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1 General Information

1.1 Validity of these Instructions

This supplementary manual applies to the Modbus. It is only valid in combination with the basic documents of the following devices:

ETAMATIC / ETAMATIC S,
ETAMATIC OEM / ETAMATIC S OEM,
ETAMATIC V / ETAMATIC VS,
Burner Control FA1

the Combustion-Management-System
FMS 4 / FMS 5

and the Fuel and Air Ratio Control
VMS4 / VMS5

in any configuration.

2 Safety

2.1 German Law on Device Safety

The German Law on Device Safety regulates the following:

Note the instructions for use!

Use the device only in compliance with the instructions, which are contained in this document for Modbus (publication no. DLT6103-11-aEN-001).

If this document is a supplement, use it only in combination with the basic manuals.

Use the devices only for the purpose described in this documentation.

Used by trained personnel only.

Only persons whose knowledge and training qualifies them to do so, are allowed to operate and service the device . Note the safety provisions of the burner manufacturer.

To be used only in a grounded power line network!

Electrical connection with devices that are not mentioned in this operating instructions - only after consultation with the manufacturers or an authorized expert.

Liability for the function of the device shall be transferred to the owner or user.

Liability for the function of the device shall be borne by the owner or user insofar as the device has been used by persons without the necessary knowledge, has been improperly used, serviced or repaired or has been handled in a manner that does not conform to proper use.

Modifications to the device with type approval render the type approval null and void. Inputs and outputs of the device and associated modules may only be connected as indicated in this manual.

LAMTEC GmbH & Co. KG is **not** liable for damages occurring as a result of non-compliance with the above instructions. Compliance with the above instructions shall **not** entail any **extension** to the warranty and liability provisions of LAMTEC GmbH & Co. KG's terms of sale and delivery.

Insofar as reference is made to laws, regulations and standards, the basis for these shall be the law of the Federal Republic of Germany.

2.2 For Your Safety

In this operating instructions, the following symbols are used as important safety instructions to the user. These symbols appear wherever there is a need for this information in a particular section.

It is essential to note and comply with the safety instructions, particularly the warnings.



DANGER!

Indicates possible danger to personnel, particularly with regard to electrical equipment



WARNING!

Indicates possible danger to personnel if the system components are not handled correctly.



CAUTION!

Indicates danger to system components or possible impairment of functionality.



NOTICE!

Contains important additional information for the user concerning the system or system components and provides helpful tips

The above-described safety instructions are within the instructional texts.

In performing all tasks:


- 1 the operator is requested to observe all statutory safety regulations
- 2 to do everything possible, according to the circumstances, to prevent injury to persons or damage to equipment.

3 Version History

3 Version History

Vers.	Date	KP-Version	Cause and motive for modifications
2.00	11.09.02	K2u001	Developed for Communication Processor Software Version up from KPR2u001 and FMS/VMS/ETAMATIC Software up from A3z104
2.10	25.02.03	#	- RelayStatus in Register 8279 replaced by KPR_uiDigitalOut (identically up to bit 9 of RelayStatus) - Detailed description of Interface Parameter and of the Modbus-Transmission-Mode
2.20	06.07.04	M4y001 06.07.04	New: Serial Modbus-Line-Configuration via parameter 893
2.30	16.07.04	-	Only for pre-dokumentary purposes (custom offer): Write-Command-Register expanded with all GESTRA-Values
2.40	01.11.04	M4f002 01.11.04	- Write-Command-Register expanded with all GESTRA-Values - Example added: How to read the Oil-Safety-Chain from register 8280 - Description of bit patterns of registers 8279, 8280, 8281, 8285. - HP-Register write not allowed any more (Register-No. 9487) - Transmission of 13. Bit in the DigitalenEingängen Register-No. 9488 and Bit-Commands as „VMS Continuous ventilating“ with KPW_FAT_Dauerlüften 16 to VMS. - Transmission of 16. Bit in the DigitalenEingängen Register-No. 9488 and Bit-Commands as „ETAMATIC-V Curve Set-1“ to VMS. - SYSTEMBUS-Parameter added. - Table of contents added
2.41	31.05.05	M4m002 31.05.05	- New Modbus-Registers 8201...8205 with Actual Values in %
2.42	08.06.05	M4p002 08.06.05	Extensions of Register 9489 with curve settings for FMS with modbus-function 6 or 16 and also bit-commands with modbus-function 5
2.50	28.09.05	M5b001 28.09.05	- Version-history added - Description of Reg. 8264 moved to register table - Extensions of Read-Registers: 8340: O ₂ actual value (from LSB) ¹⁾ 8341: O ₂ actual value status (from LSB) ¹⁾ 8342: CO _e -value (from LSB) ¹⁾ 8343: CO _e -value status (from LSB) ¹⁾ 8344: Flue gas temperature (from LSB) ¹⁾ 8345: Flue gas temperature status (from LSB) ¹⁾ 8346: Induction air (from LSB) ¹⁾ 8347: Induction air status (from LSB) ¹⁾ 8348: Efficiency (from LSB) ¹⁾ 8349: Efficiency status (from LSB) ¹⁾ 8360-8374: All values from LT1/LT2-1 (Device-09) ¹⁾ 8375-8389: All values from LT1/LT2-2 (Device-10) ¹⁾ - Chapter 7.2.1...7.2.9 added: Description of all LT1/LT2-values
2.51	13.10.05	#	Warning added concerning the actualisation of the value range of the actual values
(2.60)	12.10.05	-	Preliminary definition only
(3.00)	16.06.04	-	Preliminary definition only

3 Version History

Vers.	Date	KP-Version	Cause and motive for modifications
3.10	21.10.05	M5e001 21.10.05 	<p>- Warning: From this version upwards bit-commands function-05: Bit-register addressing now with 0...31, instead before 1...32</p> <p>- Warning: From this version upwards Write-registers: Gestra-values at 9476-9485 now moved to 9492-9501</p> <p>- Modbus-register 8256 description of bits added</p> <p>- Chapter „Bit-commands (function 05)” moved to Chapter “Write-commands”</p> <p>Extensions of write-registers: 9476: mixing-signal for mixed combustion²⁾ 9489.8-.15: CO/O₂ controller, oil-pump, FAT-values, curve setting VMS²⁾ 9504 – 9512: LSB-modules²⁾ 9514 – 9518: PID-Controller²⁾ 9520 – 9524: NEMS-devices²⁾ - Chapter 7.1.1 – 7.1.6 added</p> <p>Extensions of read-registers: 8259: KPR_uiZustandInfoLeistungsregler²⁾ 8261: KPR_uiTextnummer²⁾ 8265: KPR_uiRelaisstatus²⁾ 8266: KPR_uiMischKorrWert²⁾ 8267: KPR_O2Impuls²⁾ 8268: KPR_uiO2CO_Betriebszustand²⁾ 8269: KPR_uiKSWechselInfo²⁾ 8270: KPR_uiMonitorausgang²⁾ 8271: KPR_uiFAT_State²⁾ 8272: KPR_uiBrennstoffMengenzaehler²⁾ 8273: KPR_uiLSBOutAusblasen²⁾ 8400 – 8415: LSB-modules²⁾ 8416 – 8447: NEMS-devices²⁾ - Chapter 7.3.10 – 7.3.16 added</p>
3.20	08.11.05	M5f001 08.11.05	<p>- Bit-registers extended with 32...255 for all bit-oriented write-values</p> <p>- Read-register 8416 extended with Bit 8...15 for NEMS-input-status-valid-bits</p> <p>- All new values since M5e001 completely tested</p>
3.21	10.11.05	#	<p>- Read-Register 8401 description modified LSB-Digital-Eingangsmodul 1,3,13,14</p> <p>- Description of new KPRs added</p>
3.22	07.12.05	M5h001 06.12.05	<p>- Chapter „4. Modbus-Parameters in the FMS/VMS“ completely revised and default value of parameter 889 corrected to „100“</p>
3.30	29.01.06	M5l001 29.01.06	<p>- New LSB-Addr. for Read-Registers 8201...8205</p> <p>- New Read-Register 8239 with %-Value of internal firing-rate ⁴⁾</p>
3.31	22.02.06	#	<p>register 8284 (5302.1): description of high-byte contents added</p>
3.32	05.04.06	#	<p>registers 8265 and 8279 bit descriptions extended</p>
3.33	18.04.06	M5n001 18.04.06	<p>- New Parameter 894 with minimal Query-Response-Time</p>
3.34	28.06.06	M5t001 28.06.06	<p>registers 8252, 8253 now not used (before 272.0, 272.1)</p>
3.35	01.09.09	M7q002 21.08.09	<p>Fix: NEMS message handshake fixed in Communication Processor unit</p> <p>NEMS status documentation fixed (bit 0 and 2 were swapped). Document for Register 8278 and 8281 updated.</p>

¹⁾ From communication processor version M5b001 28.09.05

²⁾ From communication processor version M5e001 21.10.05

⁴⁾ From communication processor version M5l001 29.01.06

4 SYSTEMBUS-Parameter for FMS/VMS/ETAMATIC

4 SYSTEMBUS-Parameter for FMS/VMS/ETAMATIC

With these parameters in the FMS/VMS the response of the communication processor to the LSB-Systembus can be configured.

FMS parameter	LSB-parameter	description	Standard value	value range
845	1	SYSTEMBUS-Family	1	
846	2	LSB-Modules-Occupancy-Configuration	6	With versions ¹⁾ and before, customer specific value 0...5 is valid With versions ²⁾ and higher this value must be = 6
847	3	LSB-Device-Number	1	
848	4	LSB-Analogue-Modules-Input-Output-Range-Configuration	0	see separate description
849	5	various special configurations	0	


¹⁾ From communication processor version M5b001 28.09.05

²⁾ From communication processor version M5e001 21.10.05

5 Modbus-Parameter in the FMS/VMS

5 Modbus-Parameter in the FMS/VMS

With these parameters in the FMS/VMS the Modbus-Interface can be configured.:

FMS Parameter	BUS-Parameter	Description	Standard values	Value range
886	1	reserved		
887	2	Modbus-Slave-Address	2	1...247
888	3	<p>FMS-Timeout Defines the response of FMS/VMS/ETAMATIC after disconnection from the modbus communication or after disconnecting the communication processor. In the case of stop receiving queries from the Modbus-Master after the timeout time set in Bus-Parameter-7, this Parameter can be used to shut off the burner by defined time and fault condition. The same reaction occurs if the communication between the communication processor and FMS/VMS/ETAMATIC is interrupted.</p> <p>NOTE: This Parameter 888 is only used for FMS/VMS/ETAMATIC internally. The communication processor does not use this parameter.</p> 	0	0...255 0 – The input data will be cleared after 5 seconds. It results in no fault condition and does not shut OFF the burner. 1 – After 5 seconds the burner shuts OFF due to fault condition. 2 – No reaction. The input data remains at the last values. >2 = Timeout-value [seconds] until one of the following reactions occur: a) for even numbers the input data will be cleared, it results in no fault condition and does not shut OFF the burner. b) for odd numbers it results in a fault condition and the burner shuts OFF.
889	4	<p>KP-Timeout Timeout value for the communication processor in units of 25 ms (after that time the data for the Modbus-master are set invalid if the communication to the FMS/VMS/ETAMATIC is disconnected, and the communication processor rejects any Modbus-response to the received Modbus-queries. A zero value (0) disables the timeout, so always Modbus-responses are transmitted with the last valid data.</p>	100 (*25ms = 2,5 s)	0...65500 (* 25 ms)
890	5	Baudrate for Modbus	3 entspricht 9600 Bit/s	0: 1200, 1: 2400, 2: 4800 3: 9600 , 4: 19200 Bit/s
891	6	<p>Message-Timeout When a started message transmission to the Modbus-Master is sending no more characters and exceeds the timeout value, the communication processor finishes the transmission and starts the evaluation.</p>	5 (5 * 1ms = 5ms)	3...20 ms
892	7	<p>Data-Reset-Time for Modbus If no more queries are received from the Modbus-Master, then the received Modbus-data will be cleared for the FMS/VMS/ETAMATIC after this Data-Reset-Time. A zero value (0) disables the timeout, which means the received Modbus-data is valid permanently.</p>	30 (30 * 1 s = 30 s)	0...999s

5 Modbus-Parameter in the FMS/VMS

FMS Parameter	BUS-Parameter	Description	Standard values	Value range
893	8	Parity and Stop-Bits for Modbus	0	0: 8N1 (no parity, 1 stop-bit) 1: 8E1 (even parity, 1 stop-bit) 2: 8O1 (odd parity, 1 stop-bit) 3: 8N2 (no parity, 2 stop-bits) 4: 8E2 (even parity, 2 stop-bits) 5: 8O2 (odd parity, 2 stop-bits)
894 ⁵⁾	9	Minimal Query-Response-Time	0	0...999 ms
895	10	reserved		

⁵⁾ From communication processor version M5n001 18.04.06

6 Parameters of the Interface

The Baudrate is adjustable between 1200 Baud and 19200 Baud (Parameter no. 890). The data are sent and received by default with **1 start bit, 8 data bits, No Parity** and **1 stop bit**. But these serial-line-parameters can be configured in FMS-Parameter no. 893. For the Modbus Transmission-Mode the RTU (Remote Terminal Unit) is used with the standard-16-Bit-CRC checksum at the end of each telegram. For 16-Bit-Values (i.e. Register-No.) always are transmitted first the high-byte and then the low-byte.

7 Modbus-Commands

From all possible Modbus-commands these are implemented:

Function	Command
03	read one or more registers
05	write one bit
06	write one register
08	LOOPBACK Test
16	write several registers

8 Register-Numbers

8 Register-Numbers

8.1 Write-Commands (Function 06 or 16)

Register- No. (dec)	LSB-Addr. Value No. 0..2	FMS/VMS/ETAMATIC destination	Description	Value Range
9472	5110.0 5110.1	KPW_Lastvorgabe KPW_Lastvorgabe_Status	Given firing-rate value	0...999
9473	5111.0 5111.1	KPW_Aussentemperaturvorgabe KPW_Aussentemperaturvorgabe_Status	Given outside temperature (only for weather guided firing-rate controller)	0...999
9474	5125.0 5125.1	KPW_Korrekturwert_1 KPW_Korrekturwert_1_Status	Input value of correction channel 1	0...999
9475	5126.0 5126.1	KPW_Korrekturwert_2 KPW_Korrekturwert_2_Status	Input value of correction channel 2	0...999
9476 ²⁾	5127.0 5127.1	KPW_Mischsignal KPW_Mischsignal_Status	Mixing signal for mixed combustion	0...999
9477		free		
9478		free		
9479		free		
9480		free		
9481		free		
9482		free		
9483		free		
9484		free		
9485		free		
9486	5210.0	RegisterNr	Main Processor register number	0...65535
9487		reserved für register-value		
9488	5100.x 5101.x 5102.x	DigitalIn	Bit pattern for digital input signals (see 7.2 Bit-commands bits 0...15)	0...65535 see bit pattern
9489	5101.x 5102.x 5103.x	DigitalIn_2	Bit pattern for digital input signals 2 (see 7.2 Bit-commands bits 16...31)	0...65535 see bit pattern
9490		free		
9491		free		
9492	5220.0	KPW_ucNRS_140_Flags_Niedrigwasser	Gestra-Tank-Value-Flags Bit 0...5: reserved Bit 6: Low-water cut off probe2 (NRG16-40) Bit 7: Low-water cut off probe1 (NRG16-40) Bit 8...15: reserved	
9493	5221.0	KPW_uiNRG1642_Wasserstand_digital	Water level digital Bit 0...3: Water level digital (Bit 0: longest probe... Bit 3: shortest probe) Bit 4...7: reserved Bit 8...11: Level in % (20, 40, 60, 80%) Bit 12...15: reserved	

8 Register-Numbers

Register-No. (dec)	LSB-Addr. Value No. 0..2	FMS/VMS/ETAMATIC destination	Description	Value Range
9494	5222.0	KPW_uiNRG2640_Wasserstand_analog	Water level analogue (0...100%)	0...100
9495	5223.0	KPW_ucNRR_240_Speisewasserventil	Feed water valve position in % (0...100%)	0...100
9496	5224.0	KPW_uiLRG1640_kompens_Leitfaehig	Compensated conductivity (0...12000 µS)	0...12000
9497	5224.1	KPW_uiLRG1640_Medientemperatur	Medium temperature in 1/10 °C	
9498	5225.0	KPW_ucLRR_140_Flag_Handbetrieb	Flag for manual operation (0x55=active, 0xAA=passive)	0x0055 o. 0x00AA
9499	5226.0	KPW_ucNRS_141_Flags_Hochwasser	Bit 0...6: reserved Bit 7: High-water cut off probe (NRG16-41) Bit 8...15: reserved	
9500	5230.0	KPW_uilstwert_Druck	current pressure value	
9501	5230.1	KPW_uilstwert_Temperatur	current temperature value	
9502		free		
9503		free		
9504 ²⁾	4213.1	LSB-Analog-Output-Module-11.1	LSB-analogue-Output-Module-11 Output 1	
9505 ²⁾	4213.2	LSB-Analog-Output-Module-11.2	LSB-analogue-Output-Module-11 Output 2	
9506 ²⁾	4214.0	LSB-Analog-Output-Module-11.3	LSB-analogue-Output-Module-11 Output 3	
9507 ²⁾	4214.1	LSB-Analog-Output-Module-11.4	LSB-analogue-Output-Module-11 Output 4	
9508 ²⁾	4214.2	LSB-Analog-Output-Module-12.1	LSB-analogue-Output-Module-12 Output 1	
9509 ²⁾	4215.0	LSB-Analog-Output-Module-12.2	LSB-analogue-Output-Module-12 Output 2	
9510 ²⁾	4215.1	LSB-Analog-Output-Module-12.3	LSB-analogue-Output-Module-12 Output 3	
9511 ²⁾	4215.2	LSB-Analog-Output-Module-12.4	LSB-analogue-Output-Module-12 Output 4	
9512 ²⁾	4222.2	LSB-Digital-Outputs-Module-6 and -7	Bit 0...3: reserved Bit 4...7: LSB-Digital-Output-Module-6 Bit 8...11: LSB-Digital-Output-Module-7 Bit 12...15: reserved	
9513 ²⁾		free		
9514 ²⁾		PID-Controller-Output		
9515 ²⁾		PID-Controller-Analog-Output-1		
9516 ²⁾		PID-Controller-Analog-Output-2		
9517 ²⁾		PID-Controller-Analog-Output-3		
9518 ²⁾		PID-Controller-Analog-Output-4		
9519 ²⁾		free		

8 Register-Numbers

Register-No. (dec)	LSB-Addr. Value No. 0..2	FMS/VMS/ETAMATIC destination	Description	Value Range
9520 ²⁾	- 6120.0	NEMS-Handshake-Out and NEMS-Key-Functions	NEMS-Handshake-Out: Bit 0: DataRead (new Message reading) Bit 1, 2, 3: free NEMS-Key-Functions: Bit 4 (0→ 1):LP lamp-test Bit 5 (0→ 1):HQ signal-horn-quit Bit 6 (0→ 1):EQ first-event-confirm Bit 7 (0→ 1):NQ New-event-confirm Bit 8...15: free	
9521 ²⁾	6010.1 6010.0	NEMS-Relais 1...16	Bit 0: relay 1 device 1 family 1 Bit 1: relay 2 device 1 family 1 Bit 2: relay 1 device 2 family 1 Bit 3: relay 2 device 2 family 1 Bit 4: relay 1 device 3 family 1 Bit 5: relay 2 device 3 family 1 Bit 6: relay 1 device 4 family 1 Bit 7: relay 2 device 4 family 1 Bit 8: relay 1 device 5 family 1 Bit 9: relay 2 device 5 family 1 Bit 10: relay 1 device 6 family 1 Bit 11: relay 2 device 6 family 1 Bit 12: relay 1 device 7 family 1 Bit 13: relay 2 device 7 family 1 Bit 14: relay 1 device 8 family 1 Bit 15: relay 2 device 8 family 1	
9522 ²⁾	257.0	NEMS-Time set	NEMS-Day (High-Byte) in BCD, NEMS-month (Low-Byte) in BCD, see description below	
9523 ²⁾	257.1	NEMS-Time set	NEMS-Year (High-Byte) in BCD, NEMS-Hour (Low-Byte) in BCD, see description below	
9524 ²⁾	257.2	NEMS-Time set	NEMS-Minute (High-Byte) in BCD, NEMS-Second (Low-Byte) in BCD, see description below	

²⁾ communication processor version M5e001 21.10.05

8.1.1 LSB-Analogue-Output-Module-11

(Register-No. 9504...9507)

These values are sent to LSB-Analog-Output-Module-11 (LSB-Module-address 43). Value 0 corresponds to 0 V output voltage, the value 999 (0x03E7) corresponds to 9,99 V output voltage.

8.1.2 LSB-Analogue-Output-Module-12

(Register-No. 9508...9511)

These values are sent to LSB-Analog-Output-Module-12 (LSB-Module-address 47). Value 0 corresponds to 0 V output voltage, the value 999 (0x03E7) corresponds to 9,99 V output voltage.

8 Register-Numbers

8.1.3 LSB-Digital-Output-Module-6 and 7

(Register-No. 9512)

Bits 4...7 of this value are sent to LSB-Digital-Output-Module-6 (LSB-Module-address 23) and Bits 8...11 are sent to LSB-Digital-Output-Module-7 (LSB-Module-address 27).

8.1.4 NEMS-Handshake-Out

(Register-No. 9520, Bit 0)

See description under „NEMS-Read-Registers“

8.1.5 NEMS-Key-Functions

(Register-No. 9520, Bit 4...7)

Same functionality as the keys on the NEMS-Devices (only the edge 0 → 1 of the bits causes the respective action):

Bit 4 (0 → 1): LP: Lamp-Test

Bit 5 (0 → 1): HQ: Signal-Horn-Quit

Bit 6 (0 → 1): EQ: First-Event-Confirm

Bit 7 (0 → 1): NQ: New-Event-Confirm

8.1.6 NEMS-Relay 1...16

(Register-No. 9521)

Bit 0 is sent to relay 1 of NEMS-Device 1 family 1.

Bit 1 is sent to relay 2 of NEMS-Device 1 family 1.

Bit 2 is sent to relay 1 of NEMS-Device 2 family 1.

Bit 3 is sent to relay 2 of NEMS-Device 2 family 1.

Bit 4 is sent to relay 1 of NEMS-Device 3 family 1.

Bit 5 is sent to relay 2 of NEMS-Device 3 family 1.

Bit 6 is sent to relay 1 of NEMS-Device 4 family 1.

Bit 7 is sent to relay 2 of NEMS-Device 4 family 1.

Bit 8 is sent to relay 1 of NEMS-Device 5 family 1.

Bit 9 is sent to relay 2 of NEMS-Device 5 family 1.

Bit 10 is sent to relay 1 of NEMS-Device 6 family 1.

Bit 11 is sent to relay 2 of NEMS-Device 6 family 1.

Bit 12 is sent to relay 1 of NEMS-Device 7 family 1.

Bit 13 is sent to relay 2 of NEMS-Device 7 family 1.

Bit 14 is sent to relay 1 of NEMS-Device 8 family 1.

Bit 15 is sent to relay 2 of NEMS-Device 8 family 1.

8.1.7 NEMS-Time set

(Register-No. 9522...9524)

The NEMS-Time is always set with the values of the registers 9522-9524 for the NEMS-devices, but only when register 9524 is written. Setting the NEMS-Time has to be done by writing the registers 9522-9524 with one write-command using Modbus-Function-16, or with 3 write-commands with Modbus-Function-6 writing the registers 9522, 9523, 9524 in this sequence.

8 Register-Numbers



WARNING!

During run-time the register 9524 should not always been written (exchanged), because every time the NEMS-Time is set, the NEMS-devices are running a system-reset operation automatically.



NOTICE!

After setting the NEMS-Time the NEMS-Devices are running a system-reset operation automatically!!!



NOTICE!

If a remote clock is connected to the NEMS-Devices, the setting of the NEMS-Time via Modbus is ignored !!!

8.2 Bit-Commands (Function 05)

The bold italic marked text for the **FMS** are neither copied nor stored for safety reasons. With **VMS** the curve setting can be done via Reg.No. 9488 or 9489. The bit-values of the curve setting of these two registers are being OR-ed. Only one of the 8 curve sets should be selected at one time. If no curve set is selected (all bits = 0) or if more than one curve set is selected (more than one bit = 1), a fault state of the burner will be caused (if the burner was in ON-state).

Bit-Register No.	Write-Register No. and Bit No.	Terminal Input No.	Function with FMS	Function with VMS
0	9488.0	1	Pre-ventilation rejection	Curve set no. 6
1	9488.1	2	Burner "ON"	Burner start up
2	9488.2	3	Fault reset (only edge 0→ 1)	Pre-Ventilation
3	9488.3	4	Control release	Control release
4	9488.4	5	<i>Gas safety interlock circuit</i>	Curve set no. 3
5	9488.5	6	Flue gas recirculation "ON"	Recirculation „ON“
6	9488.6	7	<i>Gas pressure < max</i>	Curve set no. 1
7	9488.7	8	<i>Flame signal</i>	Flame signal
8	9488.8	35	<i>Boiler safety interlock circuit</i>	Curve set no. 2
9	9488.9	69	Oil safety interlock circuit	Curve set no. 4
10	9488.10	70	Setpoint switching	Setpoint switching
11	9488.11	71	External high fire position prove true	Curve set no. 5
12	9488.12	72	<i>Air fan pressure switch</i>	VMS-Continuous ventilating
13	9488.13	73	<i>Gas pressure < min</i>	Curve set no. 7
14	9488.14	74	External ignition position prove true	Curve set no. 8
15	9488.15	75	Fuel selection	ETAMATIC-V Curve set no. 1
16	9489.0	-	Curve set no. 1	Curve set no. 1 ²⁾
17	9489.1	-	Curve set no. 2	Curve set no. 2 ²⁾
18	9489.2	-	Curve set no. 3	Curve set no. 3 ²⁾
19	9489.3	-	Curve set no. 4	Curve set no. 4 ²⁾
20	9489.4	-	Curve set no. 5	Curve set no. 5 ²⁾
21	9489.5	-	Curve set no. 6	Curve set no. 6 ²⁾
22	9489.6	-	Curve set no. 7	Curve set no. 7 ²⁾

8 Register-Numbers

Bit-Register No.	Write-Register No. and Bit No.	Terminal Input No.	Function with FMS	Function with VMS
23	9489.7	-	Curve set no. 8	Curve set no. 8 ²⁾
24	9489.8	-	O ₂ Controller on/off ²⁾	O ₂ Controller on/off ²⁾
25	9489.9	-	CO Controller on/off ²⁾	CO Controller on/off ²⁾
26	9489.10	-	Oil pump on/off ²⁾	reserved
27	9489.11	-	reserved	reserved
28	9489.12	-	FAT-Standby ²⁾	reserved
29	9489.13	-	FAT-Continuous ventilating ²⁾	VMS-Continuous ventilating ²⁾
30	9489.14	-	reserved	reserved
31	9489.15	-	reserved	reserved
32...47	9490.0...15	-	reserved for 9490 ^{**)}	reserved for 9490 ^{**)}
48...63	9491.0...15	-	reserved for 9491 ^{**)}	reserved for 9491 ^{**)}
			All the following have the same functionality with FMS and VMS	
64...69	9492.0...5		reserved for 9492 ^{**)}	
70	9492.6		Low-water cut off probe 2 (NRG16-40)	
71	9492.7		Low-water cut off probe 1 (NRG16-40)	
72...79	9492.8...15		reserved for 9492 ^{**)}	
80	9493.0		Water level digital Bit 0: longest probe	
81	9493.1		Water level digital Bit 1: second longest probe	
82	9493.2		Water level digital Bit 2: second shortest probe	
83	9493.3		Water level digital Bit 3: shortest probe	
84...87	9493.4...7		reserved for 9493 ^{**)}	
88	9493.8		Level in %, Bit 8: 20 %	
89	9493.9		Level in %, Bit 9: 40 %	
90	9493.10		Level in %, Bit 10: 60 %	
91	9493.11		Level in %, Bit 11: 80 %	
92...95	9493.12...15		reserved for 9493 ^{**)}	
96...111	9498.0...15		reserved for 9498 ^{**)}	
112...118	9499.0...6		reserved for 9499 ^{**)}	
119	9499.7		High-water cut off probe (NRG16-41)	
120...127	9499.8...15		reserved for 9499 ^{**)}	
128...143	9502.0...15		reserved for 9502 ^{**)}	
144...159	9503.0...15		reserved for 9503 ^{**)}	
160...163	9512.0...3		reserved for 9512 ^{**)}	
164	9512.4		LSB-Digital-Output-Module-6 Output 1	
165	9512.5		LSB-Digital-Output-Module-6 Output 2	
166	9512.6		LSB-Digital-Output-Module-6 Output 3	
167	9512.7		LSB-Digital-Output-Module-6 Output 4	
168	9512.8		LSB-Digital-Output-Module-7 Output 1	
169	9512.9		LSB-Digital-Output-Module-7 Output 2	
170	9512.10		LSB-Digital-Output-Module-7 Output 3	
171	9512.11		LSB-Digital-Output-Module-7 Output 4	
172...175	9512.12...15		reserved for 9512 ^{**)}	
176...191	9513.0...15		reserved for 9513 ^{**)}	

8 Register-Numbers

Bit-Register No.	Write-Register No. and Bit No.	Terminal Input No.	Function with FMS	Function with VMS
192...207	9514.0...15		reserved for 9514 ^{**}) (PID-controller-digital-outputs)	
208...223	9519.0...15		reserved for 9519 ^{**})	
224	9520.0		DataRead (new Message reading) NEMS-Handshake-Out Bit 0	
225...227	9520.1...3		reserved for 9520 ^{**})	
228	9520.4		LP Lamp-Test NEMS-Key-Functions Bit 4 (0→ 1)	
229	9520.5		HQ Signal-Horn-Quit (Tasten) NEMS-Key-Functions Bit 5 (0→ 1)	
230	9520.6		EQ First-Event-Confirm NEMS-Key-Functions Bit 6 (0→ 1)	
231	9520.7		NQ New-Event-Confirm NEMS-Key-Functions Bit 7 (0→ 1)	
232...239	9520.8...15		reserved for 9520 ^{**})	
240	9521.0		NEMS-Relay 1 Device 1 Family 1	
241	9521.1		NEMS-Relay 2 Device 1 Family 1	
242	9521.2		NEMS-Relay 1 Device 2 Family 1	
243	9521.3		NEMS-Relay 2 Device 2 Family 1	
244	9521.4		NEMS-Relay 1 Device 3 Family 1	
245	9521.5		NEMS-Relay 2 Device 3 Family 1	
246	9521.6		NEMS-Relay 1 Device 4 Family 1	
247	9521.7		NEMS-Relay 2 Device 4 Family 1	
248	9521.8		NEMS-Relay 1 Device 5 Family 1	
249	9521.9		NEMS-Relay 2 Device 5 Family 1	
250	9521.10		NEMS-Relay 1 Device 6 Family 1	
251	9521.11		NEMS-Relay 2 Device 6 Family 1	
252	9521.12		NEMS-Relay 1 Device 7 Family 1	
253	9521.13		NEMS-Relay 2 Device 7 Family 1	
254	9521.14		NEMS-Relay 1 Device 8 Family 1	
255	9521.15		NEMS-Relay 2 Device 8 Family 1	

Example for function-05 byte contents:

Byte-No	1	2	3	4	5	6	7	8
Meaning	Addr	Function	HighByte Register	LowByte Register	ON/OFF value	zero	CRC	CRC
Value	04	05	00	01 (for Burner ON)	0xFF (switch on) 0x00 (switch off)	00	0x2D	0xAF

²⁾ From communication processor version M5e001 21.10.05

^{**)} Future Extensions, not implemented yet

8 Register-Numbers

8.3 Write Commands (Function 03)



NOTICE!

With one read-command the maximal number of 125 Read-Registers can be read.

Register-No. (decimal)	LSB-Addr. Value No. 0..2	FMS/VMS/ETAMATIC Source	Description	Value Range
8192	5303.0	KPR_uiInterneLast	internal firing-rate value	0..999
8193	5303.1	KPR_uiLastMin	base firing-rate point	0..999
8194	5303.2	KPR_uiLastMax	high firing-rate point	0..999
8195	5310.0	KPR_uiKesselTemp	actual value of firing-rate controller (if available)	0..999
8196	5401.0	KPR_uilstwert_Kanal_1	actual value, main processor, channel 1	0..999
8197	5402.0	KPR_uilstwert_Kanal_2	actual value, main processor, channel 2	0..999
8198	5403.0	KPR_uilstwert_Kanal_3	actual value, main processor, channel 3	0..999
8199	5404.0	KPR_uilstwert_Kanal_4	actual value, main processor, channel 4	0..999
8200	5405.0	KPR_uilstwert_Kanal_5	actual value, main processor, channel 5	0..999
8201	5406.2 (5406.0) (5406.1)	KPR_uilstwert_Kanal_1 (KPR_uiMinWert_Kanal_1) (KPR_uiMaxWert_Kanal_1)	Actual value main processor channel 1 in % 0% = actuator position at low level of value range limit 100% = actuator position at high level of value range limit	0..100
8202	5407.2 (5407.0) (5407.1)	KPR_uilstwert_Kanal_2 (KPR_uiMinWert_Kanal_2) (KPR_uiMaxWert_Kanal_2)	Actual value main processor channel 2 in % 0% = actuator position at low level of value range limit 100% = actuator position at high level of value range limit	0..100
8203	5408.2 (5408.0) (5408.1)	KPR_uiInterneLast (KPR_uiMinWert_Kanal_3) (KPR_uiMaxWert_Kanal_3)	Actual value main processor channel 3 in % 0% = actuator position at low level of value range limit 100% = actuator position at high level of value range limit	0..100
8204	5409.2 (5409.0) (5409.1)	KPR_uiInterneLast (KPR_uiMinWert_Kanal_4) (KPR_uiMaxWert_Kanal_4)	Actual value main processor channel 4 in % 0% = actuator position at low level of value range limit 100% = actuator position at high level of value range limit	0..100
8205	5410.2 (5410.0) (5410.1)	KPR_uiInterneLast (KPR_uiMinWert_Kanal_5) (KPR_uiMaxWert_Kanal_5)	Actual value main processor channel 5 in % 0% = actuator position at low level of value range limit 100% = actuator position at high level of value range limit	0..100
8206	5401.1	KPR_uiKorrSollwert_Kanal_1	setpoint, main processor, channel 1	0..999
8207	5402.1	KPR_uiKorrSollwert_Kanal_2	setpoint, main processor, channel 2	0..999
8208	5403.1	KPR_uiKorrSollwert_Kanal_3	setpoint, main processor, channel 3	0..999
8209	5404.1	KPR_uiKorrSollwert_Kanal_4	setpoint, main processor, channel 4	0..999
8210	5405.1	KPR_uiKorrSollwert_Kanal_5	setpoint, main processor, channel 5	0..999
8211		free		
8212		free		

8 Register-Numbers

Register-No. (decimal)	LSB-Addr. Value No. 0..2	FMS/VMS/ETAMATIC Source	Description	Value Range
8213		free		
8214		free		
8215		free		
8216	5406.0	KPR_uiMinWert_Kanal_1	lower stop, main processor, channel 1	0..999
8217	5407.0	KPR_uiMinWert_Kanal_2	lower stop, main processor, channel 2	0..999
8218	5408.0	KPR_uiMinWert_Kanal_3	lower stop, main processor, channel 3	0..999
8219	5409.0	KPR_uiMinWert_Kanal_4	lower stop, main processor, channel 4	0..999
8220	5410.0	KPR_uiMinWert_Kanal_5	lower stop, main processor, channel 5	0..999
8221		free		
8222		free		
8223		free		
8224		free		
8225		free		
8226	5406.1	KPR_uiMaxWert_Kanal_1	upper stop, main processor, channel 1	0..999
8227	5407.1	KPR_uiMaxWert_Kanal_2	upper stop, main processor, channel 2	0..999
8228	5408.1	KPR_uiMaxWert_Kanal_3	upper stop, main processor, channel 3	0..999
8229	5409.1	KPR_uiMaxWert_Kanal_4	upper stop, main processor, channel 4	0..999
8230	5410.1	KPR_uiMaxWert_Kanal_5	upper stop, main processor, channel 5	0..999
8231		free		
8232		free		
8233		free		
8234		free		
8235		free		
8236		free		
8237		free		
8238		free		
8239 ⁴⁾	5303.0 (5303.1) (5303.2)	KPR_uiInterneLast (KPR_uiLastMin) (KPR_uiLastMax)	0% = base firing-rate: internal firing-rate-value at low level of value range 100% = max. firing-rate: internal firing-rate-value at high level of value range	0..100
8240	5301.0	KPR_uiInterneLast	position of the internal firing-rate	
8241	5301.1	KPR_uiLastvorgabeDisplay	active firing-rate presetting	
8242	5301.2	KPR_uiHPLastEingang	terminal input of the external firing-rate	
8243	5411.0	KPR_Leistungsregler_Sollwert	firing-rate controller setpoint	
8244	5120.0	O ₂ actual value (from LSB e.g. LT1)	O ₂ actual value	
8245	5120.1	O ₂ actual value state (from LSB e.g. LT1)	O ₂ actual value status	
8246	5320.0	KPR_uiO2Sollwert	O ₂ setpoint value	
8247	5320.1	KPR_O2Betriebsmodus	O ₂ controller operating status	
8248	5320.2	KPR_O2Fehlerursache	O ₂ controller warning/fault	
8249	5325.1	KPR_COBetriebsmodus	CO controller operating status	
8250	5325.2	KPR_COFehlerursache	CO controller warning/fault	
8251	5311.0	KPR_uiAussenTemp	outside temperature (unsigned)	
8252 ⁶⁾		free		

8 Register-Numbers

Register-No. (decimal)	LSB-Addr. Value No. 0..2	FMS/VMS/ETAMATIC Source	Description	Value Range
8253 ⁶⁾		free		
8254	5420.0	KPR_ucAktFreigabe	active access level	
8255	5331.0	KPR_uiFlammIntens	flame intensity	
8256	5305.0 (5304.1)	KPR_uiInterneZustandsinfo	Bit 0 leakage test is running Bit 1 boiler thermostat Bit 2 reserved for curve set change is running Bit 3 reserved for curve set change is running Bit 4 ETAMATIC TRIAC self test is running Bit 5 flame signal Bit 6 CO controller is defective Bit 7 CO controller is defective	
8257	5305.1	KPR_uiZustandInfoLSB	Information text	
8258	5305.2	KPR_uiZustandInfoParameterLSB	additional information for the information text (i.e. channel no.)	
8259 ²⁾	5350.0	KPR_uiZustandInfoLeistungsregler	additional information for firing-rate controller actual value of the firing-rate controller is above the switch-on point Bit 0 Def_LR_UEBER_EIN 1	
8260	5330.0	KPR_FMS_Brennstoff	OIL or GAS active at FMS	
8261 ²⁾	5304.2	KPR_uiTextnummer	Information text no.	
8262	5422.0	KPR_uiSynchron	0x0001 ignition position main processor 0x0002 ignition position monitoring processor 0x0004 high firing-rate main processor 0x0008 high firing-rate monitoring processor Bit 4...15 reserved	
8263	5422.1	KPR_uiAcHandmodus	Manual Mode: 0x0001 fuel-air ratio control setting via front panel 0x0002 O ₂ setting via front panel 0x0004 Given firing-rate at normal operation via front panel 0x0100 Given firing-rate for fuel-air ratio control adjustment by Remote Control Software 0x0200 Given firing-rate for O ₂ adjustment by Remote Control Software 0x0400 External manual given firing-rate 0x0800 External manual given firing-rate 0x1000 Manual given firing-rate under control mode operation via Remote Control Software 0x2000 Given firing-rate via LSB / Field bus Remaining bits are reserved.	

8 Register-Numbers

Register-No. (decimal)	LSB-Addr. Value No. 0..2	FMS/VMS/ETAMATIC Source	Description	Value Range
8264	5422.2	Bit-combination of: KPR_uiSynchron and KPR_uiAcHandmodus	<p>0x0200: Ignition position reached Set bit only if following both bits of KPR_uiSynchron simultaneously reach value 1 PQ_ZP_HP 0x0001 // Ignition position Main processor reached PQ_ZP_UE 0x0002 // Ignition position Monitoring processor reached</p> <p>0x0400: High fire position reached Set bit only if following both bits of KPR_uiSynchron simultaneously reach value 1 PQ_GL_HP 0x0004 // High fire position Main processor reached PQ_GL_UE 0x0008 // High fire position Monitoring processor reached</p> <p>0x0800: Manual operation Following bits of KPR_uiAcHandmodus are WIRED OR. 0x0001 fuel-air ratio control setting via front panel 0x0002 O₂ setting via front panel 0x0004 Manual given burner firing-rate controlled via front panel 0x0100 Burner firing-rate given for fuel-air ratio control setting by Remote Software 0x0200 Burner firing-rate given for O₂ adjustment by Remote-Software 0x0400 External manual given firing-rate 0x0800 External manual given firing-rate 0x1000 Manual given burner firing-rate in control mode via Remote Control Software therefore KPR_uiAcHandmodus & 0x1fff</p>	

8 Register-Numbers

Register-No. (decimal)	LSB-Addr. Value No. 0..2	FMS/VMS/ETAMATIC Source	Description	Value Range
8265 ²⁾	5304.0	KPR_uiRelaisstatus	<p>Relay status</p> <p>FMS</p> <p>0x0001: oil valve 0x0002: ignition valve 0x0004: oil / gas 0x0008: end of pre-ventilation period 0x0010: gas1 0x0020: ignition transformer 0x0040: gas2 0x0080: fault relay 0x0100: fan ON (up to bit 9 identical with KPR_uiDigitalOut 149)</p> <p>ETAMATIC</p> <p>0x0001: oil valve 0x0002: ignition valve 0x0004: oil / gas 0x0008: oilpump 0x0010: gas1 0x0020: ignition transformer 0x0040: gas2 0x0080: fault relay 0x0100: fan ON (up to bit 9 identical with KPR_uiDigitalOut 149)</p> <p>VMS</p> <p>0x0001: ignition position main processor 0x0002: fault main processor 0x0004: mixed combustion fuel A release 0x0008: mixed combustion gas release 0x0010: fault monitoring processor 0x0020: reaching high firing-rate 0x0040: ignition point monitoring processor 0x0080: mixed combustion oil release 0x0100: burner ON (up to bit 9 identical with KPR_uiDigitalOut 149)</p>	
8266 ²⁾	5306.2	KPR_uiMischKorrWert	correction value of mixing signal	
8267 ²⁾	5321.2	KPR_O2Impuls	=, +, -, ! → sO ₂ Data.uclmpuls	
8268 ²⁾	5322.0	KPR_uiO2CO_Betriebszustand	<p>CO/O₂ Status (values are in decimal):</p> <p>1 measured O₂ value too low at pre-ventilation 2 measured O₂ value too high during pre-ventilation 3 measured O₂ value too high after pre-ventilation 4 no probe-dynamics: O₂ controller inactive 5 measured O₂ value 1 upper range exceeded 6 measured O₂ value 2 upper range exceeded 7 measured O₂ value 1 upper range exceeded 8 measured O₂ value 2 lower range exceeded 9 half of the air deficiency value reached</p>	

8 Register-Numbers

Register-No. (decimal)	LSB-Addr. Value No. 0..2	FMS/VMS/ETAMATIC Source	Description	Value Range
8268	5322.0	KPR_uiO2CO_Betriebszustand	<p>CO/O₂ Status (values are in decimal):</p> <p>10 measured O₂ Value defective 11 measurement O₂ Value defective (LSB defective) 12 O₂ controller defective, internal error 13 air deficiency: O₂ controller deactivated 14 air deficiency: O₂ controller deactivated 15 no probe dynamics: increasing air supply 16 correction limited:O₂ controller deactivated 17 O₂ controller defective 18 O₂ setpoint curve not OK 19 not defined 20 O₂ controller defective 21 O₂ controller defective 22 not defined 23 not defined 24 O₂ controller standby 25 O₂ controller OFF: firing-rate value out of range 26 O₂ controller OFF 27 O₂ controller defective 28 O₂ controller defective 29 O₂ controller defective 30 O₂ controller temporarily defective 31 O₂ controller via LSB OFF 32 correction value is run manually 33 O₂ controller in standby 34 O₂ controller in operation 35 effective CO probe value UCOe defective 40 no valid edge-information available at LSB 41 probe voltage not in monitoring window 42 probe-Offset-Voltage not in the monitoring window 43 cell internal resistance not in monitoring window 44 cell internal temperature not in monitoring window 45 probe voltage dynamics is not visible 46 internal firing-rate is outside of the parameterized window 47 CO controller is deactivated by the monitoring processor 48 CO controller is deactivated by LSB 49 CO controller is deactivated by O₂ monitoring 50 effective CO probe voltage UCOe is outside the monitoring window 51 CO controller active</p> <p>Rest: not defined</p> <p>The text definition is always followed by the corresponding code no.</p>	
8269 ²⁾	5330.2	KPR_uiKSWechselInfo	information of the curve set changing	
8270 ²⁾	5331.1	KPR_uiMonitorausgang	Monitoring output	
8271 ²⁾	5331.2	KPR_uiFAT_State	Status of FAT	




8 Register-Numbers

Register-No. (decimal)	LSB-Addr. Value No. 0..2	FMS/VMS/ETAMATIC Source	Description	Value Range
8272 ²⁾	5351.1	KPR_uiBrennstoffMengenzaehler	Fuel amount counter	
8273 ²⁾	5352.0	KPR_uiLSBOutAusblasen	LSB Out purge Bit 0: blow out valve Bit 1: sprayer valve Bit 2: FMS oil pump	
8274		free		
8275		free		
8276	5306.0	KPR_uiKoval_1	value correction channel 1	0..999
8277	5306.1	KPR_uiKoval_2	value correction channel 2	0..999
8278	5300.1	KPR_uiStoerung	Last fault code message Offset 10.000 for Monitoring-Processor Offset (0-4) if channel-dependant fault	0..999
8279	5302.2 (5422.2)	KPR_uiDigitalOut & 0xF1FF (RelayStatus) 5422.2 & 0x0E00	Status of relay outputs: 0x0001 relay 11 0x0002 relay 16 0x0004 relay 36 0x0008 relay 41 0x0010 relay 43 0x0020 relay 45 0x0040 relay 67 0x0080 relay 68 0x0100 relay 76 0x0200 Ignition position reached*) 0x0400 High firing-rate reached*) 0x0800 Manual given firing-rate*) 0x1000 Curve set change is running 0x2000 Mixed combustion relay FMS 0x0001 Oil valve 0x0002 Ignition valve 0x0004 OIL / GAS 0x0008 End of per-ventilation period 0x0010 Gas valve 1 0x0020 Ignition transformer 0x0040 Gas valve 2 0x0080 Fault relay 0x0100 Fan ON 0x0200 Ignition position reached*) 0x0400 High firing-rate reached*) 0x0800 Manual given firing-rate*) 0x1000 Curve set change is running 0x2000 Mixed combustion relay	0..65535


8 Register-Numbers

Register-No. (decimal)	LSB-Addr. Value No. 0..2	FMS/VMS/ETAMATIC Source	Description	Value Range
			ETAMATIC 0x0001 Oil valve 0x0002 Ignition valve 0x0004 OIL / GAS 0x0008 Oil pump 0x0010 Gas valve 1 0x0020 Ignition transformer 0x0040 Gas valve 2 0x0080 Fault relay 0x0100 Fan ON 0x0200 Ignition position reached*) 0x0400 High firing-rate reached*) 0x0800 Manual given firing-rate*) 0x1000 Curve set change is running 0x2000 Reserved VMS 0x0001 Ignition position main processor 0x0002 Fault main processor 0x0004 Mixed combustion fuel A release 0x0008 Mixed combustion Gas release 0x0010 Fault monitoring processor 0x0020 High firing-rate reached 0x0040 Ignition position main processor 0x0080 Mixed combustion Oil release 0x0100 Burner ON 0x0200 Ignition position reached*) 0x0400 High firing-rate reached*) 0x0800 Manual given firing-rate*) 0x1000 Curve set change is running 0x2000 Mixed combustion relay	
8280	5302.0	KPR_uiDigitalIn Example: Reading the Oil-Safety-Chain via register 8280. Use for example the outputbytes 30,31. Put the number 8280 (decimal!) into the inputbytes 16,17 and do not change this no further. Then read out the 16 input terminals from the outputbytes 30,31. The Oil-Safety-Chain can be read out from Bit-6 (0x0040)	Mode of digital inputs: FMS 0x8000 Pre-ventilation suppression 0x4000 Burner ON 0x2000 Fault release 0x1000 Control release 0x0800 Safety interlock chain gas 0x0400 Recirculation ON 0x0200 Gas pressure < max / ignition flame 0x0100 Main flame 0x0080 Safety interlock chain boiler 0x0040 Safety interlock chain oil 0x0020 Setpoint switching 0x0010 High firing-rate reached 0x0008 Air pressure monitor 0x0004 Gas pressure > min 0x0002 Ignition position acknowledgement 0x0001 Fuel switching	0..65535

8 Register-Numbers

Register-No. (decimal)	LSB-Addr. Value No. 0..2	FMS/VMS/ETAMATIC Source	Description	Value Range
8280	5302.0	KPR_uiDigitalln	Mode of digital inputs: VMS 0x8000 Curve set-6 0x4000 Burner ON 0x2000 Pre-ventilation 0x1000 Control release 0x0800 Curve set-3 0x0400 Recirculation ON 0x0200 Curve set -1 0x0100 Flame signal 0x0080 Curve set -2 0x0040 Curve set -4 0x0020 Setpoint switching 0x0010 Curve set -5 0x0008 Continuous ventilation 0x0004 Curve set -7 0x0002 Curve set -8 0x0001 External firing-rate limit	0..65535
8281	5300.0	KPR_uiBetrModus	Operating mode FMS: 0x0001 Power ON 0x0002 Burner OFF 0x0004 Burner standby 0x0008 Pre-ventilation 0x0010 Run to ignition position 0x0020 Ignition 0x0040 Base firing-rate 0x0080 Control mode 0x0200 Fault 0x1000 O ₂ adjustment 0x2000 Parameterization 0x4000 Setting 0x8000 Clear Memory	0..512
8282	5510.0	RegisterNr	register number main processor	0..65535
8283	5510.1	RegisterWert	register value main processor	0..65535
8284	5302.1	KPR_ucAktBrennstoff	active curve selection value = 0: curve set-1 value = 1: curve set-2 ... value= 7: curve set-8  NOTE: since version E4o002: High-Byte is expanded additionally with the bit signalisation of the active curve selection: Bit 8: curve set-1 Bit 9: curve set -2 Bit 10: curve set -3 Bit 11: curve set -4 Bit 12: curve set -5 Bit 13: curve set -6 Bit 14: curve set -7 Bit 15: curve set -8	Values: 0x0000, 0x0001 ... 0x0007 New Values: 0x0100 0x0201 0x0402 0x0803 0x1004 0x2005 0x4006 0x8007

8 Register-Numbers

Register-No. (decimal)	LSB-Addr. Value No. 0..2	FMS/VMS/ETAMATIC Source	Description	Value Range
8285	5421.0	KPR_ucSchalter_S5	Position of switch S5: 0x0001 display monitoring 0x0002 parameterization 0x0004 manual 0x0008 automatic 0x0010 setting 0x0020 Clear memory	0..65535
8286		free	 (NOTE: The Thermostat-Bit in this register is available via register 8263 Bit 1, with Modbus activation via internal bus card)	
8287		free		
8288		free		
8289		free		
8290		free		
8291		free		
8292		free		
8293		free		
8294		free		
8295		free		
8296		free		
8297		free		
8298		free		
8299		free		
8300	5520.0	KPR_BetrStd_Gesamt_Hi	total operating hours	
8301	5520.1	KPR_BetrStd_Gesamt_Lo	total operating hours	
8302	5521.0	KPR_BetrStd_Kurvensatz_1_Hi	operating hours curve set-1	
8303	5521.1	KPR_BetrStd_Kurvensatz_1_Lo	operating hours curve set-1	
8304	5522.0	KPR_BetrStd_Kurvensatz_2_Hi	operating hours curve set-2	
8305	5522.1	KPR_BetrStd_Kurvensatz_2_Lo	operating hours curve set-2	
8306	5523.0	KPR_BetrStd_Kurvensatz_3_Hi	operating hours curve set-3	
8307	5523.1	KPR_BetrStd_Kurvensatz_3_Lo	operating hours curve set-3	
8308	5524.0	KPR_BetrStd_Kurvensatz_4_Hi	operating hours curve set-4	
8309	5524.1	KPR_BetrStd_Kurvensatz_4_Lo	operating hours curve set-4	
8310	5525.0	KPR_BetrStd_Kurvensatz_5_Hi	operating hours curve set-5	
8311	5525.1	KPR_BetrStd_Kurvensatz_5_Lo	operating hours curve set-5	
8312	5526.0	KPR_BetrStd_Kurvensatz_6_Hi	operating hours curve set-6	
8313	5526.1	KPR_BetrStd_Kurvensatz_6_Lo	operating hours curve set-6	
8314	5527.0	KPR_BetrStd_Kurvensatz_7_Hi	operating hours curve set-7	
8315	5527.1	KPR_BetrStd_Kurvensatz_7_Lo	operating hours curve set-7	
8316	5528.0	KPR_BetrStd_Kurvensatz_8_Hi	operating hours curve set-8	
8317	5528.1	KPR_BetrStd_Kurvensatz_8_Lo	operating hours curve set-8	
8318	5531.0	KPR_AnIzaehl_Kurvensatz_1_Hi	start up counter curve set-1	
8319	5531.1	KPR_AnIzaehl_Kurvensatz_1_Lo	start up counter curve set-1	
8320	5532.0	KPR_AnIzaehl_Kurvensatz_2_Hi	start up counter curve set-2	

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Register-No. (decimal)	LSB-Addr. Value No. 0..2	FMS/VMS/ETAMATIC Source	Description	Value Range
8321	5532.1	KPR_AnIzAehl_Kurvensatz_2_Lo	start up counter curve set-2	
8322	5533.0	KPR_AnIzAehl_Kurvensatz_3_Hi	start up counter curve set-3	
8323	5533.1	KPR_AnIzAehl_Kurvensatz_3_Lo	start up counter curve set-3	
8324	5534.0	KPR_AnIzAehl_Kurvensatz_4_Hi	start up counter curve set-4	
8325	5534.1	KPR_AnIzAehl_Kurvensatz_4_Lo	start up counter curve set-4	
8326	5535.0	KPR_AnIzAehl_Kurvensatz_5_Hi	start up counter curve set-5	
8327	5535.1	KPR_AnIzAehl_Kurvensatz_5_Lo	start up counter curve set-5	
8328	5536.0	KPR_AnIzAehl_Kurvensatz_6_Hi	start up counter curve set-6	
8329	5536.1	KPR_AnIzAehl_Kurvensatz_6_Lo	start up counter curve set-6	
8330	5537.0	KPR_AnIzAehl_Kurvensatz_7_Hi	start up counter curve set-7	
8331	5537.1	KPR_AnIzAehl_Kurvensatz_7_Lo	start up counter curve set-7	
8332	5538.0	KPR_AnIzAehl_Kurvensatz_8_Hi	start up counter curve set-8	
8333	5538.1	KPR_AnIzAehl_Kurvensatz_8_Lo	start up counter curve set-8	
8334 ¹⁾		free		
8335 ¹⁾		free		
8336 ¹⁾		free		
8337 ¹⁾		free		
8338 ¹⁾		free		
8339 ¹⁾		free		
8340 ¹⁾	5120.0	O ₂ actual value (from LSB)	O ₂ actual value (= register 8244)	
8341 ¹⁾	5120.1	O ₂ actual value (from LSB)	O ₂ actual value (= register 8245)	
8342 ¹⁾	5122.0	CO _e value (from LSB)	CO _e value	
8343 ¹⁾	5122.1	CO _e value Status (from LSB)	CO _e value status	
8344 ¹⁾	5123.0	flue gas temperature (from LSB)	flue gas temperature 1/10 K (signed int)	
8345 ¹⁾	5123.1	flue gas temperature status (from LSB)	flue gas temperature status	
8346 ¹⁾	5124.0	inlet air (from LSB)	inlet air 1/10 K (signed int)	
8347 ¹⁾	5124.1	inlet air status (from LSB)	inlet air status	
8348 ¹⁾	5121.0	efficiency (from LSB)	efficiency 1/10%	
8349 ¹⁾	5121.1	efficiency status (from LSB)	efficiency status	
8350 ¹⁾		free		
8351 ¹⁾		free		
8352 ¹⁾		free		
8353 ¹⁾		free		
8354 ¹⁾		free		
8355 ¹⁾		free		
8356 ¹⁾		free		
8357 ¹⁾		free		
8358 ¹⁾		free		
8359 ¹⁾		free		
		following values from LT1/LT2-1 (device-09)		
8360 ¹⁾	7310.0	measured O ₂ value LT1 or LT2	measured O ₂ value in tenth of percent	

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Register-No. (decimal)	LSB-Addr. Value No. 0..2	FMS/VMS/ETAMATIC Source	Description	Value Range
8361 ¹⁾	7310.1	operating mode of LT1 or LT2	bit pattern of the LT1/LT2-operating mode, see table	
8362 ¹⁾	7310.2	faults of LT1 or LT2	bit pattern of the LT1/LT2-faults, see table	
8363 ¹⁾	7311.0	warnings 1 of LT1 or LT2	bit pattern of the LT1/LT2-warning words 1, see table	
8364 ¹⁾	7311.1	warnings 2 of LT1 or LT2	bit pattern of the LT1/LT2-warning words 2, see table	
8365 ¹⁾	7311.2	absolute pressure LT1 or internal probe resistance LT2	absolute pressure in mbar or internal resistance in 0,1 Ohm, the meaning of this LT-value may be modified with parameter 1302 at the LT.	
8366 ¹⁾	7312.0	LT1/LT2: custom designed measured value 1	configurable measured value 1 of the LT1/LT2. The allocation of this LT-value may be modified with parameter 1303 at the LT.	
8367 ¹⁾	7312.1	LT1/LT2: custom designed measured value 2	configurable measured value 1 of the LT1/LT2. The allocation of this LT-value may be modified with parameter 1304 at the LT.	
8368 ¹⁾	7312.2	LT1/LT2: custom designed measured value 3	configurable measured value 1 of the LT1/LT2. The allocation of this LT-value may be modified with parameter 1305 at the LT.	
8369 ¹⁾	7313.0	LT1/LT2: custom designed measured value 4	configurable measured value 1 of the LT1/LT2. The allocation of this LT-value may be modified with parameter 1306 at the LT.	
8370 ¹⁾	7313.1	LT1/LT2: reserved	reserved for future extensions	
8371 ¹⁾	7313.2	LT1/LT2: reserved	reserved for future extensions	
8372 ¹⁾	7314.0	LT1/LT2: reserved	reserved for future extensions	
8373 ¹⁾	7314.1	LT1/LT2: reserved	reserved for future extensions	
8374 ¹⁾	(7314.2)	reserved		
		following values from LT1/LT2-2 (device-10)		
8375 ¹⁾	7320.0	measured O ₂ value LT1 or. LT2	measured O ₂ value in tenth of percent	
8376 ¹⁾	7320.1	operating mode of LT1 or LT2	bit pattern of the LT1/LT2-operating mode, see table	
8377 ¹⁾	7320.2	faults of LT1 or LT2	bit pattern of the LT1/LT2-faults, see table	
8378 ¹⁾	7321.0	warnings 1 of LT1 or LT2	bit pattern of the LT1/LT2-warning words 1, see table	
8379 ¹⁾	7321.1	warnings 2 of LT1 or LT2	bit pattern of the LT1/LT2-warning words 2, see table	
8380 ¹⁾	7321.2	absolute pressure LT1 or internal probe resistance LT2	absolute pressure in mbar or internal resistance in 0,1 Ohm, the meaning of this LT-value may be changed with parameter 1302 at the LT	
8381 ¹⁾	7322.0	LT1/LT2: custom designed measured value 1	configurable measured value 1 of the LT1/LT2. The allocation of this LT-value may be modified with parameter 1303 at the LT.	
8382 ¹⁾	7322.1	LT1/LT2: custom designed measured value 2	configurable measured value 2 of the LT1/LT2. The allocation of this LT-value may be modified with parameter 1304 at the LT.	
8383 ¹⁾	7322.2	LT1/LT2: custom designed measured value 3	configurable measured value 3 of the LT1/LT2. The allocation of this LT-value may be modified with parameter 1305 at the LT.	

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Register-No. (decimal)	LSB-Addr. Value No. 0..2	FMS/VMS/ETAMATIC Source	Description	Value Range
8384 ¹⁾	7323.0	LT1/LT2: custom designed measured value 4	configurable measured value 4 of the LT1/LT2. The allocation of this LT-value may be modified with parameter 1306 at the LT.	
8385 ¹⁾	7323.1	LT1/LT2: reserved	reserved for future extensions	
8386 ¹⁾	7323.2	LT1/LT2: reserved	reserved for future extensions	
8387 ¹⁾	7324.0	LT1/LT2: reserved	reserved for future extensions	
8388 ¹⁾	7324.1	LT1/LT2: reserved	reserved for future extensions	
8389 ¹⁾	(7324.2)	reserved		
8390 ²⁾		free		
8391 ²⁾		free		
8392 ²⁾		free		
8393 ²⁾		free		
8394 ²⁾		free		
8395 ²⁾		free		
8396 ²⁾		free		
8397 ²⁾		free		
8398 ²⁾		free		
8399 ²⁾		free		
8400 ²⁾		Status LSB-Output-Modules and PID-Controller-Analog-Output-Status ^{**)} PID-Controller-Digital-Output Status ^{**)}	Status-Bits (0→ Offline, 1→ Online): Bit 0: LSB-Analog-Output-Module-11 Bit 1: LSB-Analog-Output-Module-12 Bit 2: LSB-Digital-Output-Module-6 Bit 3: LSB-Digital-Output-Module-7 Bit 4...7: PID-Controller-Analog-Output ^{**)} Bit 8...14: PID-Controller-Digital-Output ^{**)}	
8401 ²⁾		Status LSB-Analog-Module and Status LSB-Digital-Output-Modules	Status-Bits (0→ Offline, 1→ Online): Bit 0: reserved Bit 1: LSB-Analog-Input-Module-14 Bit 2: LSB-Analog-Input-Module-15 Bit 3: LSB-Analog-Input-Module-16 Bit 4: LSB-Digital-Input-Module-1 Bit 5: LSB-Digital-Input-Module-3 Bit 6: LSB-Digital-Input-Module-13 Bit 7: LSB-Digital-Input-Module-14	
8402 ²⁾		LSB-Analog-Input-Module-14.1	LSB-Analog-Input-Module-14 Value 1	
8403 ²⁾		LSB-Analog-Input-Module-14.2	LSB-Analog-Input-Module-14 Value 2	
8404 ²⁾		LSB-Analog-Input-Module-14.3	LSB-Analog-Input-Module-14 Value 3	
8405 ²⁾		LSB-Analog-Input-Module-14.4	LSB-Analog-Input-Module-14 Value 4	
8406 ²⁾		LSB-Analog-Input-Module-15.1	LSB-Analog-Input-Module-15 Value 1	
8407 ²⁾		LSB-Analog-Input-Module-15.2	LSB-Analog-Input-Module-15 Value 2	
8408 ²⁾		LSB-Analog-Input-Module-15.3	LSB-Analog-Input-Module-15 Value 3	
8409 ²⁾		LSB-Analog-Input-Module-15.4	LSB-Analog-Input-Module-15 Value 4	
8410 ²⁾		LSB-Analog-Input-Module-16.1	LSB-Analog-Input-Module-16 Value 1	
8411 ²⁾		LSB-Analog-Input-Module-16.2	LSB-Analog-Input-Module-16 Value 2	
8412 ²⁾		LSB-Analog-Input-Module-16.3	LSB-Analog-Input-Module-16 Value 3	
8413 ²⁾		LSB-Analog-Input-Module-16.4	LSB-Analog-Input-Module-16 Value 4	

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Register-No. (decimal)	LSB-Addr. Value No. 0..2	FMS/VMS/ETAMATIC Source	Description	Value Range
8414 ²⁾		LSB-Digital-Input-Modules-1-3-13-14	Bit 0...3: LSB-Digital-Input-Module-1 Bit 4...7: LSB-Digital-Input-Module-3 Bit 8..11: LSB-Digital-Input-Module-13 Bit12...15: LSB-Digital-Input-Module-14	
8415 ²⁾		free		
8416 ²⁾		NEMS-Device-Status and NEMS-Input-Status-Valid	NEMS-Device-Status: Bit 0: Device No. 1 (0→ Offline, 1→ On) ... Bit 7: Device No. 8 (0→ Offline, 1→ On) NEMS-Input-Status-Valid: Bit 8: Input-Status-Device-No. 1 (0 → Input-Status is not valid, 1 → Input-Status is valid) ... Bit 15: Input-Status-Device-No. 8 (0 → Input-Status is not valid, 1 → Input-Status is valid)	
8417 ²⁾		NEMS-Handshake-IN	NEMS-Handshake-IN: Bit 0: NewData (new message arrived)	
8418 ²⁾		NEMS-MeldungsInfo	NEMS-MessageInfo-Bits: Bit 0: reserved Bit 1: TimeStamp valid = 1 / not valid = 0 Bit 2: Input unstable = 1 / stable = 0 Bit 3: Not confirmed = 1 / confirmed = 0 Bit 4: Link-Input = 1 / Not a Link-Input = 0 Bit 5: FirstValue = 1 / NewValue = 0 Bit 6: Arrived = 1 / Gone = 0 Bit 7: Process signal = 1 / Fault signal = 0	
8419 ²⁾		NEMS-Message-No.	Message-Number 1...1024	
8420 ²⁾		NEMS-Day in BCD (High-Byte) NEMS-Month in BCD (Low-Byte)	Message-Timestamp Day in BCD Message-Timestamp Month in BCD	
8421 ²⁾		NEMS-Year in BCD (High-Byte) NEMS-Hour in BCD (Low-Byte)	Message-Timestamp Year in BCD Message-Timestamp Hour in BCD	
8422 ²⁾		NEMS-Minute in BCD (High-Byte) NEMS-Second in BCD (Low-Byte)	Message-Timestamp Minute in BCD Message-Timestamp Second in BCD	
8423 ²⁾		NEMS-Millisecond in Hex.	Message-Timestamp Millisecond in Hex.	
8424 ²⁾		NEMS-Input-Status-0 from NEMS-Device-No. 1	Status-0 of inputs 1-16 Device-No. 1 (Bit 0: Input1... Bit 15: Input16)	
8425 ²⁾		NEMS-Input-Status-1 from NEMS-Device-No. 1	Status-1 of inputs 1-16 Device-No. 1 (Bit 0: Input1... Bit 15: Input16)	
8426 ²⁾		NEMS-Input-Status-2 from NEMS-Device-No. 1	Status-2 of inputs 1-16 Device-No. 1 (Bit 0: Input1... Bit 15: Input16)	
8427 ²⁾		NEMS-Input-Status-0 from NEMS-Device-No. 2	Status-0 of inputs 1-16 Device-No. 2 (Bit 0: Input1... Bit 15: Input16)	
8428 ²⁾		NEMS-Input-Status-1 from NEMS-Device-No. 2	Status-1 of inputs 1-16 Device-No. 2 (Bit 0: Input1... Bit 15: Input16)	
8429 ²⁾		NEMS-Input-Status-2 from NEMS-Device-No. 2	Status-2 of inputs 1-16 Device-No. 2 (Bit 0: Input1... Bit 15: Input16)	
8430 ²⁾		NEMS-Input-Status-0 from NEMS-Device-No. 3	Status-0 of inputs 1-16 Device-No. 3 (Bit 0: Input1... Bit 15: Input16)	
8431 ²⁾		NEMS-Input-Status-1 from NEMS-Device-No. 3	Status-1 of inputs 1-16 Device-No. 3 (Bit 0: Input1... Bit 15: Input16)	

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Register-No. (decimal)	LSB-Addr. Value No. 0..2	FMS/VMS/ETAMATIC Source	Description	Value Range
8432 ²⁾		NEMS-Input-Status-2 from NEMS-Device-No. 3	Status-2 of inputs 1-16 Device-No. 3 (Bit 0: Input1... Bit 15: Input16)	
8433 ²⁾		NEMS-Input-Status-0 from NEMS-Device-No. 4	Status-0 of inputs 1-16 Device-No. 4 (Bit 0: Input1... Bit 15: Input16)	
8434 ²⁾		NEMS-Input-Status-1 from NEMS-Device-No. 4	Status-1 of inputs 1-16 Device-No. 4 (Bit 0: Input1... Bit 15: Input16)	
8435 ²⁾		NEMS-Input-Status-2 from NEMS-Device-No. 4	Status-2 of inputs 1-16 Device-No. 4 (Bit 0: Input1... Bit 15: Input16)	
8436 ²⁾		NEMS-Input-Status-0 from NEMS-Device-No. 5	Status-0 of inputs 1-16 Device-No. 5 (Bit 0: Input1... Bit 15: Input16)	
8437 ²⁾		NEMS-Input-Status-1 from NEMS-Device-No. 5	Status-1 of inputs 1-16 Device-No. 5 (Bit 0: Input1... Bit 15: Input16)	
8438 ²⁾		NEMS-Input-Status-2 from NEMS-Device-No. 5	Status-2 of inputs 1-16 Device-No. 5 (Bit 0: Input1... Bit 15: Input16)	
8439 ²⁾		NEMS-Input-Status-0 from NEMS-Device-No. 6	Status-0 of inputs 1-16 Device-No. 6 (Bit 0: Input1... Bit 15: Input16)	
8440 ²⁾		NEMS-Input-Status-1 from NEMS-Device-No. 6	Status-1 of inputs 1-16 Device-No. 6 (Bit 0: Input1... Bit 15: Input16)	
8441 ²⁾		NEMS-Input-Status-2 from NEMS-Device-No. 6	Status-2 of inputs 1-16 Device-No. 6 (Bit 0: Input1... Bit 15: Input16)	
8442 ²⁾		NEMS-Input-Status-0 from NEMS-Device-No. 7	Status-0 of inputs 1-16 Device-No. 7 (Bit 0: Input1... Bit 15: Input16)	
8443 ²⁾		NEMS-Input-Status-1 from NEMS-Device-No. 7	Status-1 of inputs 1-16 Device-No. 7 (Bit 0: Input1... Bit 15: Input16)	
8444 ²⁾		NEMS-Input-Status-2 from NEMS-Device-No. 7	Status-2 of inputs 1-16 Device-No. 7 (Bit 0: Input1... Bit 15: Input16)	
8445 ²⁾		NEMS-Input-Status-0 from NEMS-Device-No. 8	Status-0 of inputs 1-16 Device-No. 8 (Bit 0: Input1... Bit 15: Input16)	
8446 ²⁾		NEMS-Input-Status-1 from NEMS-Device-No. 8	Status-1 of inputs 1-16 Device-No. 8 (Bit 0: Input1... Bit 15: Input16)	
8447 ²⁾		NEMS-Input-Status-2 from NEMS-Device-No. 8	Status-2 of inputs 1-16 Device-No. 8 (Bit 0: Input1... Bit 15: Input16)	

1) From communication processor version M5b001 28.09.05

2) From communication processor version M5e001 21.10.05

4) From communication processor version M5l001 29.01.06

6) From communication processor version M5t001 28.06.06

*) The Bits 0x0200, 0x0400, 0x0800 are generated with KPR_uiSynchron and KPR_uiAcHandmodus (see also register 8264)

**) Future Extensions, not implemented yet

8.3.1 LT1/LT2-Values

(Register-No. 8360...8389)

These values are only available if an O2 analyser (LT1 or LT2) is connected via LAMTEC SYSTEM BUS. The meaning of some values is different, depending on whether an LT1 or LT2 is connected.

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8.3.2 Operating mode LT1

(Register-No. 8361, 8376)

The operating mode is bit-coded, combinations of several set bits are possible.

0x0001 = Measurement
0x0002 = Calibration
0x0004 = Maintenance
0x0008 = Heating active
0x0010 = Cold start
0x0020 = Standby
0x0040 = At least one warning active
0x0080 = At least one fault active
0x0100 = Manual calibration active
0x0200 to 0x0800 = not in use yet
0x1000 = Limit value 1 active
0x2000 = Limit value 2 active
0x4000 = Limit value 3 active
0x8000 = Limit value 4 active

8.3.3 Operating mode LT2

(Register-No. 8361, 8376)

The operating mode is bit-coded, combinations of several set bits are possible.

0x0001 = Measurement
0x0002 = Calibration
0x0004 = Maintenance
0x0008 = not used
0x0010 = Cold start
0x0020 = Standby
0x0040 = At least one warning active
0x0080 = At least one fault active
0x0100 to 0x0800 = not in use yet
0x1000 = Limit value 1 active
0x2000 = Limit value 2 active
0x4000 = Limit value 3 active
0x8000 = Limit value 4 active

8.3.4 Fault states LT1

(Register-No. 8362, 8377)

The faults are bit-coded, combinations of several set bits are possible.

0x0000 = No warning / fault active
0x0001 = Probe defective LS 1
0x0002 = Flow throughput to low $I_S < 200$ mA (1)
0x0004 = Vacuum pressure (flue gas pump)
0x0008 = LS 1 defective probe heater
0x0010 = LS 1 broken wire
0x0020 = Current input of pump too high
0x0040 = LS 1 Probe: no constant current (dl/dT is not small enough)
0x0080 = Fault test gas (check with test gas failed)
0x0100 = Dynamic LS 1 is missing
0x0200 = Dirty pre-filter (sintered metal preliminary filter dirty)
0x0400 = Error analogue output

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0x0800 = Error parameters
0x1000 = Error analogue inputs
0x2000 = Error O₂ controller (look at Par. 4002)
0x4000 to 0xffff provided for expansions
(1) Parameter 51 can be used to read-out the probe current at the last calibration.

8.3.5 Fault states LT2

(Register-No. 8362, 8377)

The faults are bit-coded, combinations of several set bits are possible.

0x0001 = Probe voltage < -20 mV
0x0002 = Probe heating defective (heating current < 200 mA)
0x0010 = Wire break in probe/probe defective (Ri too high)
0x0100 = Probe dynamics missing
0x0400 = Fault in analogue outputs

8.3.6 Warnings LT1 section 1

(Register-No. 8363, 8378)

The warnings are bit-coded, combinations of several set bits are possible.

0x0000 = No warning
0x0001 = Warning 1: LS1 defective heating control (Probe heating control defective, heating with fixed voltage)
0x0002 = Warning 2: Dirty pre-filter-heating (filter SEA blocked)
0x0004 = Warning 3: Flow throughput too low, $I_S < 260 \text{ mA}$ ⁽¹⁾ (par. 51)
0x0008 = Warning 4: LS1 O₂ sensor used up → must be replaced
0x0010 = Warning 5: Leakage of flue gas piping
0x0020 = Warning 6: Defective MEV-heating
0x0040 = Warning 7: Defective pre-filter-heating
0x0080 = Warning 8: Cal. Gas flow throughput too low, increase!
0x0100 = Warning 9: Pressure at measuring point outside the permissible range (too high / too low)
0x0200 = Warning 10: LS1 temperature at measuring point outside the permissible range (too high / too low)
0x0400 = Warning 11: Don't draw stack gas through a cold LS 1
0x0800 = Warning 12: Defective LS 1 temperature-measuring
0x1000 = Warning 13: Defective MEV temperature-measuring ⁽²⁾
0x2000 = Warning 14: Defective pre-filter temperature measuring (SEA filter defective)
0x4000 = Warning 15: LS 1 probe current limit active
0x8000 = Warning 16: Line voltage too high or too low
⁽¹⁾ at the probe current, at the last calibration ⁽²⁾ Option in course of preparation

8.3.7 Warnings LT1 section 2

Register-No. (8364, 8379)

The warnings are bit-coded, combinations of several set bits are possible.

0x0001 = Warning 17: Running time definition of flue gas pump active (determination of operating time for measuring gas pump active, measuring value deviations possible)
0x0002 = Warning 18: No constant probe current while calibration
0x0004 = Warning 19: Value of analogue input 1 too high/low
0x0008 = Warning 20: Value of analogue input 2 too high/low
0x0010 = Warning 21: Value of analogue input 3 too high/low
0x0020 = Warning 22: Value of analogue input 4 too high/low

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0x0040 = Warning 23: Configuration error analogue outputs
0x0080 = Warning 24: Service warning 1
0x0100 = Warning 25: Service warning 2
0x0200 = Warning 26: Dynamic LS1 missing
0x0400 = Warning 27: Dynamic test LS1 activated
0x0800 = Warning 28: Probe exchange? If yes, activate Par. 104
0x1000 = Warning 29: (not assigned yet)
0x2000 = Warning 30: (not assigned yet)
0x4000 = Warning 31: (not assigned yet)
0x8000 = Warning 32: (not assigned yet)

8.3.8 Warnings LT2 section 1

(Register-No. 8363, 8378)

The warnings are bit-coded, combinations of several set bits are possible.

0x0001 = Warning 1: Internal resistance LS2 too high
0x0002 = Warning 2: LS2 offset voltage air defective
0x0100 = Warning 9: Pressure at measuring point outside the permissible range
0x0200 = Warning 10: Temperature at measuring point outside the permissible range
0x0800 = Warning 12: Temperature sensor probe defective

8.3.9 Warnings LT2 section 2

(Register-No. 8364, 8379)

The warnings are bit-coded, combinations of several set bits are possible.

0x0004 = Warning 19: Value of analogue input 1 too high/low
0x0008 = Warning 20: Value of analogue input 2 too high/low
0x0010 = Warning 21: Value of analogue input 3 too high/low
0x0020 = Warning 22: Value of analogue input 4 too high/low
0x0080 = Warning 24: Service warning 1
0x0100 = Warning 25: Service warning 2
0x0200 = Warning 26: Probe dynamics missing
0x0400 = Warning 28: Dynamic test triggered

8.3.10 Status-LSB-Output-Modules and PID-Controller-Output

(Register-No. 8400)

Status-Bits (0→ LSB-Module is Offline, 1→ LSB-Module is Online):

Bit 0: LSB-Analog-Output-Module-11 (LSB-Module-Address 43)
Bit 1: LSB-Analog-Output-Module-12 (LSB-Module-Address 47)
Bit 2: LSB-Digital-Output-Module-6 (LSB-Module-Address 23)
Bit 3: LSB-Digital-Output-Module-7 (LSB-Module-Address 27)
Bit 4...7: PID-Controller-Analog-Outputs^{**})
Bit 8...14: PID-Controller-Digital-Outputs^{**})

8.3.11 Status-LSB-Input-Modules

(Register-No. 8401)

Status-Bits (0→ LSB-Module is Offline, 1→ LSB-Module is Online):

Bit 0: reserved
Bit 1: LSB-Analog-Input-Module-14 (LSB-Module-address 55)
Bit 2: LSB-Analog-Input-Module-15 (LSB-Module-address 59)

8 Register-Numbers

Bit 3: LSB-Analog-Input-Module-16 (LSB-Module-address 63)
Bit 4: LSB-Digital-Input-Module-1 (LSB-Module-address 3)
Bit 5: LSB-Digital-Input-Module-3 (LSB-Module-address 11)
Bit 6: LSB-Digital-Input-Module-13 (LSB-Module-address 51)
Bit 7: LSB-Digital-Input-Module-14 (LSB-Module-address 55)

8.3.12 LSB-Analogue-Input-Module-14

(Register-No. 8402...8405)

These are the Analog-Input-Values of LSB-Analog-Input-Module-14 (LSB-Module-address 55). Value 0 corresponds to 0 V input voltage, the value 999 (0x03E7) corresponds to 9,99 V input voltage.

8.3.13 LSB-Analogue-Input-Module-15

(Register-No. 8406...8409)

These are the Analog-Input-Values of LSB-Analog-Input-Module-15 (LSB-Module-address 59). Value 0 corresponds to 0 V input voltage, the value 999 (0x03E7) corresponds to 9,99 V input voltage.

8.3.14 LSB-Analogue-Input-Module-16

(Register-No. 8410...8413)

These are the Analog-Input-Values of LSB-Analog-Input-Module-16 (LSB-Module-address 63). Value 0 corresponds to 0 V input voltage, the value 999 (0x03E7) corresponds to 9,99 V input voltage.

8.3.15 LSB-Analogue-Input-Module-1-3-13-14

(Register-No. 8414)

The four Input-Bits of LSB-Digital-Input-Module-1 (LSB-Module-address 3) are sent to the Bits 0...3 of this value.

The four Input-Bits of LSB-Digital-Input-Module-3 (LSB-Module-address 11) are sent to the Bits 4...7 of this value.

The four Input-Bits of LSB-Digital-Input-Module-13 (LSB-Module-address 51) are sent to the Bits 8...11 of this value.

The four Input-Bits of LSB-Digital-Input-Module-14 (LSB-Module-address 55) are sent to the Bits 12...15 of this value.

8.3.16 NEMS-read-register

(Register-No. 8416...8447)

There are 5 areas of NEMS-Read-Data:

1. Register-No. 8416 Bit 0...7: NEMS-Device-Status

The Device-Status is continuously updated and indicates which NEMS-Devices are online.

2. Register-No. 8416 Bit 8...15: NEMS-Input-Status-Valid

These bits indicate whether the input-status in register-No. 8424...8447: NEMS-Input-Status-Area of the corresponding NEMS-device is valid or not. (see also following the description under „5. Register-No. 8424...8447: NEMS-Input-Status-Area“)

3. Register-No. 8417: NEMS-Handshake-Bit for new Messages

(see Handshaking-Procedure for Message-Window)

4. Register-No. 8418...8423: NEMS-Message-Window

It shows all specified data of a new message and is updated via handshaking-procedure from the communication processor.

Handshaking-Procedure between Communication Processor (CP) and Modbus-Master (MM) for the Message-Window:

HandshakeBit: „NewData“ Source:CP Reg.-No. 8417 Bit 0	HandshakeBit: „DataRead“ Source:MM Reg.-No. 9520 Bit 0	
0	0	Normal state (CP can write a new message into the Message-Window (Reg.-No. 8418...8423))
1	0	CP has written a new Message into the Message-Window (Reg.-No. 8418...8423) and sets then NewData = 1
1	1	MM sets DataRead = 1
0	1	MM reads the new message from the Message-Window (Reg.-No. 8418...8423); CP sets NewData = 0
0	0	Having read the complete message the MM checks if NewData = 0 and if so it sets DataRead = 0

Timeout for new messages: A new message (NewData = 1) in the Message-Window must be fetched by the Modbus-Master (MM) during the configured timeout time (configured in NEMS-Config). Otherwise the messages which possibly follow are being cleared by the NEMS-Devices. The messages are sent to over to the NEMS-printer (if connected) and are not sent any more to the modbus-interface, until the Modbus-Master (MM) fetches the messages in the message-buffer via the above described handshaking-procedure.

5. Register-No. 8424...8447: NEMS-Input-Status-Area

This area shows the current states of the 16 NEMS-Inputs of all 8 NEMS-Devices with the following coding and the continuously updated values.

Coding of NEMS-Input-Status0...2 (Bit 0: NEMS-Input 1...Bit 15: NEMS-Input 16)

Status0 Bit x	Status1 Bit x	Status2 Bit x	Status of the related NEMS-Input x
0	0	0	Process-State-/Fault-State-Input is not active
0	0	1	Fault-State-Input is active
0	1	0	Input bypassed and Input is not active
0	1	1	Input bypassed and Input is active
1	0	0	Input unstable
1	0	1	Process-State-Input is active
1	1	0	reserved
1	1	1	reserved

Example: NEMS-Input-Status0 = 0x0002
 NEMS-Input-Status1 = 0x0000
 NEMS-Input-Status2 = 0x0003
 → NEMS-Input1: Fault-State-Input is active and
 NEMS-Input2: Process-State-Input is active



NOTICE!

If new messages of an NEMS-Device are available in the Message-Window (NewData = 1), then the Input-Status is kept at the previous state until the new messages are fetched completely by the Modbus-Master. After this procedure the Input-Status is continuously updated again. The validity of the Input-Status-Data of each NEMS-Device is signalled in register 8416. (see also the description above „2. Register-No. 8416 Bit 8...15: NEMS-Input-Status-Valid“)

9 Fault Conditions

The Modbus protocol has no possibilities to transmit data marked with 'non valid', so there is no answer on the Modbus in a fault condition.

Some of these fault conditions are:

- no "new" data from the FMS
- a write command exceeds the max. no. of the registers
- a read command exceeds the max. no. of the registers
- an unknown command was received
- a wrong slave-address was received
- several messages were received without waiting for the response
- a too long message was received
- wrong Baudrate
- wrong COM-Parameter

10 Examples for Write- and Read-Commands

10 Examples for Write- and Read-Commands

In these examples only the commands, the register-no. and the register-contents are listed.

Commandbyte	Direction	Register-No.	Register Value	Comment
03	Bus→ FMS	8281		Recall the operating status of the FMS
03	FMS→ Bus	8281	512 (HEX:0x0200)	The FMS is in fault condition
03	Bus→ FMS	8278		Recall the fault code
03	FMS→ Bus	8278	0002	Flame signal-fault
06	Bus→ FMS	9488	0004	Perform fault reset
06	FMS→ Bus	9488	0004	Echo of the command
06	Bus→ FMS	9488	0010	Burner ON & Control Release via Bus
06	FMS→ Bus	9488	0010	Echo of the command
06	Bus→ FMS	9473	0500	Preset the outside temperature input to 10mA (moving the setpoint for weather guided firing-rate controller)
06	FMS→ Bus	9473	0500	Echo of the command
03	Bus→ FMS	8192		Recall the internal firing-rate
03	FMS→ Bus	8192	609	The firing-rate is 609
03	Bus→ FMS	8279		Recall the relay outputs
03	FMS→ Bus	8279	476 HEX(0x1DC)	Relay Terminal 36, 41, 43, 67, 68, 76 - are activated

11 Example for a Modbus-Read-Query

11 Example for a Modbus-Read-Query

Modbus-Read-Query:

Byte-No.	Value in hex.	Description
1. Byte	0x04	modbus-slave address (parameter no: 887)
2. Byte	0x03	function-code (3 means reading several registers)
3. Byte	0x20	high-byte of first register
4. Byte	0x56	low-byte of first register
5. Byte	0x00	high-byte number of registers to read
6. Byte	0x04	low-byte number of registers to read
7. Byte	0xaf	CRC16-Checksum
8. Byte	0x8c	CRC16-Checksum

Modbus-Read-Response:

Byte-No.	Value in hex.	Description
1. Byte	0x04	modbus-slave address
2. Byte	0x03	function-code
3. Byte	0x08	number of bytes in the answer
4. Byte	0x02	high-byte first value (fault code)
5. Byte	0x58	low-byte first value (fault code)
6. Byte	0x00	high-byte second value (relay status)
7. Byte	0x04	low-byte second value (relay status)
8. Byte	0xbb	high-byte third value (digital input)
9. Byte	0xdb	low-byte third value (digital input)
10. Byte	0x02	high-byte fourth value (operating mode)
11. Byte	0x00	low-byte fourth value (operating mode)
12. Byte	0x78	CRC16-Checksum
13. Byte	0x78	CRC16-Checksum

In this example the telegram message means:

Fault code: 0x0258 is 600 in decimal, which means „Timeout FMS (burner sequence control)“

Relay status: 0x0004, which means „Fuel indication“ etc.



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