

**KUHSE Network Gateway  
KNG – KEA Modbus Gateway**



**1. Table of contents**

<b>1.</b>	<b>Table of contents .....</b>	<b>1</b>
<b>2.</b>	<b>Version information .....</b>	<b>2</b>
<b>3.</b>	<b>Introduction .....</b>	<b>3</b>
3.1.	Remarks about the following documentation .....	3
3.2.	Safety notices .....	3
3.3.	General device description .....	3
<b>4.</b>	<b>Device installation and connection.....</b>	<b>4</b>
4.1.	Overview of the connections and displays .....	4
4.2.	Power supply and earthing .....	4
4.3.	Ethernet interface .....	4
4.4.	Serial interfaces.....	5
4.4.1.	Optical fibre conductor interface .....	5
4.4.2.	RS-232 interface .....	5
4.4.3.	RS-485 interface .....	5
4.5.	CAN bus .....	6
4.6.	Connecting the KEA Modbus gateway.....	7
<b>5.</b>	<b>Operating modes and displays .....</b>	<b>8</b>
5.1.	Starting process.....	8
5.2.	Device status .....	8
5.2.1.	Boot loader status .....	8
5.2.2.	Communication status .....	8
5.3.	Device reset.....	8

## KNG – KEA Modbus Gateway

<b>6.</b>	<b>"KNG Tool" service program</b> .....	<b>9</b>
6.1.	Parametrisation .....	9
6.2.	Firmware update.....	9
6.3.	Security.....	10
<b>7.</b>	<b>Parametrisation</b> .....	<b>10</b>
<b>8.</b>	<b>Modbus Data point list (KEA 1xx)</b> .....	<b>11</b>
8.1.	Overview.....	11
8.2.	Digital signals of the KEA 1xx (FC03) .....	12
8.3.	Analogue values of the KEA 1xx (FC03).....	14
8.4.	Counter values from the KEA 1xx (FC03) .....	15
8.5.	Commands to KEA 1xx (FC16) .....	15
8.6.	Status value (FC03) .....	16
8.7.	Sample message.....	16
<b>9.</b>	<b>Modbus Data point list (KEA 2xx)</b> .....	<b>17</b>
9.1.	Overview.....	17
9.2.	Digital signals of the KEA 2xx (FC03) .....	18
9.3.	Analogue values of the KEA 2xx (FC03).....	20
9.4.	Counter values from the KEA 2xx (FC03).....	21
9.5.	Commands to KEA 2xx (FC16) .....	21
9.6.	Connection Status (FC03).....	22
9.7.	Sample message.....	22
<b>10.</b>	<b>Technical data</b> .....	<b>23</b>
10.1.	Housing .....	23
10.2.	Nominal/threshold values .....	24

## 2. Version information

Version	Date	Comment	Initials
0.1	05.12.2008	Counters for "Created Work" inserted	Hen
0.2	12.07.2011	First issue, created from KNG - KEA Profibus Gateway template	RK
0.2	11.04.2013	Correction data point list; description COM-Port extended	RK
0.3	-	Internal revision	RK
0.4-0.6	29.10.2013	Data point list KEA2xx; Corrections in Data point lists	RK

### 3. Introduction

#### 3.1. Remarks about the following documentation



The information symbol highlights important remarks about operation or commissioning and connection, which must be adhered to.



The caution symbol makes you aware of dangers that could lead to destruction of the device, or equipment and devices connected to it. The remarks must be adhered to and the relevant precautions must be taken.

#### 3.2. Safety notices



- Installation and commissioning may only be carried out by personnel with sufficient qualifications.
- Usable specifications (in particular, the VDE specifications) must be adhered to.
- Before commissioning, refer to the remarks in these instructions.

#### 3.3. General device description

The KNG (KUHSE Network Gateway) is a multi-interface converter for various data couplings.

In the KEA Modbus Gateway variant, the KNG enables data coupling between a KEA 10x control and a Modbus master (see diagram). Several KEAs can also be coupled to a Modbus. To do this, each KEA must be equipped with its own KNG module.

Connection to the KEA always takes place via the CAN bus (CAN0).

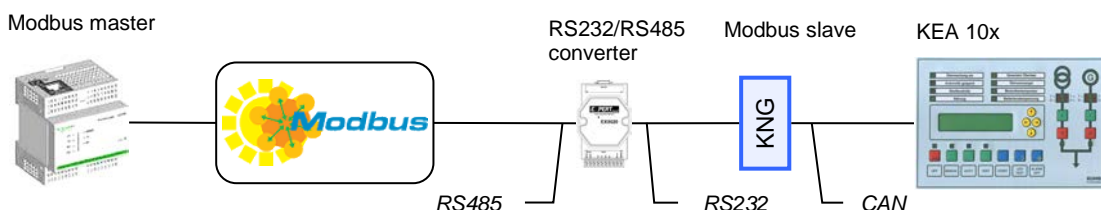


Diagram 1: Figure showing KNG use

## 4. Device installation and connection

### 4.1. Overview of the connections and displays

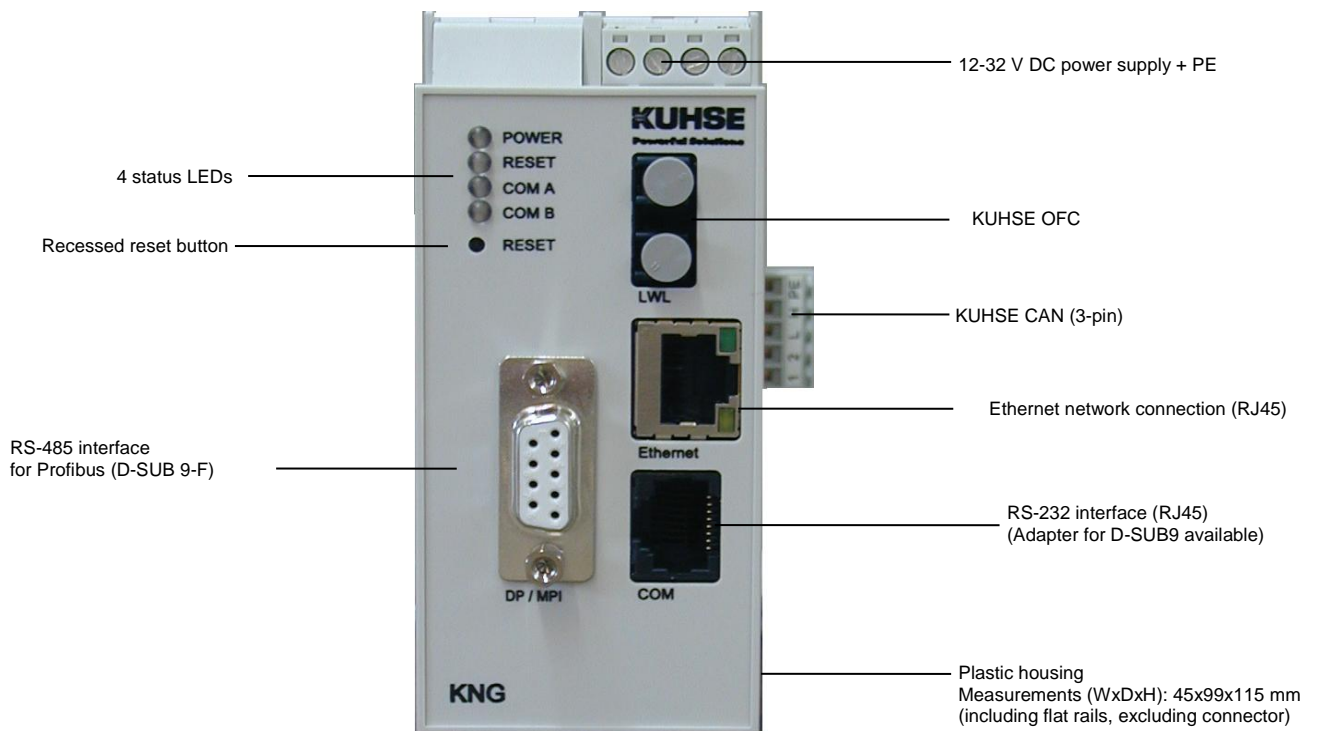


Diagram 2: Overview of the displays and connections

### 4.2. Power supply and earthing

Terminal	Connection
+ (1)	Power supply (12-32 V DC)
- (2)	Ground
(3)	Not connected
PE (4)	Functional earth

Table 1: Connections, power supply and earthing



**To ensure interference resistance for the KNG, the device must be connected with the protective earth (PE).**

### 4.3. Ethernet interface

The KNG is equipped with a normal RJ45 Ethernet connection. This can be used to connect the KNG to a network using a patch cable (not included). If an open DSL connection exists and the "Telecontrol" option is bought, the KEA data can be monitored and recorded remotely in the "KUHSE Telecontrol" system.

## 4.4. Serial interfaces

### 4.4.1. Optical fibre conductor interface

The KNG is equipped with a KUHSE OFC (optical fibre conductor) interface, which is used during data coupling with KUHSE devices.

### 4.4.2. RS-232 interface

The RS-232 interface of the KNG is designed as an RJ45 connection. The maximum cable length is 15 metres.

Pin	Connection (signal)
1	Not connected
2	DCD
3	DTR
4	GND (signal ground)
5	RXD
6	TXD
7	Connected internally (connection identification)
8	

Table 2: RS-232 interface connections

The RS-232 interface can be used to exchange data via the Modbus/RTU protocol using the KNG. The KNG is therefore the slave and provides the data to the KEA according to the data point list. An optional adapter cable on the D-SUB9 connector is available for the RS-232 interface. The configuration of this cable is specified below.

Pin	Connection (signal)
1	DCD
2	TXD
3	RXD
4	DTR
5	GND (signal ground)
6	Not connected
7	
8	Connected internally via KNG
9	Not connected

Table 3: Configuring adapter cable RS-232 on D-SUB9

### 4.4.3. RS-485 interface

The serial RS-485 interface of the KNG is designed as a D-Sub-9-F connector. In the corresponding device variants, it serves as a **Profibus** or an **MPI** interface. The RS-485 bus must be terminated from both sides, for which the KNG *does not have internal* termination. The maximum bus length is 30 metres.

Terminal	Connection (signal)
Pin (3)	Signal line B (Rx/D/TxD-P)
Pin (8)	Signal line A (Rx/D/TxD-N)
Pin (5)	Functional earth (screen)

Table 4: RS-485 interface connections

### 4.5. CAN bus

A bus connection for the CAN bus is provided on the underside of the housing. This bus can be used to connect individual modules or external devices to the KNG for data coupling purposes.

The CAN bus must be connected using the provided bus connector for corresponding device variants. The CAN bus must be terminated on both sides. The resistor to bus termination (120 ohm) is integrated into the KNG and is active by default. The maximum bus length is 30 metres.

Pin	Connection (signal)
1	Ground (ground, optional)
2	+5V DC (optional)
L (3)	CAN bus low
H (4)	CAN bus high
PE (5)	Protective earth (CAN bus screen)

Table 5: Configuring bus connection (CAN bus )



Diagram 3: KNG CAN bus connection with connector

#### 4.6. Connecting the KEA Modbus gateway

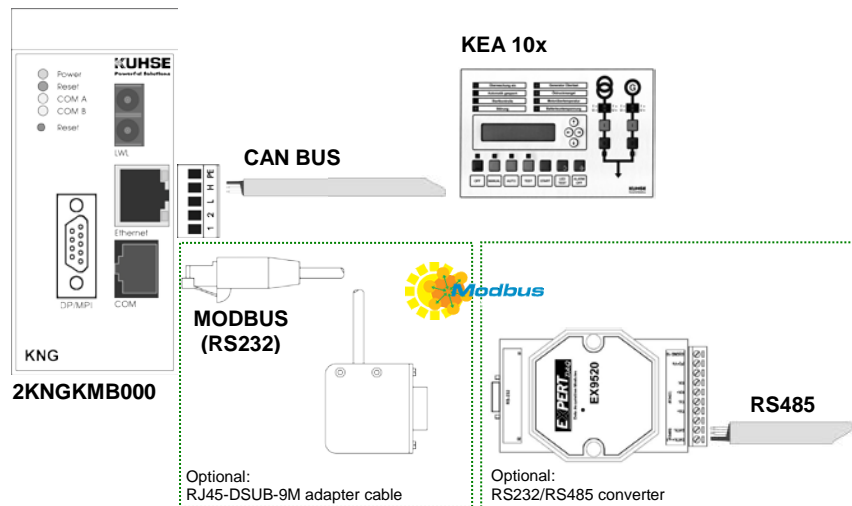


Diagram 4: Connecting the KEA Modbus gateway

As shown in the diagram, the KEA Modbus gateway (2KNGKMB000) is connected to the KEA 10x with a shielded two-wire cable via the CAN bus. The CAN connection to the KNG is located on the underside of the device and is lead through on the right hand side. On the KEA, the CAN0 connection is used on the underside of the device. The connection to the Modbus takes place via the COM interface (EIA-232 specification, RJ45 connector). Optionally, an RJ45/DSUB9-M adapter cable and an interface converter from RS232 to RS485 can be used. The Modbus parameters can be found in "Datenpunkliste\_KNG\_KEA\_Modbus\_dexx.xls".

## 5. Operating modes and displays

### 5.1. Starting process

In the first ten seconds after connecting the power supply or after a reset, a start program (boot loader) runs in the KNG. The KNG performs internal tests and loads the actual operating program (known as the firmware). While the boot loader is active, the COM A LED flashes. After the ten seconds is over, the firmware is executed automatically. If no firmware is installed in the device, the boot loader remains active even after the ten seconds. Basic parameters can be set or the firmware can be updated using the boot loader.

### 5.2. Device status

The status of the device is shown using four LEDs on the housing cover. The green power LED lights up when the internal operating voltage (5V / 3.3V) is available. The red reset LED shows the reset status while the device is being restarted. The yellow communication LEDs (COM A + B) show the status of individual interfaces or data connections depending on the device variant. In addition, the COM A LED flashing shows the boot loader status.

#### 5.2.1. Boot loader status

If the boot loader of the KNG is active, the communication LED COM A shows the boot loader status, regardless of which device variant exists:

LED	Behaviour	Meaning	Frequency
COM A	On/off	Transitional phase If the device remains in this status for longer than 4 seconds, a device fault exists. In this case, please contact Kuhse.	n/a
	Flashing	Boot loader is active, waiting time is elapsing.	10 Hz
	Flashing	Boot loader is in device test mode.	100 Hz

Table 6: Boot loader status (COM A LED)

#### 5.2.2. Communication status

In the KNG variant as a KEA Modbus gateway, the communication LEDs show the following status:

LED	Behaviour	Meaning	Frequency
COM A	On	Communication with KEA is running without faults	n/a
	Flashing	faults in communication with KEA, For example, parametrisation or CAN bus faults	100 Hz
	Off	Device fault, please contact Kuhse	n/a
COM B	On	Not relevant: Communication with Profibus DP master occurs	n/a
	Off, flashing	Not relevant: Faults in communication with DP master, for example, parametrisation or Profibus faults	n/a

Table 7: Status of communication LEDs

### 5.3. Device reset

If the KNG is in an unclear operating status, it can be reset using a narrow, pointed object to press the reset button. During the reset process, the red reset LED lights up for confirmation.



## 6. "KNG Tool" service program

The "KNG Tool" service program is required for parametrisation of the KNG and for updating the firmware. The software runs on all Microsoft Windows operating systems. The connection to the device takes place via a network or directly via a crossover patch cable between the PC and the KNG. Therefore, a network-compatible PC is required. The network connection of the PC must be configured for dynamic address assignment (DHCP) or have a fixed IP address that is suitable for the network. After calling the KNG tool, the program lists all accessible devices.

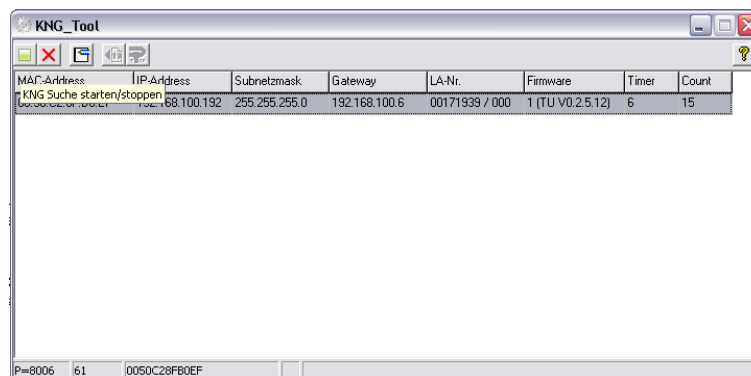


Diagram 5: "KNG Tool" service program

The device with which the program is to communicate must first be selected from the list. The corresponding MAC address is then displayed in the lower status bar. All functions are available via the context menu (right mouse button).

### 6.1. Parametrisation

The options for parametrisation differ depending on the device variant that exists. For more information, see Chapter 7 Parametrisation.

### 6.2. Firmware update

The update to the firmware is started via the "Firmware Update" context menu entry. A dialogue follows in which the firmware file that is to be loaded is selected. The update progress is then shown. After the operation is complete, a result dialogue window is displayed.

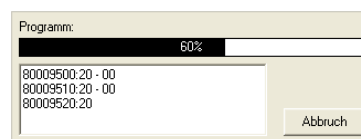


Diagram 6: Firmware update status

To ensure that the KNG uses the new firmware, a reset is required.

### 6.3. Security

The KNG can be protected against unauthorised accesses by setting a user-defined password. The protection comprises both the parametrisation and the firmware. This cannot be updated without entering the password after setting up password protection.

To set up password protection, select the "Change Password" context menu entry. Several dialogues appear. First, the current password and then the new password twice are requested; this is to identify and catch possible typing faults. A blank input field always means "No password". At the end, a result dialogue displays whether the password change was successful or not.



**The KNG is delivered with password protection ("phantasia"). We recommend that you set up a new password when commissioning. KUHSE does not take responsibility for damage caused by inadequate security.**



**A forgotten password can only be reset by KUHSE. In this case, the KNG must be sent in or a service technician must be requested.**

## 7. Parametrisation

In the KNG, the CAN and Modbus interfaces must be parametrised according to the devices that are connected so that a data connection can be set up. In the condition as supplied to the customer, the KNG is parametrised as follows:

Parameter		Condition as supplied to customer	Permitted values
Modbus	Protocol	RTU	RTU, ASCII
	Baud rate	19200 kBaud	2400..115200 kBaud
	Data bits, parity, stop bits	8,N,1	8,N/O/E,1/2/1,5
	Slave address	7	1..127
CAN	Connected device	KEA 10x	KEA 10x
	Machine number (KEA)	1	1..31

Table 8: KNG parametrisation

Change requirements must be made known before delivery. However, parametrisation can be changed afterwards using the KNG tool and the configuration file sent by us. The context menu in the KNG tool (right-click) also provides the "CAN Bus Settings" option. The value itself can then be entered in a corresponding dialogue window. Successful parametrisation is confirmed by a response.



**The KNG must be reset (for example, using the reset button) for changed parametrisation to take effect.**

## 8. Modbus Data point list (KEA 1xx)

### 8.1. Overview

Direction	Data	Number	Input (register)	Output (register)
From Kuhse FC03	Fault signals	4.5 register	47001...47005(H bytes)	
	Status messages	1.5 register	47005(L bytes)...47006	
	Analogue values	38 register	47101...47138	
	Counter values	5 register	47139...47146	
	Status values	2 register	47147...47148	
To Kuhse FC16	Commands*	16 register		47301...47316

**Table 9: Overview of data point list**

\* Digital outputs are not available in the standard design. A corresponding enhancement module is intended but not yet available. However, the option to use the relay output card of the KEA also exists. The digital outputs of the KEA can be assigned to "ZLT commands" and, therefore, a remote start via ZLT or a remote confirmation on the existing standard inputs of the KEA can be returned (see below).



**Notation of individual bits within a register:  
Bit 15 = MSB ("left" in the register), bit 00 = LSB**

Bit No.	H bytes								L bytes							
	<b>15</b>	14	13	12	11	10	9	8	7	6	5	4	3	2	1	<b>0</b>

**Table 10: Bit numbering within a register**



**Certain analogue values such as mains current and mains power are only valid if they are entered by the control unit. This depends on the KEA type and more information can be found in the operating instructions of the KEA.**

**8.2. Digital signals of the KEA 1xx (FC03)**

Fault signals

Register	47001	47002
Bit 15	Fault 8 - e.g. COLLECTIVE FAULT A	Power regulator fault
Bit 14	Fault 7 - e.g. COLLECTIVE FAULT W	Overspeed
Bit 13	Fault 6 - e.g. OVERSPEED	Aborted start
Bit 12	Fault 5 - e.g. COOLING WATER DEFICIENCY	Motor does not shut down
Bit 11	Fault 4 - e.g. GEN. OVER TEMPERATURE	Batt. Undervoltage
Bit 10	Fault 3 - e.g. EMERGENCY STOP PRESSED	Fault 19
Bit 09	Fault 2 - e.g. COOLING WATER TEMP. MAX	Fault 18
Bit 08	Fault 1 - e.g. OIL PRESSURE DEFICIENCY	Fault 17
Bit 07	Parameterized Fault 16	Gen. phase sequence
Bit 06	Fault 15 - e.g. MAINS SWITCH	Mains phase sequence
Bit 05	Fault 14 - e.g. LEAKAGE	Gen. switch case
Bit 04	Fault 13 - e.g. TANK OVERFLOW	Mains switch case
Bit 03	Fault 12 - e.g. SOOT FILTER BYPASS	Gen. off fault
Bit 02	Fault 11 - e.g. STORAGE TANK MIN.	Mains off fault
Bit 01	Fault 10 - e.g. DAY TANK MIN.	Synchronisation fault
Bit 00	Fault 9 - e.g. OVERVOLTAGE RELEASE	Reverse power

**Faults 1-16 depend on the parametrisation of the fault inputs of the KEA.**

Register	47003	47004
Bit 15	Gen. thermal overload	Fault 56
Bit 14	Gen. unbalanced load	Fault 55
Bit 13	Gen. Overcurrent II	Fault 54
Bit 12	Gen. Overcurrent I	Fault 53
Bit 11	Mains thermal overload	Fault 52
Bit 10	Mains unbalanced load	Fault 51
Bit 09	Mains overcurrent II	Fault 50
Bit 08	Mains overcurrent I	Fault 49
Bit 07	Gen. Overfrequency	Fault 64
Bit 06	Gen. Underfrequency	Fault 63
Bit 05	Gen. Overvoltage	Fault 62
Bit 04	Gen. Undervoltage	Fault 61
Bit 03	Mains overfrequency	Fault 60
Bit 02	Mains underfrequency	Fault 59
Bit 01	Mains overvoltage	Fault 58
Bit 00	Mains undervoltage	Fault 57

**Table 11: Data point list fault signals KEA 1xx**

Status messages

Register	47005	47006
Bit 15	n.a.	Message 16
Bit 14	n.a.	Message 15
Bit 13	n.a.	Message 14
Bit 12	n.a.	Message 13
Bit 11	Collective fault all alarms	Emergency stop pressed
Bit 10	Collective fault shutdown	Remote start
Bit 09	Collective fault warning	Peak load requirement
Bit 08	Cos phi regulator fault	Mains failure
Bit 07	Test operating mode	Message 24
Bit 06	Automatic operating mode	Message 23
Bit 05	Manual operating mode	Message 22
Bit 04	Operating mode off	Message 21
Bit 03	Generator switch is on	Message 20
Bit 02	Mains switch is on	Message 19
Bit 01	Unit running	Message 18
Bit 00	Unit available	Message 17

Table 12: Data point list status messages KEA 1xx

8.3. Analogue values of the KEA 1xx (FC03)

Register	Analogue value	Dimension	Valence
47101	Mains voltage L1	V	1
47102	Mains voltage L2	V	1
47103	Mains voltage L3	V	1
47104	Mains frequency	Hz	0.01
47105	Mains current L1	kW	1
47106	Mains current L2	A	1
47107	Mains current L3	A	1
47108	Mains real power	kW	1
47109	Generator voltage L1	V	1
47110	Generator voltage L2	V	1
47111	Generator voltage L3	V	1
47112	Generator frequency	Hz	0.01
47113	Generator current L1	A	1
47114	Generator current L2	A	1
47115	Generator current L3	A	1
47116	Generator real power	kW	1
47117	Battery voltage	V	0.1
47118	Speed	RPM	1
47119	Analogue value 1	Temperatures without decimal point; oil pressure with decimal point	
47120	Analogue value 2		
47121	Analogue value 3		
47122	Analogue value 4		
47123	Cos phi mains L1		0.01
47124	Cos phi mains L2		0.01
47125	Cos phi mains L3		0.01
47126	Mains apparent power	kVA	1
47127	Generator cos-phi L1		0.01
47128	Generator cos-phi L2		0.01
47129	Generator cos-phi L3		0.01
47130	Apparent generator power	kVA	1
47131	Mains load	%	1
47132	Gen. Load	%	1
47133	Consumer load	kW	1
47134	Consumer apparent load	kVA	1
47135	Reserve		
47136	Reserve		
47138			

Table 13: Data point list analogue values

**8.4. Counter values from the KEA 1xx (FC03)**

Register	Counter value	Dimension	Valence
47201	MSW operating hours	h	65536
47202	LSW operating hours	h	1
47203	MSW start counter	-	65536
47204	LSW start counter	-	1
47205	MSW effective work	kWh	65536
47206	LSW effective work	kWh	1
47207	MSW reserve	kWh	65536
47208	LSW reserve	kWh	1

**Table 14: Data point list counter values**
**8.5. Commands to KEA 1xx (FC16)**

Register	Command and parameter	Value / valence
47301	Command #0 : Allowed power command	<b>\$243C</b>
47302	Parameter #0 : Allowed power	in <b>kW</b> , without decimal point
47303	Command #1 : n/a	\$0000
47304	Parameter #1 : n/a	0
47305	Command #2 : Command for ZLT commands	<b>\$2850</b>
47306	Parameter #2 : ZLT commands (cmd 8...1 /16...9)	E.g. ZLT command 1: \$0100
47307	Command #3 : n/a	\$0000
47308	Parameter #3 : n/a	0
47309	Command #4 : n/a	\$0000
47310	Parameter #4 : n/a	0
47311	Command #5 : n/a	\$0000
47312	Parameter #5 : n/a	0
47313	Command #6 : n/a	\$0000
47314	Parameter #6 : n/a	0
47315	Command #7 : n/a	\$0000
47316	Parameter #7 : n/a	0

**Table 15: Data point list commands**


**To ensure that the commands are accepted by the KEA, the value specified in the table must be transferred in the data word for the relevant command. Transferring command values that are not specified (except for zero) may cause undesired reactions in the KEA.**

**8.6. Status value (FC03)**

Register	Value
47401	CAN data traffic (0 = OK, 1 = CAN fault)

Table 16: Data point list CAN status KEA 1xx

**8.7. Sample message**

<b>Function code 03</b>	Read several registers
Example: 38 register	Register address 47001 == initial address 7000 Master message: 07 03 <b>1B 58</b> 0026 [CRC]   -> (start address 1B58 hex = 7000 dec )

Table 17: Data point list commands



## 9. Modbus Data point list (KEA 2xx)

### 9.1. Overview

Direction	Data	Number	Input (register)	Output (register)
From Kuhse FC03	Fault signals	4 registers	47001...47004	
	Status messages	4 registers	47005...47008	
	Analogue values	38 registers	47101...47136	
	Status values	2 registers	47137...47138	
	Counter values	10 registers	47201...47210	
To Kuhse FC16	Commands*	8 registers		47301...47308

**Table 18: Overview of data point list**

\* Digital outputs: The option to use the relay output card of the KEA exists. The digital outputs of the KEA relay output card can be assigned to "ZLT commands" and, therefore, a remote start via ZLT or a remote confirmation on the existing standard inputs of the KEA can be returned (see below).



**Notation of individual bits within a register:  
Bit 15 = MSB ("left" in the register), bit 00 = LSB**

Bit No.	H bytes								L bytes							
	<b>15</b>	14	13	12	11	10	9	8	7	6	5	4	3	2	1	<b>0</b>

**Table 19: Bit numbering within a register**



**Certain analogue values such as mains current and mains power are only valid if they are entered by the control unit. This depends on the KEA type and more information can be found in the operating instructions of the KEA.**

**9.2. Digital signals of the KEA 2xx (FC03)**

Fault signals

Register	47001	47002
Bit 15	Fault 8 - e.g. COLLECTIVE FAULT A	Power regulator fault
Bit 14	Fault 7 - e.g. COLLECTIVE FAULT W	Overspeed
Bit 13	Fault 6 - e.g. OVERSPEED	Aborted start
Bit 12	Fault 5 - e.g. COOLING WATER DEFICIENCY	Motor does not shut down
Bit 11	Fault 4 - e.g. GEN. OVER TEMPERATURE	Batt. Undervoltage
Bit 10	Fault 3 - e.g. EMERGENCY STOP PRESSED	Fault 19
Bit 09	Fault 2 - e.g. COOLING WATER TEMP. MAX	Fault 18
Bit 08	Fault 1 - e.g. OIL PRESSURE DEFICIENCY	Fault 17
Bit 07	Parameterized Fault 16	Gen. phase sequence
Bit 06	Fault 15 - e.g. MAINS SWITCH	Mains phase sequence
Bit 05	Fault 14 - e.g. LEAKAGE	Gen. switch case
Bit 04	Fault 13 - e.g. TANK OVERFLOW	Mains switch case
Bit 03	Fault 12 - e.g. SOOT FILTER BYPASS	Gen. off fault
Bit 02	Fault 11 - e.g. STORAGE TANK MIN.	Mains off fault
Bit 01	Fault 10 - e.g. DAY TANK MIN.	Synchronisation fault
Bit 00	Fault 9 - e.g. OVERVOLTAGE RELEASE	Reverse power

**Faults 1-16 depend on the parametrisation of the Fault inputs of the KEA.**

Register	47003	47004
Bit 15	Gen. thermal overload	Fault 56
Bit 14	Gen. unbalanced load	Fault 55
Bit 13	Gen. Overcurrent II	Fault 54
Bit 12	Gen. Overcurrent I	Fault 53
Bit 11	Mains thermal overload	Fault 52
Bit 10	Mains unbalanced load	Fault 51
Bit 09	Mains overcurrent II	Fault 50
Bit 08	Mains overcurrent I	Fault 49
Bit 07	Gen. Overfrequency	Fault 64
Bit 06	Gen. Underfrequency	Fault 63
Bit 05	Gen. Overvoltage	Fault 62
Bit 04	Gen. Undervoltage	Fault 61
Bit 03	Mains overfrequency	Fault 60
Bit 02	Mains underfrequency	Fault 59
Bit 01	Mains overvoltage	Fault 58
Bit 00	Mains undervoltage	Fault 57

**Table 20: Data point list fault signals KEA 2xx**

Status messages

Register	47005	47006
Bit 15	n.a.	Test operating mode
Bit 14	n.a.	Automatic operating mode
Bit 13	n.a.	Manual operating mode
Bit 12	Gen.voltage ok	Operating mode off
Bit 11	Parametrisation on	Generator switch is on
Bit 10	Vector shift release	Mains switch is on
Bit 09	df/dt release	Unit running
Bit 08	du/dt release	Unit available
Bit 07	n.a.	n.a.
Bit 06	n.a.	n.a.
Bit 05	n.a.	Control Unit locked
Bit 04	n.a.	External quick stop
Bit 03	Collective fault all alarms	Manual quick stop
Bit 02	Collective fault shutdown	Remote start
Bit 01	Collective fault warning	Peak load requirement
Bit 00	Cos phi regulator fault	Mains failure

Register	47007	47008
Bit 15	Gen. Overfrequency	CanOpen Inputmodule 1, Input 8
Bit 14	Gen. Underfrequency	CanOpen Inputmodule 1, Input 7
Bit 13	Gen. Overvoltage	CanOpen Inputmodule 1, Input 6
Bit 12	Gen. Undervoltage	CanOpen Inputmodule 1, Input 5
Bit 11	Mains overfrequency	CanOpen Inputmodule 1, Input 4
Bit 10	Mains underfrequency	CanOpen Inputmodule 1, Input 3
Bit 09	Mains overvoltage	CanOpen Inputmodule 1, Input 2
Bit 08	Mains undervoltage	CanOpen Inputmodule 1, Input 1
Bit 07	n.a.	CanOpen Inputmodule 2, Input 8
Bit 06	Gen. unbalanced load	CanOpen Inputmodule 2, Input 7
Bit 05	Gen. Overcurrent II	CanOpen Inputmodule 2, Input 6
Bit 04	Gen. Overcurrent I	CanOpen Inputmodule 2, Input 5
Bit 03	Mains thermal overload	CanOpen Inputmodule 2, Input 4
Bit 02	Mains unbalanced load	CanOpen Inputmodule 2, Input 3
Bit 01	Mains overcurrent II	CanOpen Inputmodule 2, Input 2
Bit 00	Mains overcurrent I	CanOpen Inputmodule 2, Input 1

Table 21: Data point list status messages KEA 2xx

**9.3. Analogue values of the KEA 2xx (FC03)**

Register	Analogue value	Dimension	Valence
47101	Mains voltage L1	V	1
47102	Mains voltage L2	V	1
47103	Mains voltage L3	V	1
47104	Mains frequency	Hz	0.01
47105	Mains power L1	kW	1
47106	Mains power L2	A	1
47107	Mains power L3	A	1
47108	Mains real power	kW	1
47109	Generator voltage L1	V	1
47110	Generator voltage L2	V	1
47111	Generator voltage L3	V	1
47112	Generator frequency	Hz	0.01
47113	Generator current L1	A	1
47114	Generator current L2	A	1
47115	Generator current L3	A	1
47116	Generator real power	A	1
47117	Battery voltage	V	0.1
47118	Speed	RPM	1
47119	Analogue value 1	Temperatures without decimal point; oil pressure with decimal point	
47120	Analogue value 2		
47121	Analogue value 3		
47122	Analogue value 4		
47123	Mains cos-phi mains L1		0.01
47124	Mains cos-phi mains L2		0.01
47125	Mains cos-phi mains L3		0.01
47126	Mains apparent power	kVA	1
47127	Generator cos-phi L1		0.01
47128	Generator cos-phi L2		0.01
47129	Generator cos-phi L3		0.01
47130	Generator apparent power	kVA	1
47131	Mains load	%	1
47132	Generator load	%	1
47133	Consumer power	kW	1
47134	Consumer apparent power	kVA	1
47135	Reserve		
47136	Reserve		

**Table 22: Data point list analogue values KEA 2xx**

**9.4. Counter values from the KEA 2xx (FC03)**

Register	Counter value	Dimension	Valence
47201	MSW operating hours	h	65536
47202	LSW operating hours	h	1
47203	MSW start counter	-	65536
47204	LSW start counter	-	1
47205	MSW hours parallel operation	h	65536
47206	LSW hours parallel operation	h	1
47207	MSW reserve	kWh	65536
47208	LSW reserve	kWh	1
47207	MSW reserve	kWh	65536
47208	LSW reserve	kWh	1

**Table 23: Data point list counter values KEA 2xx**
**9.5. Commands to KEA 2xx (FC16)**

Register	Command and parameter	Value / valence
47301	Command #1 : Key# for nominal value control	<b>\$243C</b>
47302	Parameter #1a : nominal value	0...1100 ‰
47303	Parameter #1b : enable nominal value control	\$0100 (\$0000= no release)
47304	Repetition Parameter #1b: n/a	\$0100
47305	Command #2 : Key# for command bit	<b>\$2850</b>
47306	Parameter #2 : bit commands (cmd 8...1 /16...9)	E.g. bit command 1: \$0100
47307	n/a	0
47308	n/a	0
47309	n/a	0
47310	n/a	0
47311	n/a	0
47312	n/a	0
47313	n/a	0
47314	n/a	0
47315	n/a	0
47316	n/a	0

**Table 24: Data point list commands KEA 2xx**


**To ensure that the commands are accepted by the KEA, the value specified in the table must be transferred in the data word for the relevant command. Transferring command values that are not specified (except for zero) may cause undesired reactions in the KEA.**

### 9.6. Connection Status (FC03)

Register	Value
47401	CAN data traffic (0 = OK, 1 = DT fault)

Table 25: Data point list CAN status KEA 2xx

### 9.7. Sample message

<b>Function code 03</b>	Read several registers (here: all analogue values)
Example: 38 register	Register address 47001 == initial address 7000 Master message: 07 03 <b>1B 58</b> 0026 [CRC]   -> (start address 1B58 hex = 7000 dec )

Table 26: Sample message KEA 2xx

## 10. Technical data

### 10.1. Housing

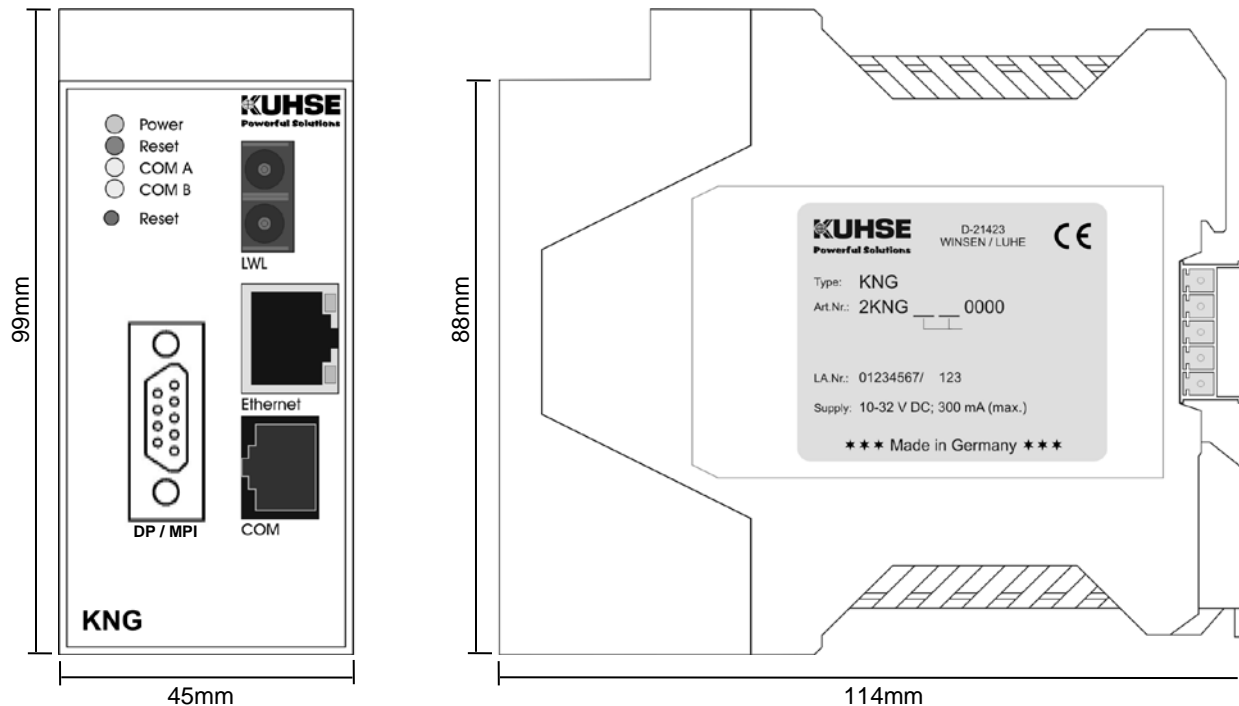


Diagram 7: KNG housing with measurements

Parameter		Unit
Width (without connector and cable)	45	mm
Width (with bus connector)	52	mm
Depth (without connector and cable)	99	mm
Height (without connector and cable)	114	mm
Weight	300	g

Table 27: Measurements and weight

The KNG is intended to be mounted on a 35 mm DIN rail (EN50022). For ease of assembly, free space of at least 10 mm must be provided for below the device. When considering the height specification, bear in mind that certain connectors and cables will stick out. Therefore, a corresponding amount of free space must be left above the device.

10.2. Nominal/threshold values

Parameter	Symbol	Conditions	min	type	max	Unit
<b>Power supply</b>						
Voltage	$U_{cc}$		10	24	32	V <sub>DC</sub>
Power input	$I_{cc}$	$U_{cc} = 24V$	80	100	120	mA
		$U_{cc} = 12V$	160	200	240	mA
Power consumption	P				3	W
<b>Environment values</b>						
Temperature	$T_A$		-10		55	°C
Humidity		Non-condensing				%
Storage temperature	$T_S$		-20		70	°C

Table 28: Nominal/threshold values