SIEMENS

LMV2… / LMV3...

Modbus

User Documentation

The LMV2 / LMV3 burner management system and this User Documentation are intended for OEMs and system integrators which integrate the system in their products!

Software version up to V1.60

Building Technologies

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Supplementary documentation

ASN	Title	Number of Documentation
LMV2 / LMV3	Environmental Product Declaration	E7541
LMV27.100	Data Sheet	N7541
LMV26 / AGM60	Basic Documentation	P7547
LMV26.310x2 / AGM60.2x9	Basic Documentation	P7548
LMV27.100	Basic Documentation	P7541
LMV27.100x2	Basic Documentation	P7549
LMV27.210x2	Basic Documentation	P7543
LMV36.520x1 / AGM60.4x9	Basic Documentation	P7544
LMV37.4	Basic Documentation	P7546
LMV37.400x2	Basic Documentation	P7536
LMV37.410x1	Basic Documentation	P7554
LMV37.820x1	Basic Documentation	P7545
LMV2 / LMV3	Product Range Overview	Q7541

Contents

1 Warning notes

Observance of the following warning notes helps avoid injury to persons and damage to property or the environment!

Caution!
The safety, warning and technical notes given in the Basic Documentation on the LMV2 / LMV3 apply fully to the present document also!

- When connecting the OCI412 to the LMV2 / LMV3, observe the warning notes contained in the Basic Documentation
- The Modbus in the LMV2 / LMV3 offers no special measures aimed at preventing or controlling errors. For this reason – when using the Modbus – it must be made certain that poor combustion values cannot occur, especially in connection with multi-burner control. Such measures are to be considered on an application-specific basis and to be verified and proven by checking the relevant standards and by conducting adequate tests

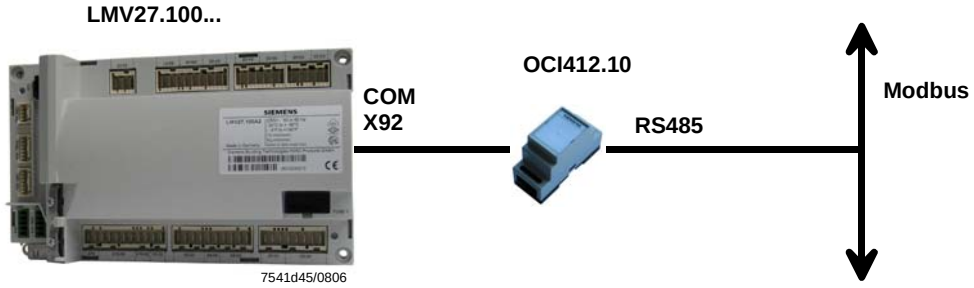
2 General

LMV2 / LMV3

The LMV2 / LMV3 is a microprocessor-based burner management system with matching system components designed for the control and supervision of forced draft burners of medium to high capacity.
Operation and programming of the burner management system takes place either via the display and operating unit (AZL2) or the PC tool.
By making use of the Modbus functionality of the LMV2 / LMV3, the system can be integrated into a data network based on a Modbus system.

This facilitates implementation of the following applications:
- Visualization of plant states
- Plant control
- Logging

The physical connection to the Modbus system is made via an external OCI412.10 module.



2.1 Master-slave principle

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

In that case, the LMV2 / LMV3 always operate as a slave.

Every device on the bus line must be assigned a different address.
For making the settings, refer to chapter 10 Modbus settings on the basic unit.

3 Plant structure

Note!
Please observe the guidelines provided by the supplier of the master covering the setting up of a communication system!

3.1 Minimum size of Modbus system

The smallest Modbus plant consists of the following components:

- A bus master for the control of data traffic
- One or several slaves which deliver data if requested by the master
- The transmission medium, consisting of bus cable and bus connector for connecting the individual users, one or several bus segments which are linked via repeaters

3.2 Maximum size of Modbus system

A bus segment consists of a maximum of 32 field devices. The maximum number of slaves that can be operated with a Modbus master across several segments is determined by the internal memory structure of the master used. Therefore, the planning engineer should have information on the master's capacity. To integrate a new user, the bus cable can be separated at any location for adding a bus connector. At the end of a segment, the bus line can be extended to the specified segment lengths. The length of a bus segment is dependent on the rate of transmission which is determined primarily on the plant's constellation (segment length, distributed inputs / outputs) and the required query cycles of the individual users.

Note!
Select the same rate of transmission for all users on the bus!
Modbus devices must be connected in line!

4 Type summary

4.1 LMV2 / LMV3

Microprocessor-based burner control for single-fuel burners of any capacity, electronic fuel / air ratio control with up to 2 actuators, with integrated gas valve proving.

4.2 OCI412.10

Interface between LMV2 / LMV3 and Modbus (refer to Basic Documentation P7541).

5 Data transmission

5.1 Modbus interface settings

In addition to the interface parameters that can be set on the basic unit (refer to chapter 10 Modbus settings on the basic unit), the following parameters for the communication interface are ready set:

Number of data bits	8
Number of start bits	1
Number of stop bits	1

5.2 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 mode is not supported.

5.3 Structure of data blocks

All data blocks are of the same structure:

Data structure

Slave address	**Function code**	**Data field**	**Checksum CRC16**
1 Byte	1 Byte	x Byte	2 Bytes

Each data block has 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	Detection of transmission errors

5.4 Checksum (CRC16)

Transmission errors are detected with the help of the checksum (CRC16).
If an error is detected during evaluation, the respective device will not respond.

Calculation scheme

CRC = 0xFFFF		
CRC = CRC XOR ByteOfMessage		
For (1 to 8)		
CRC = SHR (CRC)		
if (flag shifted to the right = 1)		
then CRC = CRC XOR 0xA001	else	
while (not all ByteOfMessage edited)		

☞ Note!
The Low-Byte of the checksum is transmitted first.

Example

Data inquiry: 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	

5.5 Mapping Long values

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

5.6 Erroneous access to parameters of the basic unit

Reading

If a non-existing parameter shall be read in, a substitute value will be sent.
The substitute value is fixed at 0xFFFF.

Writing

In case of write access to non-existing parameters, or to parameters disabled for building automation mode, the value of the parameter will not be changed and no response will be sent.

5.7 Temporal process of communication

Both beginning and end of a data block are characterized by transmission pauses. Between 2 successive characters, a maximum period of 3.5 times the character transmission time may elapse.
The character transmission time (time required for the transmission of one character) is dependent on the Baud rate and the data format used.

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

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

And with the other data formats:

Character transmission time [ms] = 1000 * 11 Bits / Baud rate

Process

Data inquiry from the master Transmission time = n characters * 1000 * x Bits / Baud rate
Identification code for end of data inquiry 3.5 characters * 1000 * x Bits / Baud rate
Handling of data inquiry by the slave
Reply from the slave Transmission time = n characters * 1000 * x Bits / Baud rate
Identification code for end of reply 3.5 characters * 1000 * x Bits / Baud rate

Example

Identification code for end of data inquiry or response in case of a data format of 11 / 10 bits.

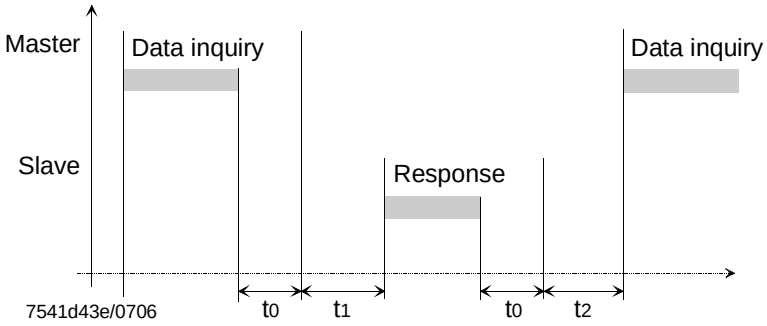
Waiting time = 3.5 characters * 1000 * x Bits / Baud rate

Baud rate [Baud]	**Data format** [Bit]	**Waiting time** [ms]
9600	11	4.01
	10	3.645

5.8 Temporal process of a data inquiry

Time scheme

A data inquiry progresses according to the following scheme:



t0 Identification code for the end = 3.5 characters
(time dependent on the Baud rate)

t1 Dependent on the time required for internal handling.
The maximum handling time is dependent on the number of data.

In case of read access for 6 parameters 50 ms
In case of write access for 2 parameters 50 ms

t2 $t2 \geq 50$ ms
This is the time required by the device to switch back from sending to receiving.
It must be observed by the master before making a new data inquiry.
If must always be observed, even if the new data inquiry is made to some other device.

5.9 Communication during the internal slave handling time

During the slave's internal handling time, the master must not make any data inquiries. Any inquiries made during this period of time will be ignored by the slave.

5.10 Communication during the slave's response time

During the time the slave responds, the master must not make any data inquiries.
If inquiries are made during this period of time, all data currently on the bus become invalid.

5.11 Number of addresses per message

The number of addresses per message is limited:

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

6 Modbus functions

The following Modbus functions are supported:

Function number	Function
0x03 / 0x04	Reading n words
0x06	Writing one word
0x10	Writing n words

7 Requirements for the Modbus master

The Modbus system whose connection is based on RS-485 is a robust system.

In view of the possible cable lengths and the loads produced by the various users and environmental conditions, the master software should satisfy the following criteria:

- In the case of write processes, correct writing must be checked through back-reading
- In the case of read processes, it must be checked whether a reply from the slave is received. If there is no such reply, the inquiry must be repeated, or it must be checked whether an error occurred (wiring, valid Modbus address, etc.)

8 Modbus addresses

8.1 Overview table

Function	Address dec / hex	Number of words	Data designation	Access	Data format	Data type / coding	Range
03 / 04	0 / 0h	1	Burner control phase	R	U16		0...255
03 / 04	1 / 1h	1	Position of current fuel actuator	R	S16	PT_WINKEL	-50...150°
03 / 04	4 / 4h	1	Position of air actuator	R	S16	PT_WINKEL	-50...150°
03 / 04	8 / 8h	1	Manipulated variable VSD	R	S16	PT_PROZENT_01	0…100
03 / 04	9 / 9h	1	Current type of fuel (default setting: 0)	R	U16	0 = fuel 0 1 = fuel 1	0.1
03 / 04	10 / Ah	1	Current output	R	U16	PT_LEISTUNG	Modulating: 0...100% Multistage: 1001..1003 Invalid: 32767
03 / 04	13 / Dh	1	Flame signal	R	U16	PT_PROZENT_01	0….100%
03 / 04	14 / 0Eh	1	Current fuel throughput	R	U16	0...65535	0...6553.4 m³ / h, l / h, ft³ / h, g / h 65535,5 error
03 / 04	21 / 15h	2	Startup counter total	R	S32		0...999999
03 / 04	25 / 19h	1	Current error: Error code	R	U16		0...255
03 / 04	26 / 1Ah	1	Current error: Diagnostic code	R	U16		0...255
03 / 04	27 / 1Bh	1	Current error: Error class	R	U16		0...6
03 / 04	28 / 1Ch	1	Current error: Error phase	R	U16		0...255

Function	Address dec / hex	Number of words	Data designation	Access	Data type / coding	Range	
03 / 04	35 / 23h	1	**Inputs**	R	U16	-	

Coding: 0 → inactive 1 → active

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

B8	Safety loop (SK)	B0	Controller on / off
B9		B1	
B10	Pressure switch-min (Pmin) (pressure switch valve proving (P LT) via pressure switch-min (Pmin)) [1]	B2	
B11	Pressure switch-max (Pmax) / POC [2]	B3	
B12		B4	
B13	Air pressure switch (LP)	B5	
B14		B6	
B15		B7	Pressure switch valve proving (P LT) [3]

Function	Address dec / hex	Number of words	Data designation	Access	Data type / coding	Range	
03 / 04	37 / 25h	1	**Outputs**	R	U16	-	

Coding: 0 → inactive 1 → active

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

B8		B0	Alarm (AL)
B9		B1	
B10		B2	
B11		B3	
B12		B4	Ignition (Z)
B13	Fuel valve 1 (V1)	B5	
B14	Fuel valve 2 (V2)	B6	Fan (M)
B15	Fuel valve 3 (V3) / pilot valve (PV) [4]	B7	

The assignment of inputs / outputs above, are valid for the types of devices LMV27 / LMV37.

The inputs / outputs for other types of devices have an alternative meaning:

1) LMV37.8 B10 = CPS
2) LMV26 B11 = pressure switch-max (Pmax) / POC / pressure switch valve proving (P LT)
3) LMV26 B7 = fuel 0
   LMV37.8 B7 = pressure switch-min (Pmin) / pressure switch valve proving (P LT)
4) LMV37.8 B15 = fan (M) via X7-02

For types not listed, refer to standard assignment.

Function	Address dec / hex	Number of words	Data designation	Access	Data format	Data type / coding	Range
R 03 / 04 W 06 / 16	38 / 26h	1	Program stop	R / W [1])	U16	0 = deactivated 1 = PrePurgP (Ph24) 2 = IgnitPos (Ph36) 3 = Interv 1 (Ph44) 4 = Interv 2 (Ph52)	0…4
R 03 / 04 W 06 / 16	41 / 29h	1	Modbus mode: Preselected output local / preselected output remote (default setting: 0)	R / W	U16	0 = locally 1 = remote	0.1
R 03 / 04 W 06 / 16	42 / 2Ah	1	Modbus breakdown time: Max. time with no communication. When this time has elapsed, automatic change from «remote» to «local» will take place	R / W [1])	U16		0...7200 s 0 = deactivated
R 03 / 04 W 06 / 16	43 / 2Bh	1	Operating mode in remote operation Remote «ON», Remote «Off» (default setting: 0)	R / W	U16	0 = Auto 1 = ON 2 = OFF	0, 1, 2
R 03 / 04 W 06 / 16	45 / 2Dh	1	Preselected target output modulating / multistage	R / W	U16	PT_LEISTUNG	Modulating: 0…100% Multistage: 1001…1003 Invalid: 32767
R 03 / 04 W 06 / 16	56 / 38h	2	Hours run fuel 0 resettable	R / W [1])	S32		0...9 999 999 h
R 03 / 04 W 06 / 16	58 / 3Ah	2	Only with LMV26 / LMV36: Hours run fuel 1 resettable	R / W [1])	S32		0...9 999 999 h
R 03 / 04 W 06 / 16	68 / 44h	2	Hours run unit live	R	S32		0...9 999 999 h
R 03 / 04 W 06 / 16	70 / 46h	2	Start counter fuel 0 resettable	R / W [1])	S32		0...9 999 999 h
R 03 / 04 W 06 / 16	72 / 48h	2	Only with LMV26 / LMV36: Start counter fuel 1 resettable	R / W [1])	S32		0...9 999 999 h
03 / 04	76 / 4Ch	2	Start counter total (read only)	R	S32		0...9 999 999 h
03 / 04	78 / 4Eh	2	Fuel volume fuel 0 0 = resettable	R / W [1])	U32		0...99999999 m^3
03 / 04	80 / 50h	2	Only with LMV26 / LMV36: Fuel volume fuel 1 1 = resettable	R / W [1])	U32		0...99999999 l
03 / 04	82 / 52h	1	Number of faults	R	U16		0...65535
R 03 / 04 W 06 / 16	84 / 54h	1	Preselected output in the event communication with BACS breaks down Fuel 0	R / W [1])	U16	PT_LEISTUNG	Modulating: 0...100% Multistage: 1001…1003 Invalid: 32767
R 03 / 04 W 06 / 16	85 / 55h	1	Only with LMV26 / LMV36: Preselected output in the event communication with BACS breaks down Fuel 1	R / W [1])	U16	PT_LEISTUNG	Modulating: 0…100% Multistage: 1001…1003 Invalid: 32767
R 03 / 04	98 / 62h	8	Burner control type reference (ASN)	R	U8[16]	String	
R 03 / 04	106 / 6Ah	1	Burner control parameter set code	R	U16		
R 03 / 04	107 / 6Bh	1	Burner control parameter set version	R	U16		
R 03 / 04	108 / 6Ch	3	Burner control identification date	R	U16[3]	Data	
R 03 / 04	111 / 6Fh	1	Burner control identification number	R	U16		
R 03 / 04	113 / 71h	1	Software version burner control	R	U16	Hexadecimal	
R 03 / 04	115 / 73h	8	Burner identification	R	U8[16]	String	

Function	Address dec / hex	Number of words	Data designation	Access	Data format	Data type / coding	Range
R 03 / 04	123 / 7Bh	1	Minimum output fuel 0	R	U16	PT_LEISTUNG_BEGRENZT	20...100%, 1001...1003 Invalid: 32676
R 03 / 04	124 / 7Ch	1	Maximum output fuel 0	R	U16	PT_LEISTUNG_BEGRENZT	20...100%, 1001...1003 Invalid: 32676
R 03 / 04	125 / 7Dh	1	Only with LMV26 / LMV36: Minimum output fuel 1	R	U16	PT_LEISTUNG_BEGRENZT	20...100%, 1001...1003 Invalid: 32676
R 03 / 04	126 / 7Eh	1	Only with LMV26 / LMV36: Maximum output fuel 1	R	U16	PT_LEISTUNG_BEGRENZT	20...100%, 1001...1003 Invalid: 32676
R 03 / 04	127 / 7Fh	1	Operation mode of burner	R	U16		1...27
R 03 / 04	128 / 80h	1	Only LMV26 / LMV36: Operation mode of burner fuel 1	R	U16		1...27
R 03 / 04	129 / 81h	2	Switching cycles *Revert to pilot*	R	S32		0…9999999
R 03 / 04	140 / 8Ch	1	Operation mode of burner	R	U16		1...29
R 03 / 04	141 / 8Dh	1	Only with LMV26 / LMV36: Operation mode of burner *Fuel 1*	R	U16		1...29
R 03 / 04	142 / 8Eh	2	Switching cycles *Revert to pilot*	R	S32		0…9 999 999
R 03 / 04	144 / 90	1	lower range limit trim function	R	S16	PT_Prozent_01	0…-15%
R 03 / 04	145 / 91	1	upper range limit trim function	R	S16	PT_Prozent_01	0…25%
R 03 / 04	146 / 92	1	lower range limit trim function fuel 1	R	S16	PT_Prozent_01	0…-15%
R 03 / 04	147 / 93	1	upper range limit trim function fuel 1	R	S16	PT_Prozent_01	0…25%
R 03 / 04	148 / 94	1	input value analog input trim function	R	S16	PT_Prozent_01	-15...+25%
R 03 / 04	149 / 95	1	current trim correction	R	S16	PT_Prozent_01	-15...+25%
R 03 / 04	150 / 96	1	absolute speed	R	U16		0…65535
R 03 / 04	151 / 97	1	mains voltage (standardized, (this means that a conversion factor must be taken into account)	R	U16		0...255 Conversion factor 120 V: value x 0,866 230 V: value x 1,710
03 / 04	544 / 220h	8	Error history: Current error Structure: Error code Diagnostic code Error class Error phase Type of fuel Output Start counter total	R	 U16 U16 U16 U16 U16 U16 U32		
03 / 04	552 / 228h : 744 / 2E8h	8 8	Error history: Current error -1 Error history: Current error -24	R	U16 / U32 []		

1) To avoid a conflict with the LMV5 Modbus parameters, we recommend using the following parameters when operating the LMV3 as the same time as LMV5:

- Parameter no. 140 instead of parameter no. 127
- Parameter no. 141 instead of parameter no. 128
- Parameter no. 142 instead of parameter no. 129

8.2 Legend to overview table

Access	R	Read only value
	R / W	Read and write value
Data format	U8	Character string
	U16	16 Bit Integer (subject to sign)
	U32	32 Bit Integer (not subject to sign)
	S16	16 Bit Integer (subject to sign)
	☞	Note! This data type is also used to mark invalid or non-existing values by using the value «-1».
	S32	32 Bit Integer (subject to sign)
	☞	Note! This data type is also used to mark invalid or non-existing values by using the value «-1».
[ ]		Data array
[1])		Refer to section «Write restrictions»

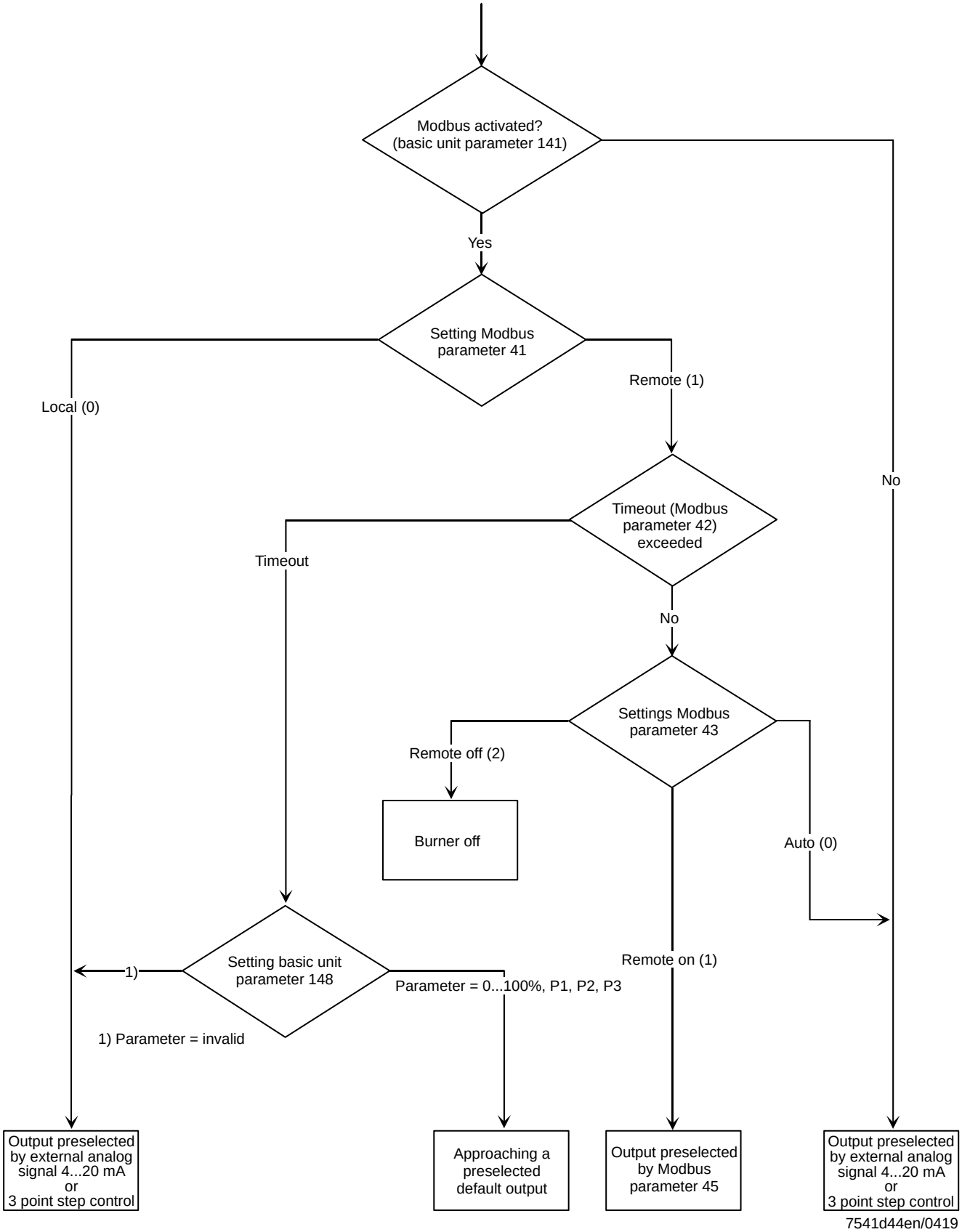
Data types

Type	Physical range	Internal range	Resolution	Conversion internally / physically
PT_PROZENT_01	0…100%	0...1000	0.1%	/ 10
PT_WINKEL	-50...150°	-500...1500	0.1°	/ 10
PT_LEISTUNG_BEGRENZT	Modulating operation: 20...100% Multistage operation: 1001 stage 1 1002 stage 2 1003 stage 3 32767 = invalid	Modulating operation: 200...1000 Multistage operation: 1001..1003 32767 = invalid	Modulating operation: 0.1% Multistage operation: 1	Modulating operation: / 10 Multistage operation: -1000
PT_LEISTUNG	Modulating operation: 0...19.9% = Burner OFF 20…100% = Burner capacity Multistage operation: 1001 stage 1 1002 stage 2 1003 stage 3 32767 = invalid	Modulating operation: 0...199 200…1000 Multistage operation: 1001..1003 32767 = invalid	Modulating operation: 0.1% Multistage operation: 1 32767 = invalid	Modulating operation: / 10 Multistage operation: -1000 32767 = invalid

8.3 Write restrictions

☞ Note!
The parameters marked with an asterisk in the overview table of section 8.1 («Access» column) must not be continuously written since they are stored in EEPROM, and this memory only permits a limited number of write accesses (< 100,000) over its lifetime!

9 Changeover of controller operating mode



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9.1 Operating modes

Changing between «local» and «remote» mode

After activating Modbus communication, data can be exchanged between the basic unit and the Modbus master via the Modbus interface.
Preselection of the target output by the Modbus can only be made after the Modus has switched from «local» to «remote». This change is made by writing the *Modbus Mode* parameter (refer to section 8.1, Modbus address 41).

Preselection of the target output that were made previously have no impact and are set «invalid» when changing to remote operation.
The presetting after activation of Modbus communication is «local». When the basic unit is switched off, the mode is set back to the presetting.

Changeover of Modbus operating mode between «auto», «remote on» and «remote off»

This setting is used to determine the behavior of the system in remote operation. The setting is made by writing the parameter *Operating mode in remote operation* (refer to section 8.1, Modbus address 43).
With the «auto» setting, the output to be delivered is determined by the basic unit.
With the «remote on» setting, the Modbus master determines the output to be delivered by the system by predefining a target output.
With the «remote off» setting, the burner will be shut down. A new start is made only when the operating mode changes to «remote on» and a new preselection of target output is made, or after a change to local operation.
For output preselection via the building automation and control system, the controller on contact on the basic unit must be closed.
The presetting after activation of remote operation is «auto». When the basic unit is switched off, the operating mode will be reset to the preselected mode.

Monitoring of Modbus timeout

If communication between the Modbus and the basic unit breaks down, the time the breakdown lasts will be monitored (refer to section 8.1, Modbus address 42). Every permissible Modbus communication on this slave (basic unit) will restart monitoring. Monitoring only takes place in «remote» operation. If the time parameterized for communication breakdown is exceeded, a change from remote to local operation will take place. In that case, the system travels to the parameterized preselected output to be delivered in the event of a communication breakdown.

Note!
If the time is exceeded, the Modbus master must again select remote operation, that is, on bus return, addresses 41 and 43 and the preselected output must be again be written. Only then can the output be readjusted. Timeout is a Modbus parameter and is retained even if the basic unit is switched off.

9.2 Bus behavior in the event of burner lockout

If the basic unit has triggered lockout due to a fault, the selected operating mode with remote mode (Modbus addresses 41 and 43) will be retained when the unit is reset. For the required target output to be reached, all that is required is to preselect again the output via Modbus address 45.

10 Modbus settings on the basic unit

To be able to edit the Modbus parameters, at least the heating engineer (HF) level must be activated via the AZL2 / ACS410.

10.1 Slave address

The setting is made via parameter 145.

According addresses from 1...247 can be set. The slave address is stored in nonvolatile memory of the basic unit.

Changes can only be made via the LMV2 / LMV3, not via Modbus.

No.	Basic unit parameter	Settings	
		Unit	Resolution
145	Device address for Modbus of basic unit Setting values 1…247 (default setting: 1)	---	1

10.2 Baud rate of Modbus interface

The setting is made via parameter 146.

The parameter specifies the transmission rate for the interface used with the Modbus. The parameter is stored in nonvolatile memory of the basic unit.
Changes can only be made via the LMV2 / LMV3, not via Modbus.

No.	Basic unit parameter	Settings	
		Unit	Resolution
146	Setting of Baud rate for Modbus communication Setting values 0 = 9600 1 = 19200 (default setting: 1)	---	1

10.3 Parity of Modbus interface

The setting is made via parameter 147.

The parameter specifies the parity for the interface used with the Modbus. The parameter is stored in nonvolatile memory of the basic unit.
Changes can only be made via the LMV2 / LMV3, not via Modbus.

No.	Basic unit parameter	Settings	
		Unit	Resolution
147	Parity for Modbus 0 = none 1 = odd 2 = even (default setting: 0)	---	1

10.4 Step back time in the event of communication breakdown

The setting is made via parameter 142.

This parameter defines the maximum period of time communication between the Modbus and the basic unit may break down. When this time has elapsed, the Modbus operating mode changes automatically from «remote» to «local» and the output specified by parameter 148 will be delivered. The parameter is stored in nonvolatile memory of the basic unit.
Changes can be made both via the LMV2 / LMV3 and the Modbus.

No.	Basic unit parameter	Settings	
		Unit	Resolution
142	Step back time in the event of communication breakdown (default setting: 600 s = 10 min) Setting values 0 = inactive 1…7200 s	s	1

10.5 Preselected output in the event of communication breakdown

The fuel setting is made via parameter 148.

Only with LMV26 / LMV36:
For basic units that support 2 types of fuel, the setting for the second type of fuel is made via parameter 149.

The output set with this parameter is approached by the system when – in remote operation – communication breakdown was longer than the period of time set with parameter 142. If this output is set «invalid» and communication breakdown occurs, the system will deliver the output set on the basic unit. The parameter is stored in nonvolatile memory of the basic unit. Changes can be made both via the LMV2 / LMV3 and the Modbus (for address for Modbus, refer to chapter *Modbus addresses*).

No.	Basic unit parameter	Settings	
		Unit	Resolution
148 149	Performance standard at interruption of communication with building automation Setting values: For **modulating operation,** the setting range is as follows: 0…199 = burner off 20…1000 = 20…100% burner output (200 = low-fire position) If parameter 545 (lower output limit) or 546 (upper output limit) is set, that parameter is decisive for the adjustable burner output. For **multistage operation** apply to setting range: settings 0 = burner OFF, P1, P2, P3 Invalid = no performance standards of the building automation (default setting: invalid)	% or stages	1

10.6 Activation of Modbus

The setting is made via parameter 141.

Modbus functionality of the LMV2 / LMV3 will be activated when setting this parameter to «1». The parameter is stored in nonvolatile memory of the basic unit.
Changes can only be made via the LMV2 / LMV3, not via Modbus.

No.	Basic unit parameter	Settings	
		Unit	Resolution
141	Operating mode building automation 0 = off 1 = Modbus 2 = reserved (default setting: 0)	---	1

11 Modbus in connection with ACS410 / AZL2

If, together with the Modbus, the ACS410 PC tool is operated with the basic unit, it must be taken into consideration that write access will be rejected if, at the same time, the ACS410 makes a write access to parameters.
The simultaneous setting of a parameter from the AZL2 and the Modbus master must be avoided, since it would not be possible to predict who is granted the access right.
Write access via Modbus is possible at any time, independent of the AZL2 or ACS410.

Exception!
From software version 03.50, the output specification can also be carried out via Modbus with write access via ACS410. Write access to other parameters is not possible.

12 Error handling

In the event of erroneous telegrams (CRC errors, etc.), the AZL2 does not send an exception code (refer to Modbus definition) but ignores the messages.

Reason: Commercially available Modbus drivers do not normally respond to exception codes.

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