



Presentation example PME7



Presentation example LME7

PME71.901Ax

Program module for burner control LME71.000Ax

User Documentation

Application:

- Modulating, direct ignited forced draft burners
- Integrated PWM fan motor control via 3-position controller or analog signal for burners with pneumatic ratio control
- Integrated valve proving (can be parameterized)
- E.g. for burners to EN 676

The PME7 and this User Documentation are intended for use by OEMs which integrate the LME7 and PME7 in their products.



Note!

This documentation is only valid together with LME7 Basic Documentation (P7105)!

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1 Supplementary documentation

Product type	Type of documentation	Documentation number
LME	Environmental Product Declaration	E7105 *)
PME	Environmental Product Declaration	E7105.1 *)
LME7	Data Sheet	N7105
LME	Product Range Overview	Q7101
LME7	Basic Documentation	P7105

*) On request



Note

This document only refers to the product type – not the *product designation*. See the table below for details.

Product type	Product designation
ACS410	PC software
AZL2	Display and operating unit
ION	Ionization probe
LME7	Burner control
QRA	UV flame detector
QRB	Photo resistive detector
QRC	Blue-flame detector
PME7	Program module

2 Warning notes



Warning!

The safety, warning and technical notes given in the Basic Documentation on the LME7 (P7105) apply fully to the present document also!

To avoid injury to persons, damage to property or the environment, the following warning notes must be observed!

The LME7 are safety devices! Do not open, interfere with or modify the unit. Siemens does not assume responsibility for damage resulting from unauthorized interference!

When the fan operates on permanent phase, it must be ensured that there is a safe electrical separation between mains voltage and PWM/Hall input/output. If not observed, there is a risk that safety functions will be impaired and that a risk of electric shock will exist



Warning!

On the OEM access level of the LME7, it is possible to make parameter settings that differ from application standards. When setting the parameters, it is important to ensure that the application will run safely in accordance with legal requirements. Failure to observe this information poses a risk of damaging the safety functions.



Warning!

Risk of damage to the switching contacts!

If the external primary fuse (Si) is blown due to overload or short-circuit at the terminals, the LME7 must be replaced.

3 Typographical conventions

3.1 Safety notes

This User Documentation contains notes which must be observed to ensure your personal safety and to protect the product and the connected equipment. The instructions and notes are highlighted by warning triangles or a hand symbol and are presented as follows, depending on the hazard level:



Warning means that death, severe personal injury or substantial damage to property **can** occur if adequate precautionary measures are not taken



Note draws your attention to **important information** on the product, on product handling, or to a special part of the documentation

3.2 Qualified personnel

Only **qualified staff** are allowed to install and operate the equipment. Qualified staff in the context of the safety-related notes contained in this document are persons who are authorized to commission, ground and tag devices, systems and electrical circuits in compliance with established safety practices and standards.

3.3 Correct use

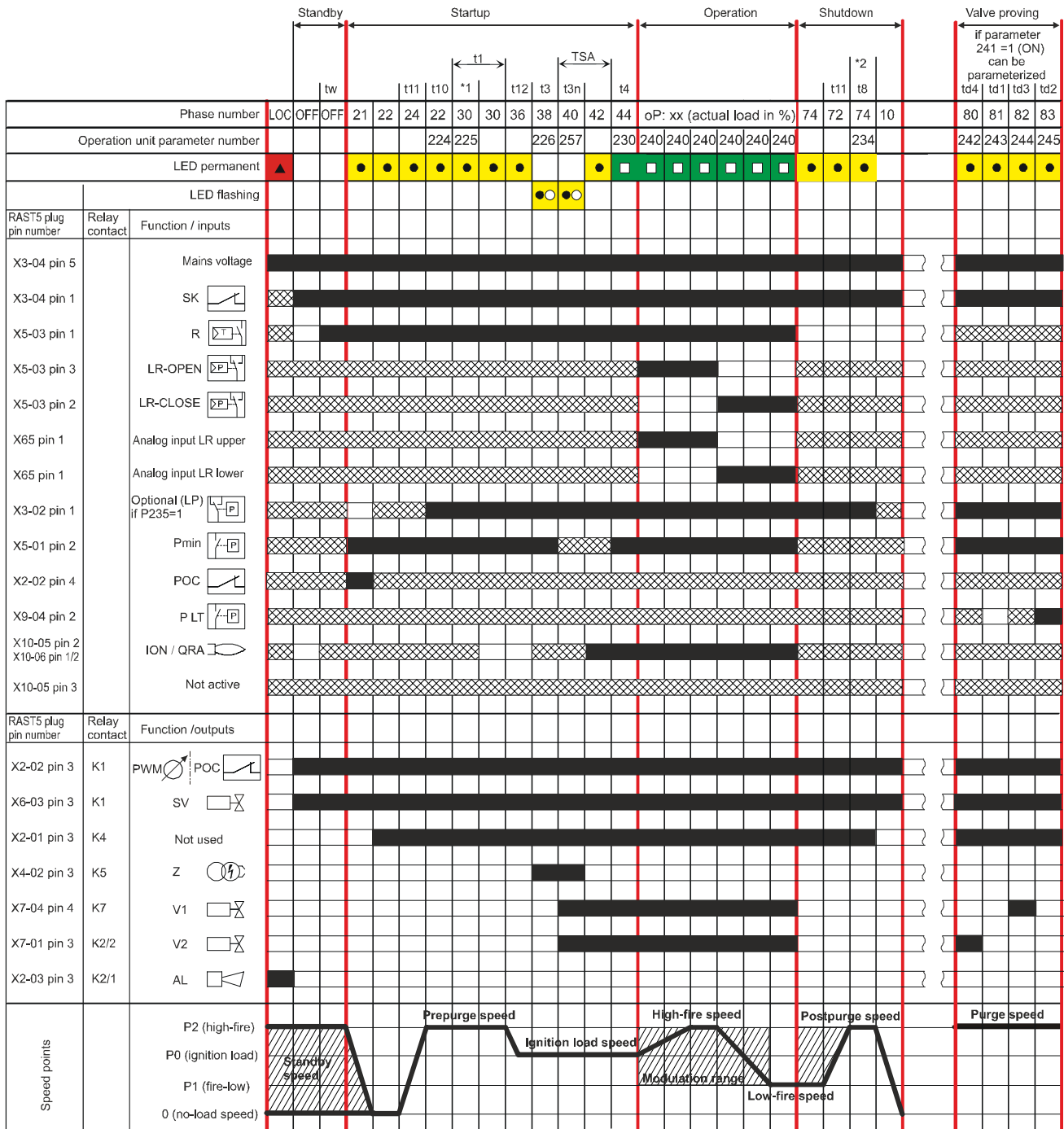
Note the following:

The device may only be used on the applications described in the technical documentation and only in connection with devices or components from other suppliers that have been approved or recommended by Siemens.

The product can only function correctly and safely if shipped, stored, set up and installed correctly, and operated and maintained as specified.

4 Program sequence PME71.901Ax

→ For fuel trains G without/with valve proving



7105d71en/0921

Figure 1: Program sequence for fuel trains G

5 List of phase display

Phase number of display		LED	Function
7-segment	AZL2		
LOC	LOC	Red	Lockout phase
Standby			
OFF	OFF	OFF	Standby, waiting for heat request
P08	Ph08	OFF	Power ON/test phase (e.g. detector test)
Startup			
P21	Ph21	Yellow	Safety valve ON, air pressure switch in no-load position Test if POC closed (timeout/lockout after 5 seconds) Fan motor speed reduced to 0
P22	Ph22	Yellow	Part 1: Fan motor ON Part 2: Specified time air pressure switch Message (timeout), stabilization air pressure switch
P24	Ph24	Yellow	Stabilization time, fan motor - prepurge speed
P30	Ph30	Yellow	Part 1: Prepurge time without extraneous light test *1 Part 2: Prepurging with extraneous light test (2.1 seconds)
P36	Ph36	Yellow	Speed stabilization time, fan motor ignition load speed
P38	Ph38	Yellow flashing	Preignition time
P40	Ph40	Yellow flashing	Postignition time
P42	Ph42	Green	Flame detection
P44	Ph44	Green	Interval: End of safety time and load controller release
Operation			
xx	oP:xx	Green	Operation (modulation), display of actual value in percent (%)
Shutdown			
P10	Ph10	OFF	Home run
P72	Ph72	Yellow	Speed stabilization time, fan motor postpurge speed
P74	Ph74	Yellow	Postpurge time *2
Valve proving			
P80	Ph80	Yellow	Test space evacuating
P81	Ph81	Yellow	Test time atmospheric pressure
P82	Ph82	Yellow	Test space filling
P83	Ph83	Yellow	Test time gas pressure
Safety shutdown phases			
P01	Ph01	Yellow / red	Under voltage / over voltage
P02	Ph02	Yellow	Safety shutdown (e.g. open safety loop) → Non-volatile lockout
P04	Ph04	Green / red	Extraneous light in standby
P90	Ph90	Yellow	Gas pressure switch-min open → safety shutdown and start prevention

*1 Valve proving during prepurging, if
 - parameter 241.00 = 1 and parameter 241.02 = 1 or
 - parameter 241.00 = 1 and parameter 241.01 = 0 or
 - parameter 234 (postpurge time) = 0 seconds

*2 Valve proving during postpurging, if
 - parameter 241.00 = 1 and parameter 241.02 = 1 or
 - parameter 241.00 = 1 and parameter 241.01 = 1 and
 - parameter 234 (postpurge time) >0 seconds

6 Fuel trains (examples)

6.1 Gas direct ignition (G), 1-stage

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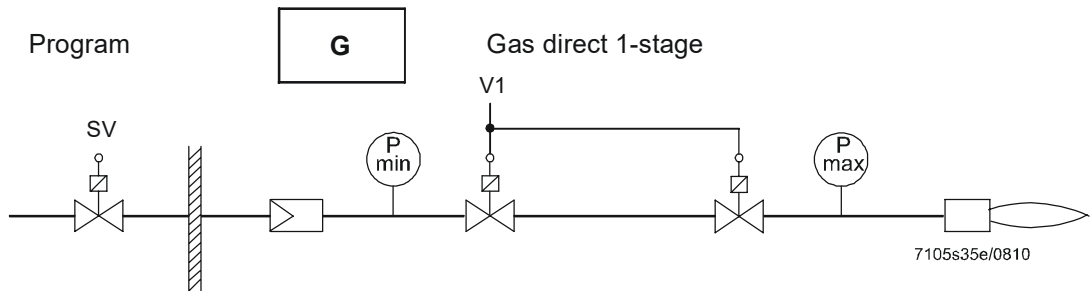
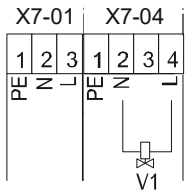


Figure 2: Fuel train gas direct ignition (G), 1-stage

6.2 Gas direct ignition (G), 1-stage, with valve proving

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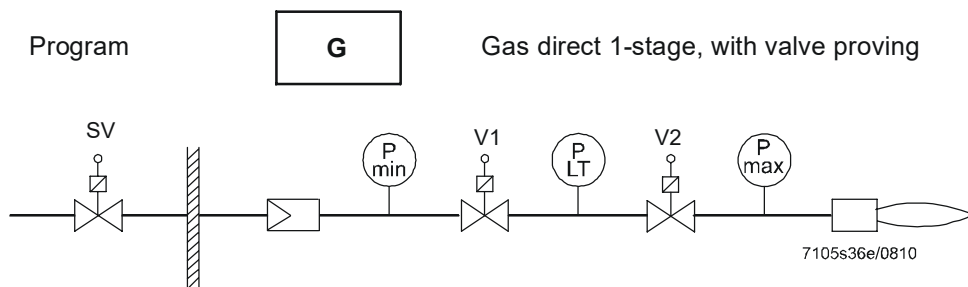
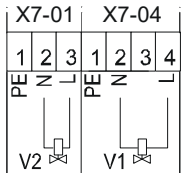


Figure 3: Fuel train gas direct ignition (G), 1-stage, with valve proving



Note:

When valve proving is activated (e.g. on shutdown), the load on the valve's terminals is restricted.

Fuel valve V1 terminal X7-04 pin 4/fuel valve V2 terminal X7-01 pin 3

- | | | |
|-----------------|---------------------|---------------------|
| • Rated voltage | AC 120 V | AC 230 V |
| | 50/60 Hz | 50/60 Hz |
| • Rated current | 1 A | 1 A |
| • Power factor | $\cos\varphi > 0.4$ | $\cos\varphi > 0.4$ |

7 Gas valve proving

Valve proving is dependent on parameter 241.

Valve proving is employed to detect leaking gas valves and, if necessary, to prevent the gas valves from opening or ignition from being switched on. A non-volatile lockout will be initiated in these cases.

Valve proving with separate pressure switch

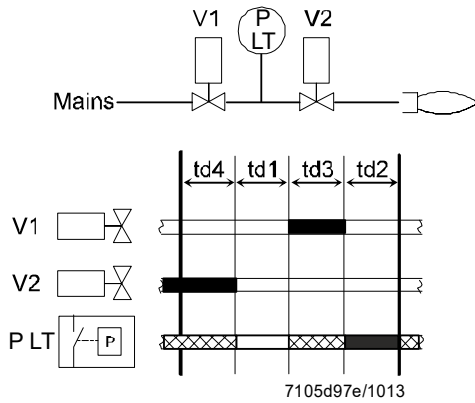


Figure 4: Valve proving with separate pressure switch

Step 1: td4 – test space evacuating

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

Step 2: td1 – Test time atmospheric pressure

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

Step 3: td3 – test space filling

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

Step 4: td2 – Test time gas pressure

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

Legend

- td1 Test time atmospheric pressure
- td2 Test time gas pressure
- td3 Test space filling
- td4 Test space evacuating
- Vx Fuel valve
- P LT Pressure switch valve proving
- Input/output signal 1 (ON)
- Input/output signal 0 (OFF)
- Permissible signal 1 (ON) or 0 (OFF)

Query logic of gas pressure switch for valve proving:

- Gas pressure present → pressure switch closed
- Gas pressure not present → pressure switch open

Valve proving can be parameterized to take place on startup, shutdown, or both.

Recommendation:

Perform valve proving on shutdown.

No.	Parameter
241.00	Valve proving 0 = OFF 1 = ON ¹⁾
242	Valve proving test space evacuating
243	Valve proving time test atmospheric pressure
244	Valve proving test space filling
245	Valve proving time test gas pressure

¹⁾ Valve proving during postpurging, if parameter 234 > 0 (postpurge time) and parameter 241.01 = 1

Program sequence with valve proving

During startup

Valve proving during startup is performed only after a reset from the lockout position, after power ON, and when parameter 234 = 0 seconds.

In that case, valve proving takes place at the same time as prepurging. This means that the prepurge time corresponds to at least the sum of all 4 valve proving parameters (242, 243, 244, 245).

During shutdown

Valve proving during shutdown is performed only if the postpurge time >0 (parameter 234 >0). If no postpurge time is parameterized, valve proving takes place during startup when prepurging. During shutdown (heat request OFF), it is checked if parameter 241 = 1 (valve proving ON) and parameter 234 ≠ 0 seconds before the fuel valves close. This means that, first, fuel valve V1 is closed. Fuel valve V2 remains open, so that the remaining gas in the test space can be burned. The postpurge time runs at the same time as valve proving. This means that the postpurge time corresponds to at least the sum of all 4 valve proving parameters (242, 243, 244, 245).

During valve proving, the prepurge speed / postpurge speed remains at the value set for parameter 503.01.



Note!

If valve proving is parameterized to take place on startup and shutdown, the gas valves must run through additional switching cycles. As a result, strain (wear) on the gas valves and the relay increases.



Warning!

The OEM must set the evacuation, filling and test times for atmospheric or mains pressure on every plant in compliance with the requirements of EN 1643. If not observed, there is a risk of impairment of safety functions.

It must be ensured that the 2 test times are correctly set. It is to be checked whether the gas required for the test may be fed into the combustion chamber (on the relevant application). The test times are safety-related. After a reset and in the case of aborted or prevented valve proving, the LME7 will perform valve proving the next time it is started up (only when valve proving is activated). In the case of valve proving, prepurging is active during the startup phase, even if it has been deactivated.

Examples of aborted valve proving:

When the safety loop or the start release input for gas (containing pressure switch-min) opens during valve proving.

Valve proving – calculation of leakage rate

$$t_{\text{Test}} = \frac{(P_G - P_W) \cdot V \cdot 3600}{P_{\text{atm}} \cdot Q_{\text{Leak}}}$$

Q_{Leak}	in l/h	Leakage rate in liters per hour
P_G	in mbar	Overpressure between the fuel valves at the beginning of the test phase
P_W	in mbar	Overpressure set on the pressure switch (normally 50% of the gas inlet pressure)
P_{atm}	in mbar	Absolute air pressure (1013 mbar normal pressure)
V	in l	Volume between the fuel valves (test volume) including valve volume and pilot path if present
t_{Test}	in s	Test time

8 Input gas pressure switch-min

Behavior in the event gas pressure switch-min fails (terminal X5-01 pin 2 and 3) If gas pressure switch-min fails, safety shutdown is triggered and startup prevented until gas pressure switch-min closes again. During start prevention, the yellow LED is lit and the safety circuit is active. LME7 operates in phase 90.

9 Time table and settings

Type	Times in seconds														
PME71.901Ax	tw	TSA max.	t1 P225 4) min.	t3 P226 min.	t3n P257 approx.	t4 P230 min.	t8 P234 5) min.	t10 P224 approx.	t11 approx.	t12 approx.	1)	2)	3)	td1 P243 td2 P245 min.	td3 P244 td4 P242 max.
Requirements	2.5	3	20	3	2.5	15	4	15	60	60	---	---	---	10	3
Factory setting	---	t3n+0.45	19.404+2.1	3.087	2.205+0.3	15.582	4.851	13.818	58.212	58.212	---	---	---	10.29	2.646
Max.	2.5	15	1237+2.1	37.485	13.23+0.3	74.97	1237	13.818	---	---	1	0.45	0.45	37.485	2.646
Min.	---	---	0+2.1	1.029	0+0.3	3.234	0	0	---	---	0.3	0.3	---	1.029	0
Step size	---	---	4.851	0.147	0.147	0.294	4.851	0.294	---	---	---	---	---	0.147	0.147

Parameter number	Function	Factory setting
235	Air pressure switch input 0 = inactive 1 = active	0
240.00	Restart in the event of loss of flame during operation <2: None 2: 1 x restart	0
240.01	Restart in the event of no flame at the end of safety time <2: None 2: 1 x restart 3: 2 x restart 4: 3 x restart	0
241.00	Valve proving 0: OFF 1: ON	0
241.01	Valve proving 0: During prepurge time 1: During postpurge time	1
241.02	Valve proving 0: According to parameter 241.01 1: During prepurge time and postpurge time	0

Legend

- tw Waiting time
- TSA Safety time
- t1 Prepurge time
- t3 Preignition time
- t3n Postignition time parameter 257 +0.3 seconds
- t4 Interval: End of safety time - load controller release
- t8 Postpurge time
- t10 Specified time air pressure switch message (timeout)
- t11 Maximum time to reach the prepurge or postpurge speed
- t12 Maximum time to reach the ignition load speed

- td1 Test time atmospheric pressure
- td2 Test time gas pressure
- td3 Test space filling
- td4 Test space evacuating

- 1) Reaction time to a change of signal by the air pressure switch contact (opens) and flame-out response time in the event of loss of flame
- 2) Reaction time to a change of signal by the inputs (e.g. pressure switch-min)
- 3) Flame detection time
- 4) Minimum time td1 + td2 + td3 + td4 if: parameter 241.00 = 1 (ON), after power ON, with a non-volatile lockout, parameter 234 (postpurge time) = 0 (postpurging) or parameter 241.01 = 0
- 5) Minimum time td1 + td2 + td3 + td4 if: Parameter 241.00 = 1 (ON) and parameter 234 (postpurge time) >0 (postpurging) and parameter 241.01 = 1

10 Inputs and outputs / internal connection diagram

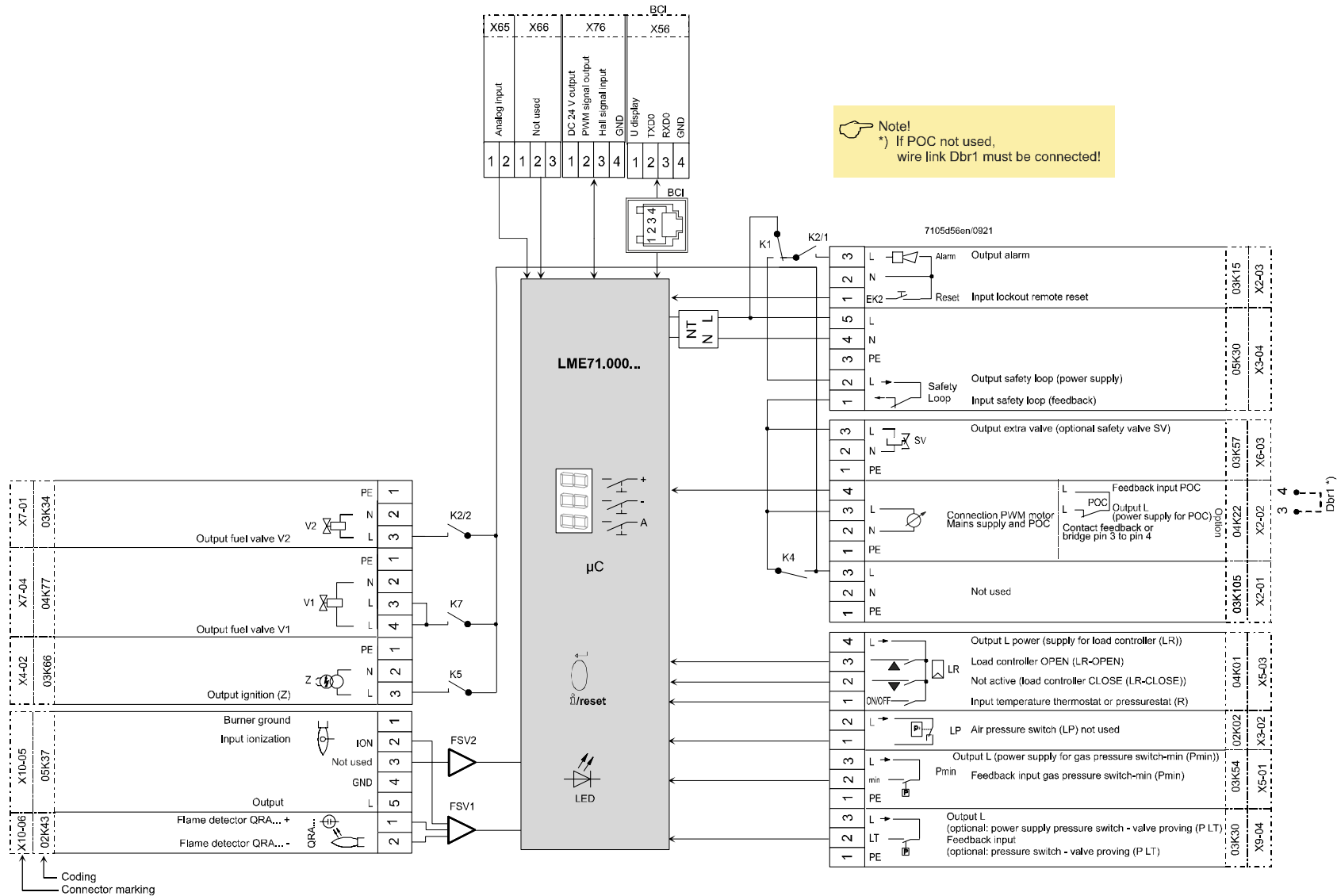


Figure 5: Inputs and outputs / internal connection diagram

11 Parameter list (AZL2)

Abbreviations for password level:

HF	Heating engineer
OEM	Manufacturer of the original product

Parameter number	Parameter	Edit	Value range		Increment	Factory setting	Password level reading from level	Password level writing from level
			Min.	Max.				
000	Internal parameter							
41	Heating engineer (HF) 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							
102	Identification date	Read only	---	---	---	---	Info	---
103	Identification number	Read only	0	9999	1	0	Info	---
113	Burner identification	AZL2: Readable ACS410: Selectable	0	99999999	1	-----	Info	OEM via ACS410
120	Type PME7	Read only	xxxxx.xxxxx	xxxxx.xxxxx	---	PME71.901Ax	Only via ACS410	---
123	Minimum load positioning step	Edit	1%	10%	0.1	2	SO	SO
140	Mode display for the 7-segment display 1 = standard (program phase) 2 = flame 1 (QRA/ION) 3 = flame 2 (QRB/QRC) ⇒ not used 4 = active power (power value)	Edit	1	4	1	4	SO	SO
164	Number of startups resettable	Resettable	0	999999	1	0	Info	Info
166	Total number of startups	Read only	0	999999	1	0	Info	---
170.00	Switching cycles relay contact K12 ⇒ not active	Read only	0	99999999	1	0	Info	---
170.01	Switching cycles relay contact K11 ⇒ not active	Read only	0	99999999	1	0	Info	---
170.02	Switching cycles relay contact K2	Read only	0	99999999	1	0	Info	---
170.03	Switching cycles relay contact K1	Read only	0	99999999	1	0	Info	---
171	Signaling of "Switching cycle exceeded" for one of the relay contact counters (parameters 170.00 to 170.03) → not active	Read only	0	99999999	1	1000000	Info	---

Parameter number	Parameter	Edit	Value range		Increment	Factory setting	Password level reading from level	Password level writing from level
			Min.	Max.				
200	Burner control LME7							
224	Special time air pressure switch	Edit	0 s	13.818 s	0.294 s	13.818 s	SO	OEM
225	Prepurge time (+2.1 seconds)	Edit	0 s	1237 s	4.851 s	19.404 s	SO	OEM
226	Preignition time	Edit	1.029 s	37.485 s	0.147 s	3.087 s	SO	OEM
230	Interval (t4): End of safety time - load controller release	Edit	3.234 s	74.97 s	0.294 s	15.582 s	SO	OEM
234	Postpurge time	Edit	0 s	1237 s	4.851 s	4.851 s	SO	OEM
235	Air pressure switch input 0 = inactive 1 = active	Edit	0	1	1	0	SO	OEM
240.00	Restart in the event of loss of flame during operation <2: None 2: 1 x restart	Edit	0	2	1	0	SO	OEM
240.01	Restart in the event of no flame at the end of safety time <2: None 2: 1 x restart 3: 2 x restart 4: 3 x restart	Edit	0	4	1	0	SO	OEM
241.00	Valve proving 0: OFF 1: ON	Edit	0	1	1	0	SO	OEM
241.01	Valve proving 0: During prepurge time 1: During postpurge time	Edit	0	1	1	1	SO	OEM
241.02	Valve proving 0: According to parameter 241.01 1: During prepurge time and postpurge time	Edit	0	1	1	0	SO	OEM
242	Valve proving - Test space evacuating	Edit	0 s	2.648 s	0.147 s	2.648 s	SO	OEM
243	Valve proving - Test time atmospheric pressure	Edit	1.029 s	37.485 s	0.147 s	10.290 s	SO	OEM
244	Valve proving - Test space filling	Edit	0 s	2.648 s	0.147 s	2.648 s	SO	OEM
245	Valve proving - Test time gas pressure	Edit	1.029 s	37.485 s	0.147 s	10.290 s	SO	OEM
257	Postignition time +0.3 seconds	Edit	0 s	13.23 s	0.147 s	2.205 s	SO	OEM

Parameter number	Parameter	Edit	Value range		Increment	Factory setting	Password level reading from level	Password level writing from level
			Min.	Max.				
400	Ratio control (operation)							
403.00	Fan speed: Ignition load speed (P0)	Edit	Parameter 516.00	Parameter 516.01	10 U/min	1600 U/min	SO	SO
403.01	Fan speed: Low-fire speed (P1)	Edit	Parameter 517.00	Parameter 517.01	10 U/min	1500 U/min	SO	SO
403.02	Fan speed high-fire speed (P2)	Edit	Parameter 518.00	Parameter 518.01	10 U/min	4800 U/min	SO	SO
500	Ratio control							
503.00	No-flame speeds PWM fan: Standby speed	Edit	0 U/min	9000 U/min	10 U/min	0 U/min	SO	SO
503.01	No-flame speeds PWM fan: Prepurge speed / postpurge speed	Edit	800 U/min	9000 U/min	10 U/min	5700 U/min	SO	SO
516.00	Speed limit ignition load P0: Minimum limit	Edit	800 U/min	9000 U/min	10 U/min	800 U/min	SO	OEM
516.01	Speed limit ignition load P0: Maximum limit	Edit	800 U/min	9000 U/min	10 U/min	9000 U/min	SO	OEM
517.00	Speed limit low-fire P1: Minimum limit	Edit	400 U/min	9000 U/min	10 U/min	400 U/min	SO	OEM
517.01	Speed limit low-fire P1: Maximum limit	Edit	800 U/min	9000 U/min	10 U/min	9000 U/min	SO	OEM
518.00	Speed limit high-fire P2: Minimum limit	Edit	800 U/min	9000 U/min	10 U/min	800 U/min	SO	OEM
518.01	Speed limit high-fire P2: Maximum limit	Edit	800 U/min	9000 U/min	10 U/min	9000 U/min	SO	OEM
519	Maximum fan speed	Edit	3000 U/min	9000 U/min	10 U/min	5830 U/min	SO	OEM
522	Ramp-up low-fire → high-fire	Edit	2.058 s	74.970 s	0.294 s	14.994 s	SO	OEM
523	Ramp-down high-fire → low-fire	Edit	2.058 s	74.970 s	0.294 s	14.994 s	SO	OEM
558	Mode: UDS status information 0 = PC tool mode 1 = PWM mode 2 = actuator mode 3 = internally 4 = internally 5 = internally	Read only	0	5	1	0	SO	---
559	PWM mode 0 = Control 1 = PID control 2 = safety mode (PWM limits)	Edit	0	2	1	1	SO	OEM
560	Pneumatic ratio control 0 = OFF / 3-position modulation 1 = PWM fan / analog modulation 2 = air damper / analog modulation (feedback potentiometer ASZxx.3x required)	Read only	0	2	1	1	SO	---

Parameter number	Parameter	Edit	Value range		Increment	Factory setting	Password level reading from level	Password level writing from level
			Min.	Max.				
600	Power setting							
644	Number of pulses per revolution	Edit	2	5	1	3	SO	OEM
646	Settling time for assessment of speed	Edit	1.029 s	2.058 s	0.147 s	2.058 s	SO	OEM
650.00	Speed tolerance band: Speed shutdown	Edit	1%	5%	1%	1%	SO	OEM
650.01	Speed tolerance band: Quick speed shutdown	Edit	1%	10%	1%	3%	SO	OEM
654	Analog input 0 = 3-position step input 1 = 0...10 V 2 = 0...135 Ω 3 = 0...20 mA 4 = 4 to 20 mA with a non-volatile lockout at I < 4 mA 5 = 4...20 mA	Edit	0	5	1	1	SO	SO
658.00	PWM values fan: Start PWM	Edit	1%	100%	1%	25%	SO	OEM
658.01	PWM values fan: Min. PWM operating range	Edit	0%	20%	1%	0%	SO	OEM
658.02	PWM values fan: Max. PWM operating range	Edit	80%	100%	1%	100%	SO	OEM
659.00	Ramp time of fan: Min. low-fire to high-fire	Read only	0 s	74.970 s	0.294 s	2.058 s	SO	---
659.01	Ramp time of fan: Max. low-fire to high-fire	Read only	0 s	74.970 s	0.294 s	74.970 s	SO	---
659.02	Ramp time of fan: Min. high-fire to low-fire	Read only	0 s	74.970 s	0.294 s	2.058 s	SO	---
659.03	Ramp time of fan: Max. high-fire to low-fire	Read only	0 s	74.970 s	0.294 s	74.970 s	SO	---
660	Tolerance time speed deviation	Read only	0 s	37.485 s	0.147 s	4.998 s	SO	---
674	Neutral band (permitted control offset)	Edit	0 U/min	255 U/min	1 U/min	40 U/min	SO	OEM
675.00	PWM: Min. PWM with prepurging, SEC	Edit	0%	100%	1%	86%	SO	OEM
675.01	PWM: Max. PWM with ignition load, SEC	Edit	0%	100%	1%	34%	SO	OEM
676	Gain factor speed control	Read only	0	255	1	112	SO	---
677	Integral action time speed control	Read only	0 s	37.485 s	0.147 s	0.441 s	SO	---
678	Derivative action time speed control	Read only	0 s	37.485 s	0.147 s	0 s	SO	---
679.00	Time constant Pt1 speed control: Lower speed range high-fire to low-fire	Edit	0 s	37.485 s	0.147 s	6.027 s	SO	OEM
679.01	Time constant Pt1 speed control: Medium speed range high-fire to low-fire	Edit	0 s	37.485 s	0.147 s	6.027 s	SO	OEM
679.02	Time constant Pt1 speed control: Upper speed range high-fire to low-fire	Edit	0 s	37.485 s	0.147 s	6.027 s	SO	OEM
679.03	Time constant Pt1 speed control: Total speed range low-fire to high-fire	Edit	0 s	37.485 s	0.147 s	6.027 s	SO	OEM
680.00	Speed range for Pt1 time constant: Threshold upper speed range	Edit	800 U/min	9000 U/min	10 U/min	4000 U/min	SO	OEM
680.01	Speed range for Pt1 time constant: Threshold lower speed range	Edit	800 U/min	9000 U/min	10 U/min	2000 U/min	SO	OEM

Parameter-number	Parameter	Edit	Value range		Increment	Factory setting	Password level reading from level	Password level writing from level
			Min.	Max.				
700	Error history							
701	Current error: 00: Error code 01: Startup meter reading 02: HMI phase 03: Power value	Read only	2 0 --- 0%	255 999999 --- 100%	1 1 --- 1	---	Service	---
702	Latest error in the history 00: Error code 01: Startup meter reading 02: HMI phase 03: Power value	Read only	2 0 --- 0%	255 999999 --- 100%	1 1 --- 1	---	Service	---
•								
•								
•								
711	Oldest error in the history 00: Error code 01: Startup meter reading 02: HMI phase 03: Power value	Read only	2 0 --- 0%	255 999999 --- 100%	1 1 --- 1	---	Service	---
900	Process data							
920	Current PWM signal fan	Read only	0%	100%	1%	---	Service	---
936	Normalized speed	Read only	0%	100%	1%	---	Service	---
951	Mains voltage	Read only	0 V	LME71.000A1: 175 V LME71.000A2: 350 V	1 V	---	Service	---
954	Flame intensity	Read only	0%	100%	1%	---	Service	---

12 PWM settings

12.1 Relevant parameters



Note:
Initial parameter settings (also see chapter *Initial PWM parameter settings*)!
Display depends on program.

Parameter	Meaning
P0	<p>Ignition load speed (parameter 403:[0] in ACS410): Corresponds to the ignition load speed in revolutions per minute (rpm). Prerequisite: $P0 \geq P0_{min}$ (parameter 516.00), $P0 \leq P0_{max}$ (parameter 516.01)</p> <p>Note: Step size of speed when making the setting with AZL2: 10 rpm Step size of speed when making the setting with ACS410: 1 rpm</p>
P1	<p>Low-fire speed (parameter 403:[1] in ACS410): Corresponds to the low-fire speed in revolutions per minute (rpm). Prerequisite: $P1 \geq P1_{min}$ (parameter 517.00), $P1 \leq P1_{max}$ (parameter 517.01)</p> <p>Note: Step size of speed when making the setting with AZL2: 10 rpm Step size of speed when making the setting with ACS410: 1 rpm</p>
P2	<p>High-fire speed (parameter 403:[2] in ACS410): Corresponds to the high-fire speed in revolutions per minute (rpm). Prerequisite: $P2 \geq P2_{min}$ (parameter 518.00), $P2 \leq P2_{max}$ (parameter 518.01)</p> <p>Note: Step size of speed when making the setting with AZL2: 10 rpm Step size of speed when making the setting with ACS410: 1 rpm</p>
503.00	<p>Standby speed: Corresponds to the standby speed in revolutions per minute (rpm), delivered as a PWM value in standby (OFF) or lockout position 1! This means that a connected PWM fan ensures purging at this speed in standby (OFF) or, when using a mains-powered fan, in lockout position 1 as well. In that case, compliance with the connection diagram of the PWM fan must be ensured!</p> <p>When using mains-powered fans, following must be observed:</p> <ul style="list-style-type: none"> • In terms of mains supply, the fan is no longer connected to the LME7 and, in the event of fault/lockout, will not be disconnected from mains supply • The PWM interface integrated in the fan must ensure safe electrical separation from mains (e.g. via optocoupler) • No PWM signal is delivered in lockout position 0 (Loc 10). The PWM fan does not provide purging in this lockout position <p>Note: Step size of speed when making the setting with AZL2: 10 rpm Step size of speed when making the setting with ACS410: 1 rpm</p>
503.01	<p>Prepurge speed / postpurge speed: Corresponds to the speed in revolutions per minute (rpm) used by the fan for pre- and/or postpurging and/or valve proving.</p> <p>Note: Step size of speed when making the setting with AZL2: 10 rpm Step size of speed when making the setting with ACS410: 1 rpm</p>
516.00	<p>Minimum limit speed ignition load P0: Corresponds to the minimum speed for ignition load P0 in revolutions per minute (rpm) at which the burner can still be securely ignited. Prerequisite: Parameter $516.00 \leq P0$</p> <p>Note: Step size of speed when making the setting with AZL2: 10 rpm Step size of speed when making the setting with ACS410: 1 rpm</p>

Parameter	Meaning
516.01	<p>Maximum limit speed ignition load P0: Corresponds to the maximum speed for ignition load P0 in revolutions per minute (rpm) at which the burner may still be securely ignited. Prerequisite: Parameter 516.01 \geq P0</p> <p>Note: Step size of speed when making the setting with AZL2: 10 rpm Step size of speed when making the setting with ACS410: 1 rpm</p>
517.00	<p>Minimum limit speed low-fire P1: Corresponds to the minimum speed for low-fire P1 in revolutions per minute (rpm) at which the burner still operates safely in the low-fire range. Prerequisite: Parameter 517.00 \leq P1 fan speed</p> <p>Note: Step size of speed when making the setting with AZL2: 10 rpm Step size of speed when making the setting with ACS410: 1 rpm</p>
517.01	<p>Maximum limit speed low-fire P1: Corresponds to the maximum speed for low-fire P1 in revolutions per minute (rpm) at which the burner still operates safely in the low-fire range. Prerequisite: Parameter 517.01 \geq P1</p> <p>Note: Step size of speed when making the setting with AZL2: 10 rpm Step size of speed when making the setting with ACS410: 1 rpm</p>
518.00	<p>Minimum limit speed high-fire P2: Corresponds to the minimum speed for high-fire P2 in revolutions per minute (rpm) for the burner operating in the high-fire range. Prerequisite: Parameter 518.00 \leq P2</p> <p>Note: Step size of speed when making the setting with AZL2: 10 rpm Step size of speed when making the setting with ACS410: 1 rpm</p>
518.01	<p>Maximum limit speed high-fire P2: Corresponds to the maximum speed for high-fire P2 in revolutions per minute (rpm) at which the burner may operate. Prerequisite: Parameter 518.01 \geq P2</p> <p>Note: Step size of speed when making the setting with AZL2: 10 rpm Step size of speed when making the setting with ACS410: 1 rpm</p>
519	<p>Maximum fan speed Corresponds to the maximum fan speed (see supplier's Data Sheet).</p>
644	<p>Number of pulses per revolution Corresponds to the number of (Hall signal) pulses per revolution the fan feeds back to the control (see supplier's Data Sheet).</p>
658.00	<p>Startup PWM PWM value the PWM fan needs as a minimum to start from standstill (see supplier's Data Sheet).</p>
658.01	<p>Minimum operating limit of PWM Represents the minimum limit value of PWM, which fan speed control does not cross.</p>
658.02	<p>Maximum operating limit of PWM Represents the maximum limit value of PWM, which fan speed control does not cross.</p>

12.2 PWM control parameters

Parameter	Meaning
522	Ramp-up Control parameter "Ramp time" is the preset time in seconds (s) within which the PWM signal reaches the setpoint with a positive setpoint step (0 rpm to high-fire rpm). Factory setting: Approx. 15 seconds
523	Ramp-down Control parameter "Ramp time" is the preset time in seconds (s) within which the PWM signal reaches the setpoint with a negative setpoint step (high-fire rpm to 0 rpm). Factory setting: Approx. 15 seconds
646	Settling time for assessment of speed The current speed must lie within tolerance band 1 (parameter 650.00) of the required speed for this period of time before the target speed is considered reached (speed release).
650.00	Tolerance band 1 (speed shutdown) Factory setting: 1% If the current speed leaves value range "Required speed \pm set tolerance band 1" for a period of time exceeding the time set with parameter 646 , a non-volatile lockout Loc 83 will be initiated.
650.01	Tolerance band 2 (quick speed shutdown) Factory setting: 3% If the current speed leaves value range "Required speed \pm set tolerance band 2", a non-volatile lockout Loc 83 will be initiated.
660	Tolerance time speed deviation A speed deviation outside tolerance band 1 (parameter 650.00) will be tolerated for the period of time set. If the deviation lasts longer, a non-volatile lockout Loc 83 will be initiated.
674	Neutral band Minimum speed change in revolutions per minute. Factory setting: 40 rpm Protection from speed oscillations. Only control offsets with speed changes above the setting value will be corrected (dead band).
679.00	Time constant Pt1 controller for speed control in the upper speed range high-fire to low-fire.
679.01	Time constant Pt1 controller for speed control in the medium speed range high-fire to low-fire.
679.02	Time constant Pt1 controller for speed control in the lower speed range high-fire to low-fire.
679.03	Time constant Pt1 controller for speed control in the entire speed range low-fire to high-fire.
680.00	Threshold between upper and medium speed range for control parameters 679.02 and 679.01.
680.01	Threshold between medium and lower speed range for control parameters 679.01 and 679.00.

12.3 PWM safety parameters



Note:
Also see chapter *Initial PWM parameter settings*.

Parameter	Meaning
559	PWM mode control Determines the behavior of PWM control, delivering a PWM signal proportional to the preset output (analog/3-position step input). Control: Controls the PWM speed proportional to the output preset via the analog or 3-position step input. Safety mode: Control for defining the PWM safety parameters.
675.00	Minimum PWM with prepurging, SEC Minimum PWM signal in percent for prepurging
675.01	Maximum PWM with ignition load, SEC Maximum PWM signal in percent for ignition load
920	(Current) PWM signal fan PWM signal in percent. Readable on the service level with AZL2 (press Info button for >3 seconds).

12.4 Initial PWM parameter settings

12.4.1 Initial settings of PWM basic parameters












Note:

The initial settings of the PWM basic parameters are made exclusively on the OEM level.















Prerequisite

- AZL2 for setting the parameters is connected
- LME7 is wired up in accordance with the proposed application
- Mains voltage present
- Safety loop closed
- Heat request OFF, LME7 in standby (OFF)
- Fan parameters, such as maximum speed and Hall signal (pulses per revolution) are known
- With unprogrammed PME7 (initial settings), AZL2 displays **OFF UPr**
- With unprogrammed PME7 (initial settings), the internal operating panel of the LME7 displays **UPr**





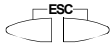




Operating steps

- Select programming mode for the OEM
- Press  and  for <5 seconds simultaneously.
Display shows **CodE**
- Enter the password for the OEM via , , and .
Also refer to the *Entering the password* chapter in the LME7 Basic Documentation (P7105).
- Display briefly switches from **PArA** to **400: SEt**
- Press 
- Display: Parameter group **500: PArA**, **500** flashes
- Press  for >1 second
- Use  or  to select parameter **519**

Parameters	Function
519	Maximum fan speed

- Press  for >1 second
- Pressing  or  can adjust the speed in increments of 10 rpm. Set the maximum speed for the connected fan here (also refer to the fan manufacturer's data sheet)
- Press  for >1 second. The setting value is transferred to the internal memory
- Press  +  1x (press  and  simultaneously)
- Display: Parameter **519** flashes
- Press  +  1x (press  and  simultaneously)
- Display: Parameter group **500** flashes
- Press  and select parameter group **600**
- Display: Parameter group **600** flashes
- Press  for >1 second
- Display: Parameter **644** flashes

Parameters	Function
644	Pulses per revolution

- Press  for >1 second
- Pressing  or  allows the number of (Hall signal) pulses per revolution that the fan feeds back to the control to be set (refer to the fan manufacturer's data sheet)
- Press  for >1 second. The setting value is transferred to the internal memory
- Press  +  1x (press  and  simultaneously)
- Display: Parameter **644** flashes
- Press  and select parameter **658**
- Parameter **658** flashes

Parameters	Function
658.00	Startup PWM



Note!
It is not normally necessary to set the parameter!


- Press for >1 second
- Subindex **00** flashes
- Press for >1 second
- Pressing or can set the PWM values that the PWM fan in use requires as a minimum to start from a standstill (refer to the fan manufacturer's data sheet)
- Press for >1 second. The setting value is transferred to the internal memory
- Press 1x (press and simultaneously)
- Subindex **00** flashes
- Press to select the next subindex
- Subindex **01** flashes










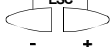











Parameters	Function
658.01	Minimum operating limit of the PWM




Note!
It is not normally necessary to set the parameter!

- Press for >1 second
- Pressing or can set the minimum limit value of the PWM that the fan speed control must not fall below (refer to the fan manufacturer's data sheet)
- Press for >1 second. The setting value is transferred to the internal memory
- Press 1x (press and simultaneously)
- Subindex **01** flashes
- Press and select subindex **02**
- Subindex **02** flashes

Parameters	Function
658.02	Maximum operating limit of the PWM
	Note! It is not normally necessary to set the parameter!


- Press /reset for >1 second
- Pressing  or  can set the maximum limit value of the PWM that the fan speed control must not exceed (refer to the fan manufacturer's data sheet)
- Press /reset for >1 second. The setting value is transferred to the internal memory
- Press  -  +  1x (press  and  simultaneously)
- Subindex **02** flashes
- Press  -  +  1x (press  and  simultaneously)
- Display: Parameter **658** flashes
- Press  -  +  1x (press  and  simultaneously)
- Display: Parameter group **600: PArA, 600** flashes
- Press  -
- Display: Parameter group **500: PArA, 500** flashes
- Press /reset
- Display: Parameter **503** flashes



Parameters	Function
503.00	Standby speed:
	Note! It is not normally necessary to set the parameter!

Corresponds to the standby speed in revolutions per minute (rpm), delivered as a PWM value in standby (OFF) or lockout position 1! This means that a connected PWM fan ensures purging at this speed in standby (OFF) or, when using a mains-powered fan, in lockout position 1 as well. In that case, it is essential to observe the connection diagrams for the PWM fan!




When using mains-powered fans, it is essential to observe the following:

- In terms of the mains supply, the fan is no longer connected to the LME7 and, in the event of fault/lockout, it will not be disconnected from the mains supply
- The PWM interface integrated in the fan must ensure safe electrical separation from the mains (e.g., via an optocoupler or similar)
- No PWM signal is delivered in lockout position 0 (Loc 10). The PWM fan does not provide purging in this lockout position.

 **Note!**
Speed increments when making the setting with AZL2: 10 rpm
Speed increments when making the setting with ACS410: 1 rpm

- Press  for >1 second
- Display: Subindex **00** flashes
- Press 
- Display: Subindex **01** flashes


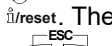








Parameters	Function
503.01	Prepurge speed / postpurge speed

- Press /reset for >1 second
- Display shows the prepurge speed. Also refer to the *Setting parameters with index, with or without direct display* chapter in the LME7 Basic Documentation (P7105).
- Pressing  or  can adjust the speed in increments of 10 rpm
- Set the required minimum prepurge speed here














Note!









Speed increments when making the setting with AZL2: 10 rpm
 Speed increments when making the setting with ACS410: 1 rpm

- Press /reset. The setting value is transferred to the internal memory
- Press  -  +  3x (press  and  simultaneously)
- Display: Parameter group **500: PArA, 500** flashes
- Press 
- Display: Parameter group **600: PArA, 600** flashes
- Press /reset
- Press  or  and select parameter **675.00**
- Display: Parameter **675** flashes

Parameters	Function
675.00	Minimum PWM in prepurging, SEC

- Press /reset for >1 second
- Display: Subindex **00** flashes
- Press /reset
- Press  or  and set the value for **LABORTESTS** to 0%
- Press /reset for >1 second. The setting value is transferred to the internal memory
- Press  -  +  1x (press  and  simultaneously)
- Display: Subindex **00** flashes
- Press 
- Display: Subindex **01** flashes

Parameters	Function
675.01	Maximum PWM in ignition load, SEC

- Press 
- Press  or  and set the value for **LABORTESTS** to 100%
- Press  for >1 second. The setting value is transferred to the internal memory
- Press   3x (press  and  simultaneously)
- Display: Parameter group **600: PArA**, **600** flashes



Warning!



In the case of burner components (PWM fan) with voltage-related behavior, it is recommended to read out the value (current PWM signal, parameter 920) for the prepurge phase (Ph30) with the minimum permissible prepurge speed close to the **undervoltage limit**, and for the ignition phases (phase 38, 40, and 44) with the maximum permissible ignition speed close to the **overvoltage limit**. **Failure to observe this information poses a risk of the safety functions being impaired.**



Note!

It is not normally necessary to set the following parameters!

Parameters	Function
522	Ramp up
523	Ramp down
646	Settling time for assessment of speed
650.00	Tolerance band 1 (speed shutdown)
650.01	Tolerance band 2 (quick speed shutdown)
660	Tolerance time speed deviation
674	Neutral band
679.00	Time constant Pt1 controller for speed control in the upper speed range, high-fire to low-fire.
679.01	Time constant Pt1 controller for speed control in the medium speed range, high-fire to low-fire.
679.02	Time constant Pt1 controller for speed control in the lower speed range, high-fire to low-fire.
679.03	Time constant Pt1 controller for speed control in the entire speed range, low-fire to high-fire.
680.00	Threshold between upper and medium speed range for control parameters 679.02 and 679.01.
680.01	Threshold between medium and lower speed range for control parameters 679.01 and 679.00.






- Press  as far as parameter group **400: SEt**
- Display: Parameter group **400: SEt**, **400** flashes
- Press  for >1 second
- Display: Subindex **P0** flashes

Parameters	Function
P0	Fan speed: Ignition load speed (403.00)

Ignition load speed (parameter 403:[0] in ACS410):
 Corresponds to the ignition load speed in revolutions per minute (rpm).
 Prerequisite: $P0 \geq P0min$ (parameter 516.00), $P0 \leq P0max$ (parameter 516.01)



Note!
 Speed increments when making the setting with AZL2: 10 rpm
 Speed increments when making the setting with ACS410: 1 rpm






- Press and hold 
- Display switches to **0A**
- Ignition speed **3000** flashes
- Pressing  or  allows the speed to be changed in increments of 10 rpm within the predefined limits (**P0max**, **P0min**)
-  release button. The set value is adopted
- Display: Parameter **P0** flashes
- Press 
- Display: Parameter **P1** flashes

Parameters	Function
P1	Fan speed: Low-fire speed (403.01)

Low-fire speed (parameter 403:[1] in ACS410):
 Corresponds to the low-fire speed in revolutions per minute (rpm).
 Prerequisite: $P1 \geq P1min$ (parameter 517.00), $P1 \leq P1max$ (parameter 517.01)



Note!
 Speed increments when making the setting with AZL2: 10 rpm
 Speed increments when making the setting via ACS410: 1 rpm

- Press and hold 
- Display switches to **1A**
- Low-fire speed **1200** flashes
- Pressing  or  allows the speed to be changed in increments of 10 rpm within the predefined limits (**P1max**, **P1min**)
-  release button. The set value is adopted
- Display: Parameter **P1** flashes
- Press 
- Display: Parameter **P2** flashes

Parameters	Function
P2	Fan speed: High-fire speed (403.02)

High-fire speed (parameter 403:[2] in ACS410):














Corresponds to the high-fire speed in revolutions per minute (rpm).

Prerequisite: $P2 \geq P2_{min}$ (parameter 518.00), $P2 \leq P2_{max}$ (parameter 518.01)





Note:

Speed increments when making the setting with AZL2: 10 rpm
 Speed increments when making the setting with ACS410: 1 rpm

- Press and hold 
- Display switches to **2A**
- High-fire speed **5700** flashes
- Pressing  or  allows the speed to be changed in increments of 10 rpm within the predefined limits (**P2max**, **P2min**)
-  release button. The set value is adopted
- Display: Parameter **P2** flashes
- Press    1x (press  and  simultaneously)
- Display: Parameter group **400: SEt**, **400** flashes
- Press 
- Display: Parameter group **500: PArA**, **500** flashes
- Press  for >1 second
- Press  or  and select parameter **516.00**
- Display: Parameter **516** flashes









Parameters	Function
516.00	Minimum limit speed ignition load P0:

- Press  for >1 second
- Display: Subindex **00** flashes
- Press  for >1 second



Note:

Speed increments when making the setting with AZL2: 10 rpm
 Speed increments when making the setting with ACS410: 1 rpm

- Pressing  or  can adjust the speed in increments of 10 rpm. Set the required minimum limit speed for the ignition load position at which the burner can still be safely ignited
- Press  for >1 second. The setting value is transferred to the internal memory
- Press   1x (press  and  simultaneously)
- Display: Subindex **00** flashes
- Press 
- Display: Subindex **01** flashes

Parameters	Function
516.01	Maximum limit speed ignition load P0:



- Press for >1 second



Note:

Speed increments when making the setting with AZL2: 10 rpm
 Speed increments when making the setting with ACS410: 1 rpm

- Pressing or can adjust the speed in increments of 10 rpm. Set the required maximum limit speed for the ignition load position at which the burner can still be safely ignited
- Press for >1 second. The setting value is transferred to the internal memory
- Press 2x (press and simultaneously)
- Display: Parameter **516** flashes
- Press
- Display: Parameter **517** flashes

Now proceed as described above for the following parameters:

- **P1** low-fire position **517**
- **P2** high-fire position **518**

Parameters	Function
517.00	Minimum limit speed low-fire P1
517.01	Maximum limit speed low-fire P1
518.00	Minimum limit speed high-fire P2
518.01	Maximum limit speed high-fire P2




- Press 2x (press and simultaneously)
- Display: **OPeRAtE** appears briefly and switches to **OFF**

12.4.2 Reading the value of parameter 920 in the prepurge phase (Ph30) and ignition load phase (Ph38, Ph40, and Ph44)

Operating steps





Press  for >3 second

- Display: **InFo**
- Display: **SEr**



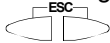
• Release 





• Display: Parameter **701.00**, **701** flashes

• Press  or  and select parameter **920**

• Switch on the burner

• Read the value of parameter **920** in the prepurge phase (Ph30) and ignition phase (Ph38, Ph40, and Ph44). Make a note of the values. They will be required as a basis for setting safety parameter **675.00**



• Press   1x (press  and  simultaneously)

• Display: **OPeAtE** appears briefly

• Display: Parameter **OP: xxx** (value display)

• Switch off the burner

• Display: Wait for **OFF**

12.4.3 Final settings for PWM safety parameters

Note:



PWM control by the LME7 makes use of the Hall signal for feedback. This Hall signal is used to calculate the manipulated variable of the PWM control process. To prevent the calculation of incorrect manipulated variables in the event of incorrect Hall signals, the working range of the PWM control must be restricted via parameter **675.00** / **675.01**. For that purpose, the burner is operated in special test mode (parameter **559**).

Warning!



For burner components (PWM fan) with voltage-dependent behavior, we recommend reading out the value (current PWM signal parameter 920) for the prepurge phase (Ph30) with the minimum permissible prepurge speed near the **overvoltage limit** and the value for the ignition phases (Ph38, Ph40 and Ph44) with the maximum permissible ignition speed near the **undervoltage limit**. **Failure to observe this information poses a risk of the safety functions being impaired.**

Procedure

Select test mode (parameter **559**) and check the prepurge speed under worst-case conditions close to the undervoltage limit, or check the ignition load speeds under worst-case conditions close to the overvoltage limit:

Note:



In test mode (parameter **559**, setting value 2), the normalized PWM signal (parameter **675.00**) for the prepurge phase or the PWM signal (parameter **675.01**) for the ignition phase is output as a fixed value. Start the burner and check the speed, air flow or air pressure under these worst-case conditions by taking appropriate measures while ensuring compliance with the relevant standards (e.g., EN 676).










Note:
















If the internal operating unit of the LME7 changes from phase display (e.g., Ph30) to **SEC** at 1-second intervals, or if the LME7 locks out (**Loc: 225**), the difference between the actually required PWM value (parameter **936**) and safety parameter **675.00** or **675.01** is too small. Reduce value **675.00** (parameter **920 - 1%**) or increase value **675.01** (parameter **920 +1%**). Reduce the value until **SEC** disappears from the display.

- Set safety parameter **675.00** to the value previously determined by parameter **920** in the prepurge phase (Ph30) **-1%** and safety parameter **675.01** to the value of parameter **920** in the ignition phase (Ph38, Ph40, and Ph48) **+1%**














Operating steps

- Select programming mode for the OEM
- Press  and  for <5 seconds simultaneously
- Display: **CoDE**
- Enter the password for the OEM via , , and . Also refer to the *Entering the password* chapter in the LME7 Basic Documentation (P7105).
- Display: **PArA** appears briefly and switches to **400: SET**
- Press  and select parameter group **500: PArA**
- Display: Parameter group **500: PArA, 500** flashes
- Press  for >1 second
- Press  or  and select parameter **559**










Parameters	Function
559	PWM mode 0: Control 1: PID control 2: Safety mode (PWM limits)

- Press  for >1 second
- Press  or  and set the value (test mode 2)
- Press  for >1 second. The setting value is transferred to the internal memory
- Press , ,  2x (press  and  simultaneously)
- Display: Parameter group **500: PArA, 500** flashes
- Press  and select parameter group **600: PArA**
- Display: Parameter group **600: PArA, 600** flashes
- Press  for >1 second
- Press  or  and select parameter **675.00**

Parameters	Function
675.00	PWM: Minimum PWM in prepurging, SEC

- Display: Parameter **675** flashes

- Press  for >1 second
- Display: Subindex **00** flashes

- Press  for >1 second
- Press  or  and set the previously determined value **-1%** of parameter **920** (prepurge phase (Ph30))
- Press  for >1 second. The setting value is transferred to the internal memory
- Press    1x (press  and  simultaneously)
- Display: Subindex **00** flashes
- Press 
- Display: Subindex **01** flashes

Parameters	Function
675.01	PWM: Maximum PWM in ignition load, SEC

- Press  for >1 second
- Press  or  and set the previously determined value **+1%** of parameter **920** (ignition phase (Ph38, Ph40, and Ph44))
- Press  for >1 second. The setting value is transferred to the internal memory
- Press    4x (press  and  simultaneously)
- Display: **OPeArTE** appears briefly and switches to **OFF**



Note:
 Test mode is indicated by the internal 7-segment display changing from **SEC** to the relevant program phase at 1-second intervals.

Checking prepurging

- To check the prepurge speed, set the required worst-case conditions close to the **undervoltage limit**
- Start the burner and check the speed, air flow, or air pressure by taking appropriate measures while ensuring compliance with the relevant standards (e.g., EN 676) in the prepurge phase (Ph30)
- If the worst-case requirements are not satisfied, change safety parameter **675.00** accordingly

Checking the ignition load

- To check the ignition load speed, set the required worst-case conditions close to the **overvoltage limit**
- Start the burner and check the speed, air flow, or air pressure by taking appropriate measures while ensuring compliance with the relevant standards (e.g., EN 676) in the ignition phase (Ph38, Ph40, or Ph44)
- If the worst-case requirements are not satisfied, change safety parameter **675.01** accordingly

On successful completion of the test, reset parameter **559** to control as described above (setting value 1).



Note:

To store the settings in the PME7, a manual backup is required. Also refer to the *Manual backup* chapter in the LME7 Basic Documentation (P7105).

12.4.4 Setting safety parameters 675.00 / 675.01 and checking the safety settings under *worst-case* conditions

Procedure

Select test mode (parameter **559**) and check the prepurge speed under worst-case conditions close to the undervoltage limit, or check the ignition load speeds under worst-case conditions close to the overvoltage limit:

- Switch on the burner and perform a test

Note:



In test mode (parameter **559**, setting value 2), the normalized PWM signal (parameter **675.00**) for the prepurge phase or the PWM signal (parameter **675.01**) for the ignition phase is output as a fixed value. Start the burner and check the speed, air flow or air pressure under these worst-case conditions by taking appropriate measures while ensuring compliance with the relevant standards (e.g., EN 676).

Checking prepurging











- To check the prepurge speed, set the required worst-case conditions close to the **undervoltage limit**
- Start the burner and check the speed, air flow, or air pressure by taking appropriate measures while ensuring compliance with the relevant standards (e.g., EN 676) in the prepurge phase (Ph30)
- If the worst-case requirements are not satisfied, change safety parameter **675.00** accordingly

Checking the ignition load







- To check the ignition load speed, set the required worst-case conditions close to the **overvoltage limit**
- Start the burner and check the speed, air flow, or air pressure by taking appropriate measures while ensuring compliance with the relevant standards (e.g., EN 676) in the ignition phase (Ph38, Ph40, or Ph44)
- If the worst-case requirements are not satisfied, change safety parameter **675.01** accordingly
- Switch on the burner and perform a test
- Display: **OPErAtE** appears briefly and switches to **OFF**

On successful completion of the test, reset parameter **559** to control as described above (setting value 1).

Operating steps

- Select programming mode for the OEM
- Press  and  for <5 seconds simultaneously
- Display: **CoDE**
- Enter the password for the OEM via , , and . Also refer to the *Entering the password* chapter in the LME7 Basic Documentation (P7105).
- **PArA** appears briefly on the display and switches to **400: SEt**
- Press  and select parameter group **500: PArA**
- Press 
- Press  for >1 second
- Display: Parameter **503** flashes
- Press  or  and select parameter **559**

Parameters	Function
559	PWM mode 0: Control 1: PID control 2: Safety mode (PWM limits)

- Press  for >1 second
- Press  and set the value (test mode 1)
- Press  for >1 second. The setting value is transferred to the internal memory
- Press  3x (press  and  simultaneously)
- Display: **OPeArAtE** appears briefly and switches to **OFF**



Note:











To store the settings in the PME7, a manual backup is required. Also refer to the *Manual backup* chapter in the LME7 Basic Documentation (P7105).

12.4.5 Matching the working points Speeds for low-fire (P1), ignition load (P0), and high-fire (P2) to the application for the heating engineer

Prerequisite

- Initial settings for the basic PWM parameters are made at OEM level
- LME7 is wired up in accordance with the proposed application
- Mains voltage present
- Safety loop closed
- Heat request OFF, LME7 in standby (OFF)









12.4.5.1 ... via AZL2











- Start the programming mode for the heating engineer
- Press  and  for <5 seconds simultaneously
- Display: **Code**
- Enter the password for the heating engineer via , , and . Also refer to the *Entering the password* chapter in the LME7 Basic Documentation (P7105).
- **PARa** appears briefly on the display and switches to **400: SET**
- Press 
- Display: **run**
- Press  to start the setting mode for low-fire (**P1**), ignition load (**P0**), and high-fire (**P2**)
- Display: **OFF** flashes
- Heat request ON (temperature controller)
- The LME7 starts and runs through the startup phase. The LME7 then runs through the respective program phases in accordance with the program sequence and the program phases appear flashing
- The LME7 proceeds to the end of prepurge phase Ph30, goes to the start load position and then displays **P0** (ignition load speed). The display changes to **P0** of the speed indication
- Display: Parameter **P0** flashes
- Press and hold 
- Display: Parameter **0A**, Speed flashes
- Press  or  and adjust the speed in increments of 10 rpm within the limits specified by the OEM (**P0max**, **P0min**)

Note!



The setting value for P0 must be greater than the setting value for P1. The LME7 checks the setting values. If the setting rules are violated, the LME7 goes into lockout position and displays error code Loc: 255.

- Release . The setting value is transferred to the internal memory
- Display: Parameter **P0** flashes
- Press 
- Startup continues. The burner is ignited. The program continues in low-fire position **P1**
- Display: Parameter **P1** flashes
- Press and hold 
- Display: Parameter **1A**, Speed flashes
- Press  or  and adjust the speed in increments of 10 rpm within the limits specified by the OEM (**P1max**, **P1min**)
- Release . The setting value is transferred to the internal memory
- Press 
- Display: Parameter **oP: P1** is displayed briefly
- The fan speed changes to the value for high-fire **P2**
- Display: Parameter **P2** flashes
- Press and hold 
- Display: Parameter **2A**, Speed flashes




- Press  or  and adjust the speed in increments of 10 rpm within the limits specified by the OEM (P2max, P2min)
- Release . The setting value is transferred to the internal memory
- Display: Parameter **P2** flashes
- Press  
- Display: Parameter **oP: P1** is displayed briefly
- The fan speed changes to the value for low-fire **P1**
- Display: Parameter **P1**, Speed indication flashes
- From here, the low-fire speeds **P1** or high-fire speeds **P2** can be changed again as described above
- Press    2x (press  and  simultaneously)
- Display: **OPErAtE** is displayed briefly
- The setting process is ended and the burner changes to the operating position
- In the operating position, the output predefined by the external load controller applies



Note!

To store the settings in the PME7, a manual backup is required. Also refer to the *Manual backup* chapter in the LME7 Basic Documentation (P7105).

12.4.5.2 ... via the onboard operating panel of the LME7 basic unit

- Keep  and  or  simultaneously depressed for >5 seconds.
- Display shows **OFF** blinking

Note:

If there is no operating action for >30 seconds, the LME7 changes automatically to standard mode. This means that adaptation of the working points must be started again.






- Heat request (temperature controller) ON
- LME7 is started and runs through the startup phase. Then, the unit runs through the respective program phases in accordance with the program sequence; the numbers appear blinking
- The LME7 proceeds to the end of the prepurge phase (Ph30), goes to the start load position and then displays **P0** (ignition load speed). In the process, the display shows alternately **P0** and a 3-digit number

Note:

The 3-digit number shows the setting value for parameter **P0/P1** or **P2** as the speed and must be multiplied by 10.














- By pressing  and  or  the speed can be changed in step sizes of 10 rpm within the limits predefined by the OEM (**P0max**, **P0min**)

Note!

The setting value of P0 must be greater than the setting value of P1. The LME7 checks the setting values. If setting rules are violated, the LME7 goes to lockout and displays error message Loc: 225.



- Press  to transfer the setting value to the onboard memory
- The startup phase proceeds. The burner is ignited. The program proceeds to low-fire position **P1**. In the process, the display shows alternately **P1** and the speed
- By pressing  and  or  the speed can be changed in step sizes of 10 rpm within the limits predefined by the OEM (P1max, P1min)
- Press  to transfer the setting value to the onboard memory
- The burner proceeds to high-fire position **P2**. In the process, the display shows alternately **P2** and the speed
- By pressing  and  or  the speed can be changed in step sizes of 10 rpm within the limits predefined by the OEM (P2max, P2min)
- Press  to transfer the setting value to the onboard memory
- By pressing ESC (press  and  simultaneously) the setting process is ended and the burner changes to the operating position
- In the operating position, the output predefined by the external load controller applies

Note:

To store the settings in the PME7, a manual backup is required. Also see chapter *Manual backup* in LME7 Basic Documentation (P7105).



12.5 Overview of PWM fan parameters (value range refers to PME71.901Ax)

Parameter-number	Designation	Value range		Step size *)	Conditions
		Min.	Max.		
403.00	Fan speed: Ignition load speed (P0)	800	9000	10 rpm	Factory setting 3000 rpm
403.01	Fan speed: Low-fire speed (P1)	400	9000	10 rpm	Factory setting 1200 rpm
403.02	Fan speed: High-fire speed (P2)	800	9000	10 rpm	Factory setting 5700 rpm
503.00	No-flame speeds PWM fan: Standby speed	0	9000	10 rpm	0 up to max. speed
503.01	No-flame speeds PWM fan: Prepurge speed / postpurge speed	800	9000	10 rpm	< max. speed
516.00	Limit speed ignition load P0: Min. limit	800	9000	10 rpm	P1min < P0min < P1max
516.01	Limit speed ignition load P0: Max. limit	800	9000	10 rpm	P0max < P1max
517.00	Limit speed low-fire P1: Min. limit	400	9000	10 rpm	---
517.01	Limit speed low-fire P1: Max. limit	800	9000	10 rpm	P1max < P2min
518.00	Limit speed high-fire P2: Min. limit	800	9000	10 rpm	P2min > P1max
518.01	Limit speed high-fire P2: Max. limit	800	9000	10 rpm	P2max > P2 min
519	Max. speed fan	3000	9000	10 rpm	Factory setting 5830 rpm
522	Ramp-up low-fire → high-fire	2.058	74.970	0.294 s	Factory setting approx. 15 s
523	Ramp-down high-fire → low-fire	2.058	74.970	0.294 s	Factory setting approx. 15 s
559	PWM mode 0 = open loop control 1 = PID control 2 = safety mode (PWM limits)	0	2	1	Factory setting 1 (control)
560	Mode: Pneumatic ratio control 0 = OFF 1 = PWM fan 2 = air damper actuator	0	2	1	Factory setting 1 (PWM fan)
644	Number of pulses per revolution	2	5	1	Factory setting 3 (Hall pulses/rev)
646	Settling time for speed assessment	1.029	2.058	0.147 s	Factory setting 2.1 seconds
650.00	Speed tolerance band: Speed shutdown	1	5	1%	Factory setting 1%
650.01	Speed tolerance band quick speed shutdown	1	10	1%	Factory setting 3%
658.00	PWM values fan: Start PWM	1	100	1%	Factory setting 25%
658.01	PWM values fan: Min. PWM	0	20	1%	Factory setting 0%
658.02	PWM values fan: Max. PWM	80	100	1%	Factory setting 100%
659.00	Ramp time of fan: Min. low-fire to high-fire	0	74.970	0.294 s	Factory setting 2.058 seconds
659.01	Ramp time of fan: Max. low-fire to high-fire	0	74.970	0.294 s	Factory setting 74.970 seconds
659.02	Ramp time of fan: Min. high-fire to low-fire	0	74.970	0.294 s	Factory setting 2.058 seconds
659.03	Ramp time of fan: Max. high-fire to low-fire	0	74.970	0.294 s	Factory setting 74.970 seconds
660	Tolerance time speed deviation	0	37.485	0.147 s	Factory setting 4.998 seconds
674	Neutral band (permitted control offset)	0	255	1 rpm	Factory setting 40 rpm
675.00	PWM: Min. PWM with prepurging, SEC	0	100	1%	Factory setting 86%
675.01	PWM: Max. PWM with ignition load, SEC	0	100	1%	Factory setting 34%
676	Gain factor speed control	0	255	1	Factory setting 112

Parameter-number	Designation	Value range		Step size *)	Conditions
		Min.	Max.		
677	Integral action time speed control	0	37.485	0.147 s	Factory setting 0.441 s
678	Derivative action time speed control	0	37.485	0.147 s	Factory setting 0 seconds
679.00	Time constant Pt1 speed control: Lower speed range high-fire to low-fire	0	37.485	0.147 s	Factory setting 6.027 seconds
679.01	Time constant Pt1 speed control: Medium speed range high-fire to low-fire	0	37.485	0.147 s	Factory setting 6.027 seconds
679.02	Time constant Pt1 speed control: Upper speed range high-fire to low-fire	0	37.485	0.147 s	Factory setting 6.027 seconds
679.03	Time constant Pt1 speed control: Entire speed range low-fire to high-fire	0	37.485	0.147 s	Factory setting 6.027 seconds
680.00	Speed range for Pt1 time constant: Threshold upper speed range	800	9000	10 rpm	Factory setting 4000 rpm
680.01	Speed range for Pt1 time constant: Threshold lower speed range	800	9000	10 rpm	Factory setting 2000 rpm
920	Current PWM signal fan	0	100	1%	Service parameter






*) Step size of speeds when making the settings via ACS410: 1 rpm

13 Error code list

Error code		Clear text	Possible cause
AZL2	LED display (alternating)		
Loc: 2	Loc 2	No establishment of flame at the end of safety time	<ul style="list-style-type: none"> Faulty or soiled fuel valves Defective, soiled or incorrectly connected flame detector Poor adjustment of burner, no fuel Faulty ignition equipment
Loc: 3	Loc 3	Air pressure faulty (air pressure switch welded in no-load position, decrease to specified time (air pressure switch flame-on response time))	Air pressure switch faulty <ul style="list-style-type: none"> Loss of air pressure signal after specified time Air pressure switch has welded in no-load position
Loc: 4	Loc 4	Extraneous light	Extraneous light during burner startup
Loc: 5	Loc 5	Air pressure faulty, air pressure switch welded in working position	Time supervision air pressure switch <ul style="list-style-type: none"> Air pressure switch has welded in working position
Loc: 7	Loc 7	Loss of flame	Too many losses of flame during operation (restart limitation) <ul style="list-style-type: none"> Faulty or soiled fuel valves Faulty or soiled flame detector Poor adjustment of burner
Loc: 10	Loc 10	Non-volatile lockout with alarm output switched on at terminal X2-03 pin 3 (fault lamp ON)	Wiring error or internal error, other errors
Loc: 10	Loc 10	Non-volatile lockout with alarm output switched off at terminal X2-03 pin 3 (fault lamp OFF)	Output contact error (welded contact of an output relay)
Loc: 12	Loc 12	Valve proving	Fuel valve V1 leak
Loc: 13	Loc 13	Valve proving	Fuel valve V2 leak
Loc: 14	Loc 14	POC error	Error valve closure control POC
Loc: 22	Loc 22	Safety loop open	<ul style="list-style-type: none"> Gas pressure switch-max open Safety limit thermostat cut out
Loc: 60	Loc 60	Analog power source 4...20 mA, I < 4 mA	Wire breakage
Loc: 83	Loc 83	Faulty PWM fan	<ul style="list-style-type: none"> PWM fan does not reach the target speed within the preset period of time, or After reaching the target speed, the PWM fan leaves the tolerance band again (parameter 650) for a time exceeding the tolerance time speed deviation (parameter 660)
Loc: 138	Loc 138	Restore process successful	Restore process successful
Loc: 139	Loc 139	No PME7 detected	No PME7 plugged in
Loc: 167	Loc 167	Manual locking	Manual locking
Loc: 206	Loc 206	AZL2 incompatible	Use the latest version

Error code		Clear text	Possible cause
AZL2	LED display (alternating)		
Loc: 225	Loc 225	Faulty PWM fan	<ul style="list-style-type: none"> Fan speed dropped below the minimum prepurge PWM (parameter 675.00) after reaching the prepurge speed, or After reaching the ignition load speed, the maximum ignition load PWM (parameter 675.01) was exceeded
Loc: 226	Loc 226	Faulty PWM fan	Parameterization error: <ul style="list-style-type: none"> Speed low-fire > speed high-fire, or Low-fire = 0 rpm, or Maximum speed = 0 rpm
Loc: 227	Loc 227	Faulty PWM fan	One or several parameters violate the minimum/maximum limit
rSt Er1	rSt Er1	Error in compatibility PME7 to LME7 during restore process	Program sequence of PME7 does not match the LME7
rSt Er2	rSt Er2	Error in compatibility PME7 to LME7 during restore process	Hardware of LME7 does not match the PME7
rSt Er3	rSt Er3	Error during restore process	<ul style="list-style-type: none"> PME7 faulty PME7 removed during restore process
bAC Er3	bAC Er3	Fault of compatibility PME7 to LME7 during backup process	Program sequence of PME7 does not match the LME7
Err PrC	Err PrC	Fault of PME7	<ul style="list-style-type: none"> Error in data content of PME7 No PME7 fitted

14 Legend

AL	Alarm device
Dbr...	Wire link
 reset (EK1)	Lockout reset button (info button)
EK2	Remote lockout reset button
FSV	Flame signal amplifier
ION	Ionization probe
Kx	Relay contact
LED	3-color signal lamp
LP	Air pressure switch
LR	Load controller
LR-OPEN	Load controller OPEN position
LR-CLOSED	Load controller CLOSED position
NT	Power supply unit
P LT	Pressure switch - valve proving
Pmax	Pressure switch-max
Pmin	Pressure switch-min
POC	Valve closure control (proof of closure)
 PWM	PWM motor power supply
QRA	Flame sensor
R	Control thermostat or pressurestat
SK	Safety Loop
SV	Safety valve
V1	Fuel valve
V2	Fuel valve
Z	Ignition transformer
	Input/output signal 1 (ON)
	Input/output signal 0 (OFF)
	Permissible signal 1 (ON) or 0 (OFF)

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