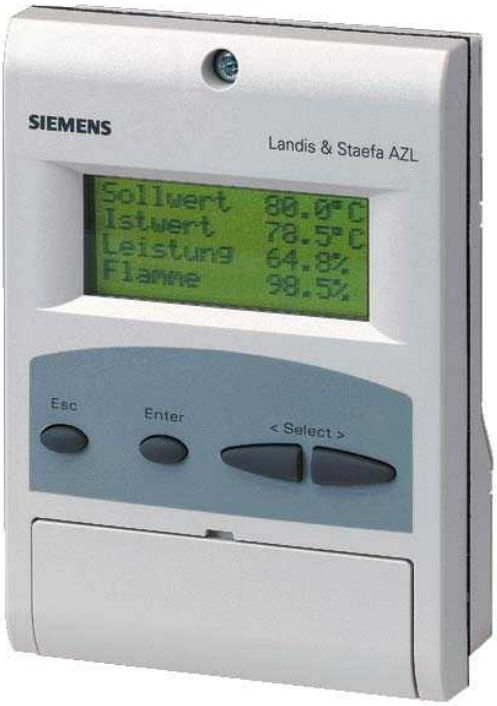
SIEMENS



AZL...
Modbus

User Documentation

CC1A7550en
10.12.2015

Building Technologies Division

Supplementary documentation

Type of product	Type of documentation	No. of documentation
LMV5...	User Documentation Basic diagram for LMV5... with 2 types of gases	A7550.1
LMV5...	User Documentation Basic diagram for LMV5... with 2 types of liquefied fuels	A7550.3
LMV5...	User Documentation Assembly of VKF41...C gas damper with ASK33.4 mounting kit to the SQM45.295A9 actuator	A7550.4
LMV52...	User Documentation COx supervision and control	A7550.5
LMV5...	Setting Lists (parameter and error list)	I7550
ACS450	Operating Instructions	J7550
LMV5…	Installation Basics	J7550.1
LMV5...	Data Sheet	N7550
LMV5...	Basic Documentation	P7550
LMV5...	Product Range Overview This document contains a complete overview	Q7550
AZL52 / LMV51	Operating Instructions	U7550
AZL52 / LMV51	Operating Instructions	U7550.1
AZL52 / LMV52	Operating Instructions	U7550.2
AZL52 / LMV52	Operating Instructions	U7550.3
AZL52 / LMV50	Operating Instructions	U7550.4
AZL52 / LMV50	Operating Instructions	U7550.5
SQM45 / SQM48	Data Sheet	N7814
SQM9...	Data Sheet	N7818
QGO20...	Data Sheet	N7842
QGO20	Basic Documentation	P7842

Contents

General

LMV5...

LMV5... is a microprocessor-based burner management system with matching system components for the control and supervision of forced draft burners of medium to high capacity.

AZL...

The burner management system is operated and programmed with the help of the AZL5... display and operating unit or a PC tool.

The Modbus functionality of the AZL... display and operating unit serves for integrating the LMV5... burner management system into a Modbus-based data network.
This makes possible the following applications:

- Visualization of plant operating states
- Plant control
- Logging

Master-slave principle

Communication between Modbus users takes place according to the master-slave principle.

The AZL... always works as a slave.

Data transmission

Transmission mode (RTU)

– The transmission mode used is RTU (Remote Terminal Unit)
– Data are transmitted in binary format (hexadecimal) with 8 bits
– The LSB (least significant bit) is transmitted first
– ASCII operating mode is not supported

Structure of data blocks

All data blocks use the same structure:

Data structure

Slave address	Function code	Data field	Checksum CRC16
1 byte	1 byte	x byte	2 bytes

Every data block contains 4 fields:

Slave address Device address of a certain slave

Function code Function selection (reading / writing words)

Data field Contains the following information:
- Word address
- Number of words
- Word value

Checksum Identification of transmission errors

Checksum (CRC16)

The checksum (CRC16) is used to detect transmission errors. If, during evaluation, an error is detected, the relevant device will not respond.

Calculation scheme

```
CRC = 0xFFFF
    CRC = CRC XOR ByteOfMessage
    For (1 through 8)
        CRC = SHR (CRC)
        if (flag shifted at right = 1)
            then                    | else
            CRC = CRC XOR           |
            0xA001                  |
while (not all ByteOfMessage handled)
```

Note!
The low-byte of the checksum is transmitted first.

Example

Data query: Reading 2 words from address 6 (CRC16 = 0x24A0)

0B	03	00	06	00	02	A0	24
						CRC16	

Reply: (CRC16 = 0x0561)

0B	03	04	00	00	42	C8	61	05
			Word 1		Word 2		CRC16	

Mapping words

B0	B1	B2	B3	B4	B5	B6	B7
Byte High							

B8	B9	B10	B11	B12	B13	B14	B15
Byte Low							

Transmission mode: The LSB (least significant bit) is transmitted first.

Mapping long values

Byte High	Byte Low	Byte High	Byte Low
Word Low		Word High	

Communication process

Start and end of a data block are characterized by transmission pauses. The maximum permissible time between 2 successive characters is 3.5 times the time required for the transmission of once character.
The character transmission time is dependent on the Baud rate and the data format used.

Having a data format of 8 data bits, no parity bit and one stop, the character transmission time is calculated as follows:

Character transmission time [ms] = 1000 * 9 bits / Baud rate

And with other data formats:

Character transmission time [ms] = 1000 * 10 bits / Baud rate

Process

Data query from the master Transmission time = n characters * 1000 * x bits / Baud rate
Marking for end of data query 3.5 characters * 1000 * x bits / Baud rate
Data query handling by the slave
Reply of slave Transmission time = n characters * 1000 * x bits / Baud rate
Marking for end of reply 3.5 characters * 1000 * x bits / Baud rate

Example

Marking for data query or end of reply with data format 10 / 9 bits

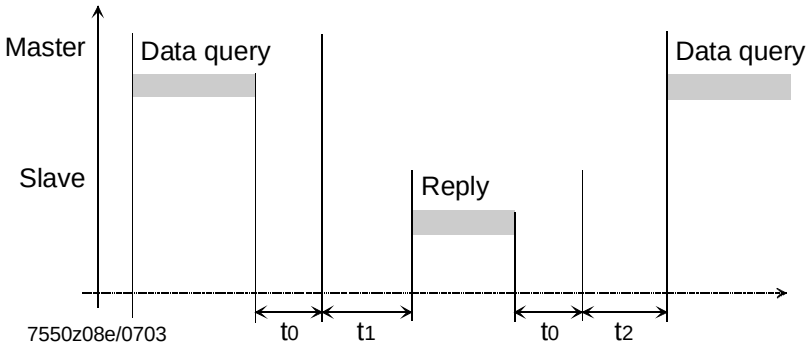
Waiting time = 3.5 characters * 1000 * x bits / Baud rate

Baud rate [Baud]	**Data format** [bit]	**Waiting time** [ms]
9600	10	3.125
	9	2.813

Data query process

Time diagram

A data query is made according to the following time diagram:



where:

t0 Marking for end = 3.5 characters (time is dependent on the Baud rate)

t1 This time is dependent on internal handling; the maximum handling time is dependent on the data type (internal and external data) and on the number of data; for more detailed information, see below!

t2 $t2 \geq 20$ ms
This time is required by the device to switch from transmitting back to receiving; this time must be observed by the master before a new data query is made; it must always be observed, even if a new data query to some other device is made

Communication during the slave's internal handling time

During the slave's internal handling time, the master is not allowed to make any data queries. The slave ignores data queries made during this period of time.

Communication during the slave's reply time

During the slave's reply time, the master is not allowed to make any data queries. Data queries made during this period of time cause all data on the bus at this instant to be deleted.

Number of messages

The number of addresses per message are limited:

- 20 addresses of the size of one word when reading
- 6 addresses of the size of one word when writing

Reply time of AZL... to a message from the master

1. Reading data from the LMV5... system:

1...3 addresses	25...75 ms
4...9 addresses	75...125 ms
10...15 addresses	125...175 ms
16...20 addresses	175...225 ms

Note!
These periods of time are defined from the complete writing of the message from the master to sending the first byte by the AZL...

2. Writing data to the LMV5... system:

1 address	25...75 ms
2...3 addresses	75...125 ms
4...5 addresses	125...175 ms
6 addresses	175...225 ms

Modbus functions

The following Modbus functions are supported:

Function number	Function
03 / 04	Reading n words
06	Writing 1 word
16	Writing n words

For more information about the Modbus protocol, refer to www.modbus.org.

Table of addresses

Function	Address	Number of words	Data designation	Access	Data format	Data type / coding	Range	Updating rate
03/04	0	1	Phase	R	U16		0...255	Fast
03/04	1	1	Position of currently active fuel actuator	R	S16	PT_WINKEL	-3... 93°	Fast
03/04	2	1	Position of gas actuator	R	S16	PT_WINKEL	-3...93°	Fast
03/04	3	1	Position of oil actuator	R	S16	PT_WINKEL	-3...93°	Fast
03/04	4	1	Position of air actuator	R	S16	PT_WINKEL	-3...93°	Fast
03/04	5	1	Position of auxiliary actuator 1	R	S16	PT_WINKEL	-3...93°	Fast
03/04	6	1	Position of auxiliary actuator 2	R	S16	PT_WINKEL	-3...93°	Fast
03/04	7	1	Position of auxiliary actuator 3	R	S16	PT_WINKEL	-3...93°	Fast
03/04	8	1	Manipulated variable for variable speed drive	R	S16	PT_PROZENTFU	0…100 %	Fast
03/04	9	1	Current type of fuel	R	U16	0= Gas 1= Oil	0...1	Fast
03/04	10	1	Current output	R	U16	PT_LEISTUNG	0…100 %	Fast
03/04	11	1	Current setpoint / temperature / pressure	R	U16	PT_TEMP_ DRUCK		Medium
03/04	12	1	Actual value / temperature / pressure Unit: See address 18 / 19	R	U16	PT_TEMP_ DRUCK	0…2000 °C 0…100 bar	Medium
03/04	13	1	Flame signal	R	U16	PT_PROZENT01	0…100 %	Medium
03/04	14	1	Current fuel throughput	R	U16	0..65534		Fast
03/04	15	1	Current O2 value (LMV52...)	R	U16	PT_PROZENT01	0…100 %	Fast
03/04	16	1	Volume unit of gas	R	U16	0= m^3 1= ft^3	0…1	Slow
03/04	17	1	Volume unit of oil	R	U16	0= l 1= gal	0…1	Slow
03/04	18	1	Unit of temperature	R	U16	0= °C 1= °F	0…1	Slow
03/04	19	1	Unit of pressure	R	U16	0= bar 1= psi	0…1	Slow
03/04	20	1	Sensor selection	R	U16	0=Pt100 1=Pt1000 2=Ni1000 3=temp. sensor 4=press. sensor 5=Pt100Pt1000 6=Pt100Ni1000 7=no sensor	0…7	Slow
03/04	21	2	Startup counter total	R	S32		0…999999	Slow
03/04	23	2	Hours run counter	R	S32		0…999999	Slow
03/04	25	1	Current error: Error code	R	U16		0...0x FF	Fast
03/04	26	1	Current error: Diagnostic code	R	U16		0…0x FF	Fast
03/04	27	1	Current error: Error class	R	U16		0...5	Fast
03/04	28	1	Current error: Error phase	R	U16		0...255	Fast
03/04	29	1	Temperature limiter OFF threshold, in degrees Celsius / Fahrenheit (in address 129: Temperature limiter switching differential ON)	R	U16		0…2000 °C 32…3632 °F	Slow
03/04	30	1	Supply air temperature, in degrees Celsius / Fahrenheit (LMV52...)	R	U16		-100…+923 °C -148..+1693 °F	Slow
03/04	31	1	Flue gas temperature, in degrees Celsius / Fahrenheit (LMV52...)	R	U16		-100...+923 °C -148...+1693 °F	Slow
03/04	32	1	Combustion efficiency (LMV52...)	R	U16	PT_Prozent01	0...200 %	Slow

Function	Address	Number of words	Data designation	Ac-cess	Data type / coding	Range	Updating rate
03/04	35	1	**Inputs**	R	U16	-	Medium

Coding: 0 → inactive 1 → active

B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1	B0

B8	Safety loop	B0	Controller ON/OFF
B9		B1	Fan contactor contact
B10	Pressure switch-min-gas	B2	Fuel selection oil
B11	Pressure switch-max-gas	B3	Fuel selection gas
B12		B4	
B13	LP	B5	Pressure switch-max-oil
B14	Start release oil	B6	Pressure switch-min-oil
B15	Heavy oil immediate start	B7	Pressure switch – valve proving

Function	Address	Number of words	Data designation	Ac-cess	Data type / coding	Range	Updating rate
03/04	37	1	**Outputs**	R	U16	-	Medium

Coding: 0 → inactive 1 → active

B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1	B0

B8	Fuel valve SV oil	B0	Alarm
B9	Fuel valve V1 oil	B1	
B10	Fuel valve V2 oil	B2	
B11	Fuel valve V3 oil	B3	
B12	Fuel valve SV gas	B4	Ignition
B13	Fuel valve V1 gas	B5	Start signal / DW valve
B14	Fuel valve V2 gas	B6	Fan
B15	Fuel valve PV gas	B7	Oil pump / magnetic coupling

Function	Address	Number of words	Data designation	Access	Data format	Data type / coding	Range	Updating rate
R 03/04 W 06/16	38	1	Program stop	R/W*	U16	0=deactivated 1=24 PrePurgP 2=32 PrePFGR 3=36 IgnitPos 4=44 Interv 1 5=52 Interv 2 6=72 PostPPos 7=76 PostPFGR	0...7	Slow
R 03/04 W 06/16	39	1	Operating mode with load controller	R/W*	U16	0=ExtLC X5-03 1=IntLC 2=IntLC Bus 3=IntLC X62 4=ExtLC X62 5=ExtLC Bus	0…5	Slow
R 03/04	40	1	Selection of manual or automatic operation	R	U16	0=automatic 1= Manual 2=burner off	0…2	Fast
R 03/04 W 06/16	41	1	Modbus mode: Local / Remote	R/W	U16	0 = Local 1 = Remote	0…1	Slow

Function	Address	Number of words	Data designation	Access	Data format	Data type / coding	Range	Updating rate
R 03/04 W 06/16	42	1	Modbus downtime: Max. time with no communication. When this time has elapsed, automatic changeover from Remote to Local takes place	R/W*	U16		0…7200 s	Slow
R 03/04 W 06/16	43	1	Operating mode in Remote mode.	R/W	U16	0 = Automatic 1 = Manual 2 = Burner OFF	0…2	Fast
R 03/04 W 06/16	44	1	External setpoint W3 Unit: See address 18 / 19	R/W	U16	PT_TEMP_ DRUCK	See ”Data types” on page 15	Fast
R 03/04 W 06/16	45	1	Predefined output mod. / multistage	R/W	U16	PT_LEISTUNG	See ”Data types” on page 15	Fast
R 03/04 W 06/16	46	1	Fuel selection AZL...	R/W*	U16	0 = Gas 1 = Oil	0…1	Slow
R 03/04 W 06/16	47	1	Setpoint W1	R/W	U16	PT_TEMP_ DRUCK	See ”Data types” on page 15	Slow
R 03/04 W 06/16	48	1	Setpoint W2	R/W	U16	PT_TEMP_ DRUCK	See ”Data types” on page 15	Slow
R 03/04 W 06/16	49	1	Weekday	R/W	U16	0 = Sunday 1 = Monday ...	0…6	Slow
R 03/04 W 16	50	3	Date	R/W	U16[3]	Data structure Date		Slow
R 03/04 W 16	53	3	Time of day	R/W	U16[3]	Data structure Time of day		Slow
R 03/04 W 16	56	2	Hours run gas (adjustable)	R/W*	S32		0...999999 h	Slow
R 03/04 W 16	58	2	Hours run oil stage 1 or modulating (adjustable)	R/W*	S32		0...999999 h	Slow
R 03/04 W 16	60	2	Hours run oil stage 2 or modulating (adjustable)	R/W*	S32		0...999999 h	Slow
R 03/04 W 16	62	2	Hours run oil stage 3 or modulating (adjustable)	R/W*	S32		0...999999 h	Slow
R 03/04 W 16	64	2	Hours run total (can be reset)	R/W*	S32		0...999999 h	Slow
03/04	66	2	Hours run total (read only)	R	S32		0...999999 h	Slow
03/04	68	2	Hours run device connected to power (read only	R	S32		0...999999 h	Slow
R 03/04 W 16	70	2	Startup counter gas (adjustable)	R/W*	S32		0...999999	Slow
R 03/04 W 16	72	2	Startup counter oil (adjustable)	R/W*	S32		0...999999	Slow
R 03/04 W 16	74	2	Startup counter total (can be reset)	R/W*	S32		0...999999	Slow
03/04	76	2	Startup counter total (read only)	R	S32		0...999999	Slow
03/04	78	2	Fuel volume gas (read only) (resettable from AZL5... version V4.10) 0…199999999.9 m^3 0…1999999999 ft^3	R/W*	S32		See ”Data types” on page 15	Slow

Function	Address	Number of words	Data designation	Access	Data format	Data type / coding	Range	Updating rate
03/04	80	2	Fuel volume oil (read only) (resettable from AZL5... version V4.10) 0…199999999.9 l 0…199999999.9 gal	R/W*	S32		See "Data types" on page 15	Slow
03/04	82	1	Number of lockouts	R	U16		0…65535	Slow
03/04	83	1	Extra temperature sensor (from AZL5... version V4.10)	R	U16	°C: *1 °F: *1	0..2000 °C 32..3632 °F	Slow
Parameters 84...137 are available from AZL5... version V4.20								
03/04	84	8	AZL5... ASN	R	U8[16]	String		Constant
03/04	92	1	AZL5... parameter set code	R	U16			Constant
03/04	93	1	AZL5... parameter set version	R	U16			Constant
03/04	94	3	AZL5... identification date	R	U16[3]	Date		Constant
03/04	97	1	AZL5... identification number	R	U16			Constant
03/04	98	8	Burner control ASN	R	U8[16]	String		Constant
03/04	106	1	Burner control parameter set code	R	U16			Constant
03/04	107	1	Burner control parameter set version	R	U16			Constant
03/04	108	3	Burner control identification date	R	U16[3]	Date		Constant
03/04	111	1	Burner control identification number	R	U16			Constant
03/04	112	1	Software version AZL5...	R	U16	Hexadecimal		Constant
03/04	113	1	Software version burner control	R	U16	Hexadecimal		Constant
03/04	114	1	Software version load controller	R	U16	Hexadecimal		Constant
03/04	115	8	Burner identification	R	U8[16]	String		Upon reset
03/04	123	1	Min-output gas	R	U16	PT_LEISTUNG	0...100 %	Slow
03/04	124	1	Max-output gas	R	U16	PT_LEISTUNG	0...100 %	Slow
03/04	125	1	Min-output oil	R	U16	PT_LEISTUNG	0...100 % 1001...1003	Slow
03/04	126	1	Max-output oil	R	U16	PT_LEISTUNG	0...100 % 1001...1003	Slow
R 03/04 W 16	127	1	Load limitation enduser (modulating)	R/W*	U16	PT_LEISTUNG	0...100 %	Slow
R 03/04 W 16	128	1	Load limitation enduser (multistage)	R/W*	U16	0: S1 1: S2 2: S3	0...2	Slow
03/04	129	1	Temperature limiter switching differential ON (in address 29: Temperature limiter OFF threshold, in degrees Celsius / Fahrenheit)	R	S16	PT_Prozent1	-50...0 %	Slow
03/04	130	1	Measuring range temperature sensor	R	U16	0: 150°C / 302°F 1: 400°C / 752°F 2: 850°C / 1562F	0...2	Slow
03/04	131	1	Adaption active / inactive	R	U16	0: Inactive 1: Active	0...1	Fast
03/04	132	1	Adaption state	R	U16	PT_ADAPTION	0...12	Slow
R 03/04 W 16	133	1	Start adaption	R/W	U16	0: Reset value 1: Start 2: Abort	0...2	Slow
R 03/04 W 16	134	1	Adaption output Permissible values: 40 %, 50 %, 60 %, 70 %, 80 %, 90 %, 100 %	R/W*	U16	PT_Prozent1	40...100 %	Slow
R 03/04 W 16	135	1	P-value	R/W*	U16	PT_Prozent01	2...500 %	Slow
R 03/04 W 16	136	1	I-value	R/W*	U16	Seconds	0...2000 s	Slow

Function	Address	Number of words	Data designation	Access	Data format	Data type / coding	Range	Updating rate
R 03/04 W 16	137	1	D-value	R/W*	U16	Seconds	0...1000 s	Slow
03/04	400	16	Lockout history (current lockout)	R	U16/U32 []			Fast
03/04	416	16	Lockout history (current lockout -1)	R	U16/U32 []			Fast
03/04	432	16	Lockout history (current lockout -2)	R	U16/U32 []			Fast
:	:	:	:	:	:			
03/04	528	16	Lockout history (current lockout -8)	R	U16/U32 []			Fast
03/04	544	8	Error history (current error)	R	U16/U32 []			Fast
03/04	552	8	Error history (current error -1)	R	U16/U32 []			Fast
:	:	:	:	:	:			
03/04	704	8	Error history (current error -20)	R	U16/U32 []			Fast

[1]) Refer to section «Data structures»

* These parameters need not be continually written since they are stored in EEPROM, which only permits a limited number of write accesses over its lifecycle (< 100,000)

Data structures

Date	U16	Year Month Day
Time of day	U16	Hour Minute Second
Lockout history	U16	Error code Error diagnostics Error class Error phase Fuel Output Date: Year Date: Month Date: Day Time of day: Hours Time of day: Minutes Time of day: Seconds
	U32	Startup counter total Hours run total
Error history	U16	Error code Error diagnostics Error class Error phase Fuel Dummy Output
	U32	Startup counter total

Legend to address table

Access	R	Value can only be read
	R / W	Value can be read and written
Data format	U16	16 bit integer, not subject to sign
	S32	32 bit integer, subject to sign
	☞	Note: In the AZL..., this data type is also used to mark an invalid or non-available value by using the value of «-1»
[ ]		Data array

Data types

TYPE	Phys.	Int. range	Resolution	Conversion int. / phys.
PT_PROZENT01	0...100 %	0...1000	0.1 %	/ 10
PT_PROZENTFU	0...110 %	0...1100	0.1 %	/ 10
PT_WINKEL	-3.0...93.0°	-30...930	0.1°	/ 10
PT_TEMP_ DRUCK	0...2000° 32...3632 °F 0...100 bar 0...1449 psi	0...2000 32...3632 0...1000 0...1449	1 °C 1 °F 0.1 bar 1 psi	1 1 / 10 1
PT_LEISTUNG	Modulating operation: 0...100 % Multistage operation: 1001 = stage 1 1002 = stage 2 1003 = stage 3	0...1003	Modulating operation: 0.1 % Multistage operation: 1	Modulating operation: / 10 Multistage operation: - 1000
PT_ADAPTION	0: Undefined 1: Identification completed, parameter determined 2: Undefined 3: Adaption aborted by user 4: Temperature differential too small, temperature will be lowered with low-fire 5: Monitoring time running 6: Delivery of identification load set 7: Error during identification (path) 8: Error during identification (internally) 9: Monitoring time running 10: Changeover from modulating to multistage during an identification 11: Timeout monitoring time 12: Timeout heating output on path with monitoring			

Starting adaption via Modbus

The routine used for identifying the path in the integrated load controller (termed “adaption“ here) of the LMV5... system can be controlled and monitored via Modbus.

In principle, the general conditions are the same as those used when making adaptions with the AZL52... (refer to subsection 6.4.2 *Self-setting of control parameters (adaption*)) in the Basic Documentation of the LMV5... system (P7550).

The terms *Start adaption*, *Adaption active / inactive* and *Adaption state* indicate the respective Modbus addresses (refer to ”Table of addresses”).

Start the adaption via *Start adaption* and change the value from ≠ 1 to = 1.
Starting the adaption has no impact on adaption processes already under way (*Adaption active / inactive* = 1).

If *Adaption active / inactive* = 1, the process can be monitored via *Adaption state* (refer to data type PT_ADAPTION).
When *Adaption active / inactive* = 0, the adaption process is completed.
On completion of the process, the result can be read out via *Adaption state*.

To complete the adaption process prematurely, the value at *Start adaption* must be changed from ≠ 2 to = 2.

Updating rate of AZL...

Fast	System data that have already been updated automatically by the system process are available on request, at a typical repetition rate of 200 ms.
Medium	These data are cyclically queried in the system by the AZL... The typical updating rate here is 5 seconds, depending on system load.
Slow	These data are cyclically queried in the system by the AZL... The typical updating rate that can be expected here is 25 seconds, depending on system load.
Constant	These data are updated in the system by the AZL5... upon each *Power On* or reset. When making a query, the updated data will be available after 25 seconds. Data that cannot be changed (e.g. the production date, etc.) – neither with the AZL5... nor via the ACS450 – can be identified by the value of *0* in the first Byte of the strings.
Upon reset	Same as constant data, but these data can be changed in the system.

Error handling

Error codes

When there are faulty telegrams (CRC errors, etc.), the AZL… does not send any exception code. It does not respond to this kind of message.

Reason: Usually, the commercially available Modbus drivers do not respond to exception codes.

Selection menus in the AZL...

Activation of Modbus operation

Activation takes place via menu
«Operation» → «OptgModeSelect» → «GatewayBASon».

Having made the selection, the menu item can be quit via ESC. The setting is retained until **«Operation» → «OptgModeSelect» → «GatewayBASoff»** is selected via the AZL… menu.

When «GatewayBASon» is activated, plant operation and diagnostics via the AZL... are still possible.

Deactivation takes place via menu
«Operation» → «OptgModeSelect» → «GatewayBASoff».

Slave address

Selection is made via menu
«Params & Display» → «AZL» → «Modbus» →«Address».

According to Modicon specifications, addresses between 1...247 can be selected. The slave address is filed in nonvolatile memory of the AZL...

Transmission parameters

Transmission rate

The setting is made via menu
«Params & Display» → «AZL» → «Modbus» → «Baud Rate»
There is a choice of 9600 bit/s or 19200 bit/s.

Parity

Using the AZL... menu
«Params & Display» → «AZL» → «Modbus» → «Parity», parity can be set to «none», «even» or «odd».

Timeout communication failure

When there is no Modbus communication, this timeout defines the period of time on completion of which the AZL… changes automatically from Remote to Local.

The setting is made via menu
«Params & Display» → «AZL» → «Modbus» → «Downtime».

Local «-» Remote mode

This setting defines whether the AZL… shall work in Local or Remote mode.

Remote mode

Display of «Remote Automatic», «Remote Manual», «Remote Burner OFF» mode. A change can only be made via Modbus.

AZL5... interface

General

The AZL... serves the Modbus via its COM2 port (8-pole Western jack RJ45). The port is assigned to the functional low-voltage range.

Assignment of RJ45 pins:

PIN	
1	TXD (RS-232 level or V28)
2	Not used
3	RXD (RS-232 level or V28)
4	GND
5	U1 (typically +8.2V)
6	GND
7	U2 (typically -8.2V)
8	Not used

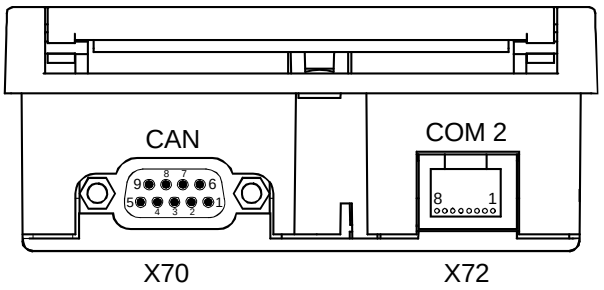
Attention!
When preparing and fitting a connecting cable between the AZL... and a converter, it is to be noted that PIN 5 and PIN 7 can deliver a current of 5 mA each. Adequate insulation against other potentials must be ensured.

The maximum permissible data line length between COM2 and a converter is 3 m. In exceptional cases, this data line length can be exceeded, depending on environmental conditions (electrical interference) and the type of cable used – without Siemens assuming responsibility.

Attention!
To ensure protection against electric shock hazard, it must be made certain that AC 230 V / AC 120 V lines are strictly separated from the functional low-voltage area.

CAN X70

PIN	
2	CAN L
3	GND
4	VAC 2
7	CAN H
8	VAC 1

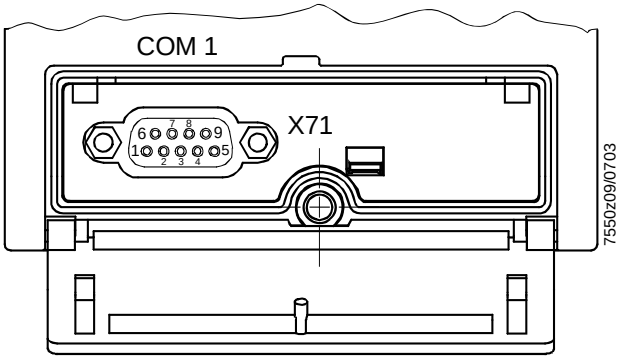


COM2 X72

PIN	
1	TXD
3	RXD
4, 6	GND
5	U 1
7	U 2

COM1 X71

PIN	
2	RXD
3	TXD
5	GND



Note!
COM1 (PC port) and COM2 cannot be active at the same time!

Converter RS-232 – RS-485

This converter converts a V.24 / RS-232 port into an RS-485 port.

Technical requirements

- Code transparency, that is, data must remain unchanged
- When using the RS-485 interface as a bus, control of the transmitting section on the RS-485 side must be ensured by the transmitter power of the AZL...
- The interfaces must be galvanically separated to improve EMC

Commercially available converters

The technical specification provided by the suppliers of the converters must be observed when doing planning work. Some of them do not meet the specifications of the LMV5... system (e.g. operating temperatures). If required, technical measures must be taken (e.g. suitable location).

The following types of converters have been tested by us with respect to function and immunity (voltage surges):

- Supplier: Hedin Tex
  Type reference: H-4

  Contact address in Germany:
  Hedin Tex GmbH
  Am Herrkamp 14
  D-24226 Heikendorf
  www.hedintex.de

- Supplier: IPC CON
  Type reference: I-7520

  Contact address in Germany:
  Spectra Computersysteme GmbH, Humboldtstraße 36
  D-70771 Leinfelden-Echterdingen
  *www.spectra.de

Connection example: Connecting cable for interface converter type Hedin Tex H4/M4

AZL COM2 8-pole Western		Cable	Hedin Tex interface converter X1 RS-232	
			H4	M4
1	TxD		21	2
2	—		—	—
3	RxD		22	3
4	GND		16	7
5	U1		(only for eBus adapter)	
6	GND		—	—
7	U2		(only for eBus adapter)	
8	—		—	—

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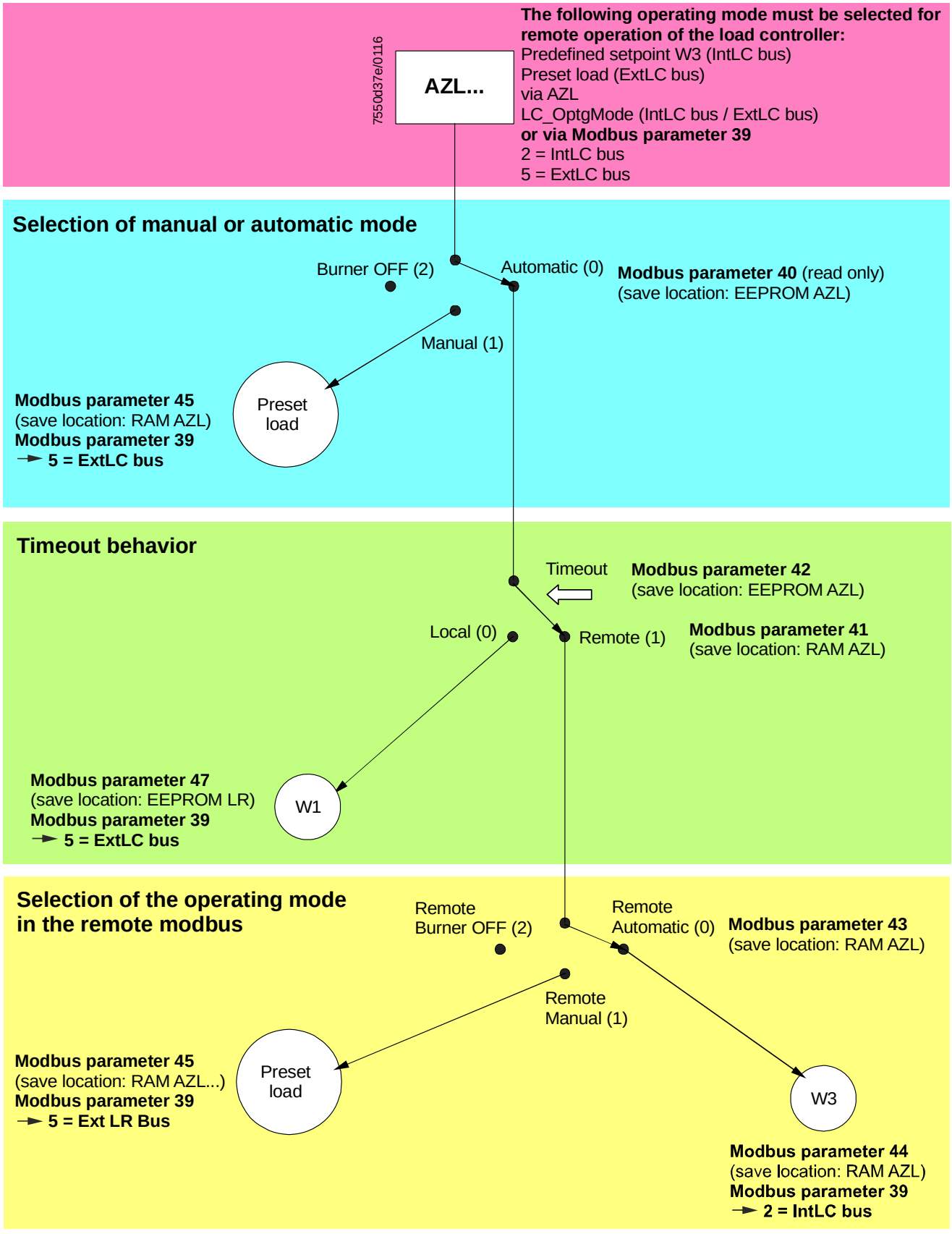
Addendum 1: Overview of «changeover of the controller operating mode»



Notes on operating modes

Modbus downtime

When there is no more communication between DDC and AZL..., the Modbus downtime is used to switch over from Remote mode to the preselected setpoint in Local mode. The timer will be activated when changing from Local to Remote. With every permissible Modbus communication to this slave (AZL...), the timer will be reloaded. Should the timer lapse, the DDC must again set the Remote mode, if required. The timer value will be retained in EEPROM and will also be retained after power off.

Note!
When deactivating the «Gateway DDC» mode (menu item **«OptgModeSelect» → «GatewayBASoff»**), automatic changeover to Local takes place, that is, preselected output «W1» will apply.

Changeover of operating mode via parameter 43

This changeover was introduced primarily because of the requirements of boiler sequence control.
In that case, the individual boiler can be operated at low output via manually «On».
When switching to «Auto» via sequence control, preselected output «W3» will be used.

Addendum 2: Default parameter settings

Parameter	Address	Storage location	Preselection	Choices for making changes
Setpoint W1	47	EEPROM	See Basic Documentation «Menu and parameter lists»	• On the AZL... (menu) • Preselection via Modbus
Setpoint W2	48	EEPROM	See Basic Documentation «Menu and parameter lists»	• On the AZL... (menu) • Preselection via Modbus
External setpoint W3	44	RAM	«0» will be reinitialized when resetting the AZL...	• On the AZL... (menu) • Preselection via Modbus
Set target load mod / multistage	45	RAM	«0» will be reinitialized when resetting the AZL...	• On the AZL... (menu) • Preselection via Modbus
Local / Remote	41	RAM	«Local»	• Via Modbus • On the AZL... (menu) • Via lapse of timer «Communication failure» from Remote to Local
Selection of manual or automatic operation	40	EEPROM	See Basic Documentation «Menu and parameter lists»	• On the AZL... (menu)
Operating mode: Remote ”off” / remote “on” / W3	43	RAM	«Auto» will be reinitialized when resetting the AZL...	• Preselection via Modbus
Operating mode with load controller	39	EEPROM	See Basic Documentation «Menu and parameter lists»	

Note!
An AZL… reset will be triggered when switching power on, or in the event of severe system errors.

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Subject to change!