LME73.000Ax + PME73.831AxBC LME73.831AxBC



Service instruction manual

M12921CB Rel.1.2 02/2016

GENERAL FEATURES

LME/ is suitable for gas, light and heavy oil burners

LME7 series has two devices: <u>LME73.000</u> (hardware) and <u>PME73.831AxBC</u> (programmable unit). The <u>LME73.831AxBC</u> is also available: it has a built in software and it is a not programmable.

LME7 is inside the control panel. If supplied, PME73.831BC is inside the LME7;

The display AZL23.. or AZL21.. is available for Service and hardware setup.

LME7... are used for the startup and supervision of 2-stage/progressive, modulating forced draft gas burners in intermittent operation.

The flame is supervised with an ionization probe, optionally with UV flame detector QRA2..., QRA4.U or QRA10.... Integrated in the LME7... basic unit are:

- Burner control
- BCI
- Control for one actuator
- Lockout reset button (info button)
- 3 multicolor signal lamp LED for operations and fault notifications
- 3 x 7-segment display for service, fault and operating state information
- Interface for program module (no function)

Passwords protect the different parameter levels against unauthorized access. Basic settings that the plant operator can make on site require no password.

Functions:

- Undervoltage detection
- Electrical remote reset facility
- Accurate control times thanks to digital signal handling
- Multicolor indication of fault status and operating state messages
- Air pressure supervision with function check of air pressure switch during start and operation (gas)
- Repetition limitation
- Controlled intermittent operation after 24 hours of continuous operation*
- BCI
- Indication of program sequence



* after no more than 24 hours of continuous operation, the burner control initiates automatic controlled shutdown followed by a restart.

User interface :



A	Button A - Display preset output - In lockout position: Power value to the time of fault
^{≜nfo}	I <i>nfo and Enter button</i> - Reset in the event of fault, changeover visual diagnostic of the cause of fault (refer to chapter Diagnostics of cause of fault)
·	 button Display flame signal current 2 or phases display In lockout position: MMI phase to the time of fault
+	 + button - Display flame signal current 1 or phases display - In lockout position: MMI phase to the time of fault
\bigcirc	3 multicolor signal lamp - Refer to chapter "Blink code table"
· · ·	+ and - button: Escape function (press + and - simultaneously) - No adoption of value - One menu level up - Keen depressed for >1second for backup / restore function

First startup when PME is supplied or PME replacement:

First startup:

1) insert a new PME

2) turn the power on; The diplay shows "rst" and "PrC" one after the other.

3) keep pushing the INFO button more than 3 seconds; "run" appears; PME parameters will be transferred to LME 4) at the end, "End" and "rst" appears one after the other; Later (2'), the control box locks out "Loc 138"

5) reset the control box by pressing the INFO is button (for less than 3 seconds) Now the display shows "OFF"; the burner is ready to be started.

Replacement:

- 1) Turn off the burner, replace the existing PME with a new one
- 2) For the first startup, repeat the above procedure, from step 2.

List of phase display on board LME :

Phase number of 7-segment display	LED	Function
Standby		
OFF	Off	Standby, waiting for heat demand
P08	Off	Mains ON / test phase (e.g. detector test)
Startup		
P21	Yellow	Safety valve ON, air pressure switch test / POC test (timeout / locking
P22	Yellow	Fan motor ON / air pressure switch test / settling time
P24	Yellow	Actuator opens in prepurging position
P30	Yellow	Prepurging
P36	Yellow	Actuator closes in ignition load / low-fire position
P38	Yellow blinking	Preignition time
P40	Yellow blinking	1st safety time (TSA1) / ignition transformer ON
P42	Green	Safety time (ignition transformer OFF), flame check
P44	Green	Interval: End of safety time and fuel valve 1 (V1) ON Interval: End of safety time and load controller (LR) release
P50 Green	P50 Green	2nd safety time (TSA2)
P54 Green	P54 Green	P259.01: Actuator opens in > low-fire
P54 Green	P54 Green	P260: Actuator closes in low-fire
oP1 Green	oP1 Green	Interval until release of load controller target (analog or 3-position step input)
Operation		
oP	Green	Operation, modulating operation
Shutdown		
P10	Yellow	Shutdown, actuator opens in CLOSE position (home run)
P72	Yellow	Actuator opens in high-fire position / end of operation
P74	Yellow	Postpurging
Valve proving		
P80	Yellow	Test space evacuating
P81	Yellow	Checking time fuel valve 1
P82	Yellow	Test space filling
P83	Yellow	Checking time fuel valve 2
Waiting phases (start	prevention)	
P01	Red / yellow blinking	Undervoltage
P02	Yellow	Safety loop open
P04	Red / green blinking	Extraneous light on burner startup (timeout / locking after 30 s)
P90	Yellow	Pressure switch-min open
Lockout		
LOC	Red	Lockout phase

Operation:

[≜] info ↓	The lockout reset button (info button) (EK) is the key operating element for resetting the burner control and for activating / deactivating the diagnostics functions.
Red Vellow Green LED	The multicolor signal lamp (LED) is the key indicating element for visual diagnostics.

Both lockout reset button (EK) and signal lamp (LED) are located in the control panel. There are 2 diagnostics choices:

1. Visual diagnostics: Indication of operating state or diagnostics of cause of fault

2. Diagnostics: Via internal display or to AZL2.. display and operating unit

Visual diagnostics:

In normal operation, the different operating states are indicated in the form of color codes according to the color code table given below.

Color code table for multicolor signal lamp (LED) :

State	Color code	Color
Waiting time (tw), other waiting states	О	OFF
Ignition phase, ignition controlled	$\bullet \bigcirc \bullet \bigcirc$	Blinking yellow
Operation, flame o.k.	0	Green
Operation, flame not o.k.		Blinking green
Extraneous light on burner startup		Green-red
Undervoltage		Yellow-red
Fault, alarm	▲	Red
Error code output (refer to «Error code table»)	$\bigcirc \land \bigcirc \land$	Blinking red
Interface diagnostics		Red flicker light
Heating request	•	Yellow
Heating request		Yellow

Key

	Steady on
0	Led off
A	Led red
•	Led yellow
	Led green

Program sequence :

Version 1:

- Ignition load < low-fire
 Prepurging in high-fire
 Parameter 515 = 1 (condition parameter 259.01 > 0 seconds)

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Program sequence :

Version 2:

- Ignition load > low-fire
 Prepurging in high-fire
 Parameter 515 = 1 (condition parameter 259.01 = 0 seconds)

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Phase	Function
LOC	Lockout phase
OFF	Standby, waiting for heat demand
oP	Operation, modulating operation
oP1	Interval until release of load controller target (analog or 3-position step input)
01	Under voltage
02	Safety loop open
04	Extraneous light on burner startup (timeout/locking after 30 seconds)
08	Mains ON/test phase (e.g. detector test)
10	Shutdown, actuator opens in CLOSE position (homerun)
21	Safety valve ON, air pressure switch OFF, actuator opens in CLOSE position
22	Part 1: Fan motor ON
	Part 2: Specified time (t10) air pressure switch (LP)
	Message (timeout) stabilization air pressure switch
24	Actuator opens in prepurge position
30	Part 1: Prepurge time (t1) without extraneous light test
	Valve proving after mains ON, lockout
	Part 2: Prepurge time (t1) with extraneous light test
36	Actuator closes in ignition load
38	Preignition (t3)
40	Postignition time (t3n), parameter 257 + 0.3 seconds
42	Flame detection
44	Interval (t4): End of safety time (TSA) and burner valve 2 ON
50	2nd safety time (t9)
54	Parameter 259.01: Actuator opens in > low-fire
	Parameter 260: Actuator closes in low-fire
72	End of operation, checking if valve proving (LT) shall be performed
74	Postpurging (t8)
80	Test space evacuation (td4)
81	Test time (td1) fuel valve 1 (V1)
82	Test space filling (td3)
83	Test time (td2) fuel valve 2 (V2)
90	Pressure switch-min open safety shutdown
*1	Valve proving is conducted when
	- parameter 241.00 = 1 and parameter 241.02 = 1, or
	- parameter 241.00 = 1 and parameter 241.01 = 0
*2	Valve proving is conducted when
	- parameter 241.00 = 1 and parameter 241.02 = 1, or
	- parameter 241.00 = 1 and parameter 241.01 = 1
*3	Valve proving (LT) will not be performed

Error code table :

Red blink code of fault signal lamp (LED)	Possible cause
2 x blinks	No establishment of flame at the end of the safety time (TSA)
	- Faulty or soiled flame detector
	- Faulty or soiled fuel valves
	- Poor adjustment of burner, no fuel
	- Faulty ignition equipment
3 x blinks	Air pressure switch (LP) faulty
	 Loss of air pressure after specified time (t10)
	 - Air pressure switch (LP) welded in no-load position
4 x blinks	Extraneous light on burner startup
5 x blinks	Time supervision air pressure switch (LP)
	- Air pressure switch (LP) welded in working position
6 x blinks	Actuator position not reached
	- Actuator faulty
	- Wrong adjustment of cam
	- Actuator defective or blocked
	- False connection
	- Misadjustment
7 x blinks	Too many losses of flame during operation (limitation of repetitions)
	- Faulty or soiled flame detector
	- Faulty or soiled fuel valves
	- Poor adjustment of burner
8 x blinks	Free
9 x blinks	Free
10 x blinks	Wiring error or internal error, output contacts, other faults
12 x blinks	Valve proving (LT)
	- Fuel valve 1 (V1) leaking
13 x blinks	Valve proving (LT)
	- Fuel valve 2 (V2) leaking
14 x blinks	Error in connection with valve closure control POC
15 x blinks	Error code ≥15
	Error code 22: Error of safety loop (SL)

During the time the cause of fault is diagnosed, the control outputs are deactivated: - Burner remains shut down

- External fault indication (AL) at terminal X2-03, pin 3 steady on Diagnostics of cause of fault is quit and the burner switched on again by resetting the burner control. Press the lockout reset button (info button) for about 1 second (<3 seconds).

Flame detection – detection electrode :

Short-circuit current	Max. AC 1 mA
Required detector current	Min. DC 2 µA, display approx. 45 %
Possible detector current	Max. DC 3 µA, display approx. 100 %
Permissible length of detector cable (laid separately)	30 m (core-earth 100 pF/m)

Measuring circuit



Keys

C	-	Electrolytic condenser 100470 µF; DC 1025 V
ION	-	Ionization probe
Μ	-	Microammeter Ri max. 5,000 Ω

Flame detection – UV probe :

Threshold values when flame is supervised by QRA...

- Start prevention (extraneous light)	Intensity (parameter 954) approx. 12 %
- Operation	Intensity (Parameter 954) approx. 13 %
Operating voltage	AC 280 V ±15 %
Mains frequency	5060 Hz ±6 %
Required detector current	Min. 70 μA
Possible detector current	
- Operation	Max. 700 μA
Perm. length of detector cable	
- Normal cable, laid separately 1)	Max. 100 m

¹) Multicore cable not permitted



Keys

-		
А	-	Exposure to light

- C Electrolytic condenser 100...470 µF; DC 10...25 V
- M Microammeter Ri max. 5,000 Ω

Warning!

Input QRA... is not short-circuit-proof!

Short-circuits of X10-06/2 against earth can destroy the QRA... input

Simultaneous operation of flame detector QRA... and detection electrode is not permitted

To make certain the age of the UV tube can be determined, the LME7... basic unit must always be connected to mains supply.

Gas proving system :

Valve proving is dependent on input valve proving ON / OFF (X2-02). When a leak is detected, the gas valve proving function ensures that the gas valves will not be opened and that ignition will not be switched on. Lockout will be initiated.

Valve proving with separate pressure switch (P LT)

Step 1: td4 – Evacuation of test space

Gas valve on the burner side is opened to bring the test space to atmospheric pressure.

Step 2: td1 – Test atmospheric pressure

When the gas has closed, the gas pressure in the test space must not exceed a certain level.

Step 3: td3 Filling of test space

Gas valve on the mains side opens to fill the test space.

Step 4: td2 - Test gas pressure

When the gas valve has closed, the gas pressure in the test space must not drop below a certain level.



Controllo tenuta con pressostati separati

Keys

td1 Test atmospheric pressure

td2 Test gas pressure

td3 Filling of test space

td4 Evacuation of test space

V... Fuel valve

PLT Pressure switch valve proving Input / output signal 1 (ON)

Input / output signal 0 (OFF)

Input permissible signal 1 (ON) or 0 (OFF)

No.	Parameter
242	Valve proving evacuation of test space
243	Valve proving time test atmospheric pressure
244	Valve proving filling of test space
245	Valve proving time test gas pressure

Instruction, control and modify via AZL2x :

The AZL2x.. display/programming unit is shown below:



The keys functions are the following:

	Key F + A While pressing the two keys contemporarly, the code message will appear: by entering the proper password it is possible to access the Service mode.
lnfo	Info and Enter keys Used for Info and Service menues Used as Enter key in the setting modes Used as Reset key in the burner operation mode Used to enter a lower level menu
	Key - Used for one menu level down Used to decrease a value
+	Key + Used for one menu level up Used to increase a a value
- +	Keys (+ & -)= ESC By pressing + and - at the same time, the ESCAPE function is performed No adoption of value One menu level down

The display will show these data:



While pushing the $\frac{2}{3}$ nfo button together with whatever else button, LME73 locks out; the display shows Ρ ñ \bigtriangleup ٧ h 8 min % ñ On stand-by position, appears h ¥ \triangle ν min s %



On operation, all the phases appears with their number.

List of phase with display AZL2x :

Phase number	Function
Standby	
OFF	Standby, waiting for heat request
Ph08	Power ON / test phase (e.g. detector test)
Startup	
Ph21	Safety valve ON, air pressure switch test / POC test (timeout / locking after 5
	seconds), actuator opens in low-fire position / CLOSE position
Ph22	Fan motor ON or air pressure switch test / settling time
Ph24	Actuator travels to the prepurge position
Ph30	Prepurging
Ph36	Actuator closes until ignition load / low-fire is reached, and parameter 259.02:
	Actuator opens to a position > ignition load
Ph38	Preignition
Ph40	1st safety time (TSA1) / ignition transformer ON
Ph42	Safety time (ignition transformer OFF), flame check
Ph44	Interval: End of safety time and fuel valve 1 (V1) ON
Ph50	2nd safety time (TSA2)
Ph54	P259.01: Actuator opens in > low-fire
Ph54	P260: Actuator closes in low-fire
oP1	Interval until release of load controller target (analog or 3-position step input)
Operation	
oP	Operation, modulating operation
Shutdown	
Ph10	Shutdown, actuator opens in CLOSE position (home run)
Ph72	Actuator opens in high-fire position / end of operation
Ph74	Postpurging
Valve proving	
Ph80	Test space evacuating
Ph81	Checking time fuel valve 1
Ph82	Test space filling
Ph83	Checking time fuel valve 2
Waiting phases	
(start prevention)	
Ph01	Undervoltage
Ph02	Safety loop open
Ph04	Extraneous light at burner startup (timeout / locking after 30 seconds)
Ph90	Pressure switch-min open \rightarrow safety shutdown
Lockout	
LOC	Lockout phase

Error code list with operation via internal AZL :

Error code	Clear text	Possible cause
Loc 2	No establishment of flame at the	- Faulty or soiled fuel valves
	end of the safety time (TSA)	- Faulty or soiled flame detector
		- Poor adjustment of burner, no fuel
		- Faulty ignition equipment
Loc 3	Air pressure faulty (air pressure	Air pressure switch (LP) faulty
	switch (LP) welded in no-load	- Loss of air pressure signal after specified time (t10)
	position, decrease to spe-cified time	- Air pressure switch (LP) is welded in no-load
	(t10) (air pressure switch (LP) re-	position
	sponse time)	
Loc 4	Extraneous light	Extraneous light when burner startup
Loc 5	Air pressure faulty, air pressure	Time out air pressure switch (LP)
	switch wel-ded in working position	- Air pressure switch (LP) is welded in working
		position
Loc 6	Fault of actuator	- Actuator faulty or blocked
		- Faulty connection
LOC /	Loss of flame	I do many losses of flame during operation (limitation
		of repetitions)
		- Faulty of solied fuel valves
		- Faulty of solied liame delector
		Free
	 Error not rolatable (application)	Wiring error or internal error output contacts, other
	internal error	foulte
Loc 12	Valve proving	
	Valve proving	Fuel value 2 ($\sqrt{2}$) leak
	Safety loop open	- Gas pressure switch-max open
		- Safety limit thermostat cut out
Loc 138	Restore process successful	
Loc 167	Manual locking	Manual locking
		Lise the latest version
LUC. 200		USE LIE IDLEST VEISION

Entering the Parameter levels:

y means of a proper use of the keys, it is possible to enter the various level parameters, as shown in the following flow chart :



Info level :



appears. Use + or - for scrolling the parameter list. If on the right side a dash-dot appears, it means the display doesn't show the

full description. Push $\frac{1}{2}$ nfo again for 1 to 3 s in order to show the full description.

Below the visible Info parameters:

Parameter	Parameter list	Edit	Value range		Resolution	Factory	Password	Password level
number	LME73.831AxBC		Min.	Max.		Setting	reading from level	writing from level
100	General							
102	Identification date	Read only					Info	
103	Identification number	Read only	0	9999	1		Info	
113	Burner identification	Read only	х	XXXXXXXX	1		Info	
164	Numbers of startups resettable	Resettable	0	999999	1		Info	Info
166	Total number of startups	Read only	0	999999	1		Info	
170.00	Switching cycles actuator relay K12	Read only	0	999999	1		Info	
170.01	Switching cycles actuator relay K11	Read only	0	999999	1		Info	
170.02	Switching cycles actuator relay K2	Read only	0	999999	1		Info	
170.03	Switching cycles actuator relay K1	Read only	0	999999	1		Info	
171	Max. switching cycles actuator relay	Read only	0	999999	1		Info	

Service level :



full description. Push $\frac{2}{3}$ nfo again for 1 to 3 s in order to show the full description.

Below the visible Info parameters:

Parameter	Parameter list Edit Value range		range	Resolution	Factory	Password	Password	
number	PME73.000Ax + PME73.831AxBC LME73.831AxBC		Min.	Max.		setting	level reading from	level writing from
							level	level
700	Error history							
701	Current error:	Read only					Service	
	00: Error code		2	255	1			
	01: Startup meter reading		0	999999	1			
	02: MMI phase							
	03: Power value		0%	100%	1			
702	Error history former 1:	Read only					Service	
	00: Error code		2	255	1			
	01: Startup meter reading		0	999999	1			
	02: MMI phase							
	03: Power value		0%	100%	1			
•								
•								
•								
711	Error history former 10:	Read only					Service	
	00: Error code		2	255	1			
	01: Startup meter reading		0	999999	1			
	02: MMI phase							
	03: Power value		0%	100%	1			

900	Process data	-	-	-	-	-	-	
936	Normalized speed	Read only	0%	100%	0.01 %		Service	
951	Mains voltage	Read only	0 V	LME73.000A1: 175 V LME73.000A2: 350 V	1 V		Service	
954	Flame intensity	Read only	0%	100%	1%		Service	

Parameter level (Heating engeneering) :

This level lets the engineer to modify some burner parameters. It is protect with a 4 digit password (SO level) and a 5 digit password (OEM level)

Password input : push **F** and **A** buttons together until the display shows "**code**" and 7 underlines. The left one flashes. By + or - move the flashing underline until it is on the desired position and push "enter". The underline becomes a dash. By means of + or -, choose the right character and push "enter". Input the whole password and the **PArA** appears and later on **000 Int**.

Scroll the parameters using + or -: 000Int, 100, 200, 500, 600 are on the display. Choose the proper parameter group with the enter button and scroll the options with + e poi - (below the full par set: the two columns on the right give the level access). Choose the parameter to be modified with "enter" is writing is allowed. The parameter now flashes: + or - modifies the parameter and enter confirms. + and - pushed togther movbe the menu one step back. Push + and - several times in order to get the home position..

Parameter	Parameter list Edit Value range		Resolution	Factory	Password	Password		
number	LME73.831AxBC		Min.	Max.		setting	reading from level	writing from level
0	Internal parameter							
41	Heating engineers password (4 characters)	Edit	XXXX	XXXX				OEM
42	OEM's password (5 characters)	Edit	XXXXX	XXXXX				OEM
60	Backup / restore	Edit	Restore	Backup				SO
100	General		-			-	-	
123	Min. power control step	Edit	1%	10%	0.1		SO	SO
140	Mode display of Display and operating unit AZL2	Edit	1	4	4		SO	SO
	1 = Standard (program phase)							
	2 = Flame 1 (QRA / ION)							
	3 = Flame 2 (QRB / QRC)							
	4 = Active power (power value)							
200	Burner control							
224	Specified time (t10) air pressure switch (LP)	Edit	0 s	13.818 s	0.294 s	12,054	SO	OEM
225	Gas: Prepurge time (t1)	Edit	0 s	1237 s	4.851 s	29,106	SO	OEM
226	Gas: Preignition time (t3)	Edit	1.029 s	37.485 s	0.147 s	2,058	SO	OEM
230	Interval (t4): End of safety time (TSA) - fuel valve 1 (V1) ON	Edit	3.234 s	74.97 s	0.294 s	3,234	SO	OEM
231	Interval (t9): Fuel valve 1 (V1) ON - pilot valve (PV) OFF	Edit	0 s	74.97 s	0.294 s	2,940	SO	OEM
232	Interval (t5): Pilot valve (PV) OFF - load controller (LR) release	Edit	2.058 s	74.97 s	0.294 s	8.820	SO	OEM
234	Gas: Postpurge time (t8)	Edit	0 s	1237 s	4.851 s	0	SO	OEM
239	Gas: Intermittent operation after 24 hours of continuous operation	Edit	0	1	1	1	SO	OEM
	0=OFF							
	1=ON							

240	Repetition in the event of loss of flame during operation	Edit	(2	1	0	SO	OEM
	0 = None							
	1 = None							
	2 = 1 x Repetition							
241.00	Valve proving	Edit	() 1	1	1	SO	OEM
	0 = Off							
	1 = On							
241.01	Valve proving	Edit	() 1	1	0	SO	OEM
	0 = During prepurge time (t1)							
	1 = During postpurge time (t8)							
241.02	Valve proving	Edit	() 1	1	0	SO	OEM
	0 = According to P241.01							
	1 = During prepurge time (t1) and postpurge time (t8)							
242	Valve proving test space evacuating	Edit	0 s	2.648 s	0.147 s	2,646	SO	OEM
243	Valve proving time test atmospheric pressure	Edit	1.029 s	37.485 s	0.147 s	10,290	SO	OEM
244	Valve proving test space filling	Edit	0 s	2.648 s	0.147 s	2,646	SO	OEM
245	Valve proving time test gas pressure	Edit	1.029 s	37.485 s	0.147 s	10,290	SO	OEM
254	Response time detector error	Edit	() 1	1	0	SO	OEM
	0 = 1 s							
	1 = 3 s							
257	Gas: Postignition time (t3n – 0.3 seconds)	Edit	0 s	13.23 s	0.147 s	2,205	SO	OEM
259.00	Opening time of actuator (t11) (timeout for lockout)	Edit	0 s	1237 s	4.851 s	67,914	SO	OEM
259.01	Opening time of actuator from ignition load to low-fire position	Edit	0 s	37.485 s	0.147 s	14,994	SO	OEM
259.02	Opening time of actuator from low-fire to ignition load position	Edit	0 s	37.485 s	0.147 s	14,994		
260	Closing time of actuator (t12) (timeout for lockout)	Edit	0 s	1237 s	4.851 s	67,914	SO	OEM
500	Ratio control			•			<u>-</u>	<u> </u>
515	Actuator position during prepurge time (t1) and postpurge time (t8)	Edit	() 1	1	1	SO	OEM
	0: Purging in low-fire							
	1: Purging in high-fire							
560	Pneumatic combustion control	Edit	() 2	1	1	SO	SO
	0 = off / 3-step modulation							
	1 = PWM fan / analog modulation							
	2 = air damper / analog modulation (feedback potentiometer ASZxx.3x							
	required)			_ _	<u> </u>		<u> </u>	L
							-	

600	Power setting							
654	Analog input (feedback potentiometer ASZxx.3x required)	Edit	0	5	1	0	SO	SO
	0 = 3-position step input							
	1 = 010 V							
	2 = 0135 Ω							
	3 = 020 mA							
	4 = 420 mA with lockout at I <4 mA							
	5 = 420 mA							

WARNING							
Parameter Num. : 41 42 60 123 140 242 243 244 245 259.01	Adjustable parameters from SO or OEM levels for LME73.831AxBC						

Note: Specifications and data subject to change. Errors and omissions excepted.