li 1 — (function A) resets limit value 1; functions B, C, D reset limit values 2, 3, 4
- Fuel 1 — (only function A) selects fuel 1; functions B, C, D select fuels 2, 3, 4
- Probe 1 — (only function A) selects probe 1; functions B, C, D select probes 2, 3, 4
- No cal. — calibration locked
- PID control unit on / off — provided the PID control unit option is activated, this function allows the PID control unit to be turned off.
- Maintenance — triggers the device to maintenance
- Deactivate — limit value x (see chapter 5.2)

7.3 Status

Parameters:
1175/1185/1195/1205/
1215/1225/1235/1245

This parameter indicates the digital input's state.

The three possible states are inactive (idle state) and active; the set functions (A, B, C, D) are triggered.

The digital input's state can be set manually with this parameter, provided the parameter Idle level is set to Diagnostic operation.

8 Appendix

8.1 Parameters associated with digital inputs

Parameter group digital input 1, 2, 3		
Parameter number	**Description**	**Access**
1170, 1180, 1190, …	Idle level, digital input 1, 2, 3,… (0 = low, 1 = high, 2 = Diagnostic operation)	variable
1171, 1181, 1191,… 1172, 1182, 1192, … 1173, 1183, 1193,… 1174, 1184, 1194,…	Function A, B, C, D of digital input 1, 2, 3, 4 0 = None 1 = Offset calibration 2 = Testgas cal. 3 = Faults reset 4 = Warning reset 5 = Probe 1/ 2/ 3 /4 6 = Reset Li1 / Li2 / Li3 / Li4 7 = Fuel 1 / 2 / 3 / 4 8 = No calibration (blocked) 9 = PID control unit off 10 = maintenance 11 = deactivate Li1/Li2/Li3/Li4	variable
1175, 1185, 1195,…	State of digital input 1,2,3,... (0=Off, 1=Active)	variable

8.2 Parameters associated with limit values

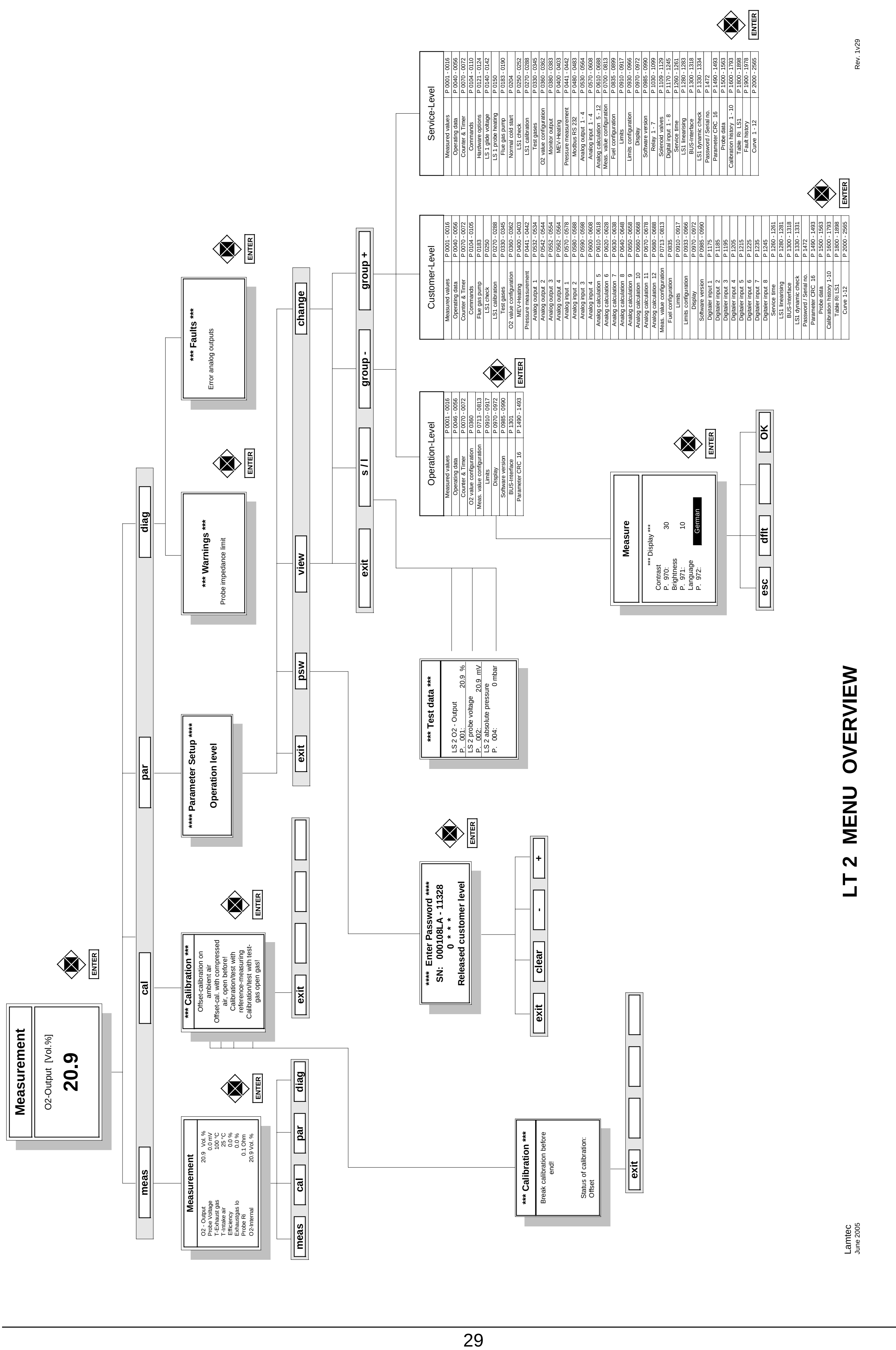
Parameter number	Description	Access
910	Display of state of limit value 1, 0 = Off, 1 = Active	read only
911	Display of state of limit value 2, 0 = Off, 1 = Active	read only
912	Display of state of limit value 3, 0 = Off, 1 = Active	read only
913	Display of state of limit value 4, 0 = Off, 1 = Active	read only
914	Manual reset of limit value 1, set to 1 for resetting	variable
915	Manual reset of limit value 2, set to 1 for resetting	variable
916	Manual reset of limit value 3, set to 1 for resetting	variable
917	Manual reset of limit value 4, set to 1 for resetting	variable
	Parameter group limit value configuration	
Parameter number	**Description**	**Access**
930 (940, 950, 960)	Selection of the monitored quantity for limit value 1 (2, 3, 4) 0 = None, 1 = O_2 value, 2...7 = configurable measured value 1 [sic].7, 8 = LS1 temperature, 9 = LS1 pressure, 10 = LS1 current, 11 = LS1 voltage	variable
931 (941, 951, 961)	Form for comparison value Max with Li 1 (2, 3, 4) 0 = Off, 1 = Const. value, 2...13 = Calculated analogue value 1...12	variable
932 (942, 952, 962)	Form for comparison value Min with Li 1 (2, 3, 4) 0 = Off, 1 = Const. value, 2...13 = Calculated analogue value 1...12	variable
933 (943, 953, 963)	Constants for comparison value Max with Li 1 (2, 3, 4) (only with 931, 941, 951, 961 = fixed value) variable	variable
934 (944, 954, 964)	Constants for comparison value Min with Li 1 (2, 3, 4) (only with 932, 942, 952, 962 = fixed value) variable	variable
935 (945, 955, 965)	Reset mode for limit value 1 (2, 3, 4) 0 = Automatic, 1 = Manual, 2 = Acknowledge	variable
936 (946, 956, 966)	Triggering delay for limit value 1, 2, 3, 4 (in sec)	variable
967	Operational mode deactivate limit value	variable

8.3 Parameters associated with digital outputs

Parameter group digital output 1 (2, 3, …, 7)			
Parameter number	**Description**	**Clearance for**	**Access**
1030, 1040, 1050,…	Idle level 0 = Down, 1 = Up, 2 = Diagnostic operation	Service	variable
1031, 1041, 1051,…	Function A 0 = Off, 1 = Warning, 2 = Fault, 3 = Calibration, 4 = Check, 5 = Cold start, 6 = Measurement, 7 = Standby, 8 = Maintenance, 9 = Li 1, 10 = Probe 1,2,3,4, 11 = No measurement	Service	variable
1032, 1042, 1052,…	Function B As function A, but 9 = Li 2, 10 = Probe 2	Service	variable
1033, 1043, 1053,…	Function C As function A, but 9=Li 3, 10=Probe 3	Service	variable
1034, 1044, 1054,…	Function D As function A, but 9=Li 4, 10=Probe 4	Service	variable
1039, 1049, 1059,…	Actual position (changeable in diagnostic mode) 0 = secede, 1 = tightened	Service	variable

8.4 Parameter groups

Test datas	from par 1	Relay 1	from par 1030
Operational data	from par 40	Relay 2	from par 1040
Counters and times	from par 70	Relay 3	from par 1050
Commands	from par 108	Relay 4	from par 1060
Hardware options	from par 120	Relay 5	from par 1070
LS2 Calibration data	from par 140	Relay 6	from par 1080
LS2 Probe heating	from par 180	Relay 7	from par 1090
Probe selection	from par 200	Digital input 1	from par 1170
LS2 Monitoring	from par 210	Digital input 2	from par 1180
Probe heating Ri supervision	from par 220	Digital input 3	from par 1190
Cold start	from par 230	Digital input 4	from par 1200
LS2 Calibration	from par 270	Digital input 5	from par 1210
O_2 meas.value config.	from par 360	Digital input 6	from par 1220
COe meas.value config.	from par 370	Digital input 7	from par 1230
Monitor output	from par 380	Digital input 8	from par 1240
Reference air	from par 390	Service times	from par 1260
Absolute pressure	from par 410	Bus interface	from par 1300
Pressure compensation	from par 420	LS2 Dynamic monitoring	from par 1330
Temperature compensation	from par 450	PID Control unit	from par 1350
Modbus RS232	from par 480	PID Control unit config.	from par 1361
Analogue output 1	from par 530	PID Control unit status	from par 1380
Analogue output 2	from par 540	Password/serial no.	from par 1472
Analogue output 3	from par 550	Parameter CRC 16	from par 1490
Analogue output 4	from par 560	Probe data	from par 1500
Analogue input 1	from par 570	Faults history	from par 1900
Analogue input 2	from par 580	Curve 1	from par 2000
Analogue input 3	from par 590	Curve 2	from par 2050
Analogue input 4	from par 600	Curve 3	from par 2100
Analogue calculation 5	from par 610	Curve 4	from par 2150
Analogue calculation 6	from par 620	Curve 5	from par 2200
Analogue calculation 7	from par 630	Curve 6	from par 2250
Analogue calculation 8	from par 640	Curve 7	from par 2300
Analogue calculation 9	from par 650	Curve 8	from par 2350
Analogue calculation 10	from par 660	Curve 9	from par 2400
Analogue calculation 11	from par 670	Curve 10	from par 2450
Analogue calculation 12	from par 680	Curve 11	from par 2500
Measured value config.	from par 700	Curve 12	from par 2550
Fuel config.	from par 835	CO-curve	from par 3600
Limit values	from par 910	Temperature statistic	from par 3750
Limit value config.	from par 930	LAMTEC SYSTEM BUS	from par 3800
Display	from par 970		
Software version	from par 985		


LT 2 MENU OVERVIEW
Measurement
O2-Output [Vol.%]
20.9
meas
cal
par
diag
*** Calibration ***
Offset-calibration on ambient air
Offset-cal. with compressed air, open before!
Calibration/test with reference-measuring
Calibration/test with test-gas open gas!
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**** Parameter Setup ****
Operation level
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view
change
*** Warnings ***
Probe impedance limit
*** Faults ***
Error analog outputs
*** Calibration ***
Break calibration before end!
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group +
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Customer-Level
Service-Level
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*** Display ***
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Rev. 1v29
Lamtec
June 2005

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Überreicht durch:

Druckschrift-Nr.: D LT 6060.05 aE - 0021
Printed in Germany