KUHSE
Powerful Solutions

User Manual
Art. No. 2KNGKP0000

KUHSE Network Gateway
KNG – KEA Profibus Gateway

1. Table of contents

2. Version information

Version	Date	Comment	Abbreviation
0.0	03/11/2008	Draft	MA
0.1	18/11/2008	First issue	MA
0.2	05/12/2008	Counters for "Created Work" inserted	Hen
0.3	15/03/2012	Current diagrams (D-Sub 9-F); update of data point list	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 Profibus Gateway variant, the KNG enables data coupling between a KEA 10x control and a Profibus DP master (see diagram). Several KEAs can also be brought to a Profibus. 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).

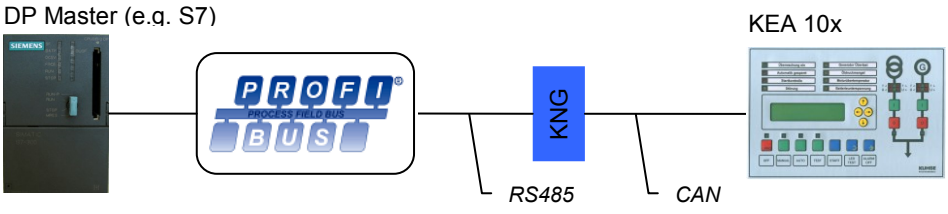

Diagram 1: Figure showing KNG use

4. Device installation and connection

4.1. Overview of the connections and displays

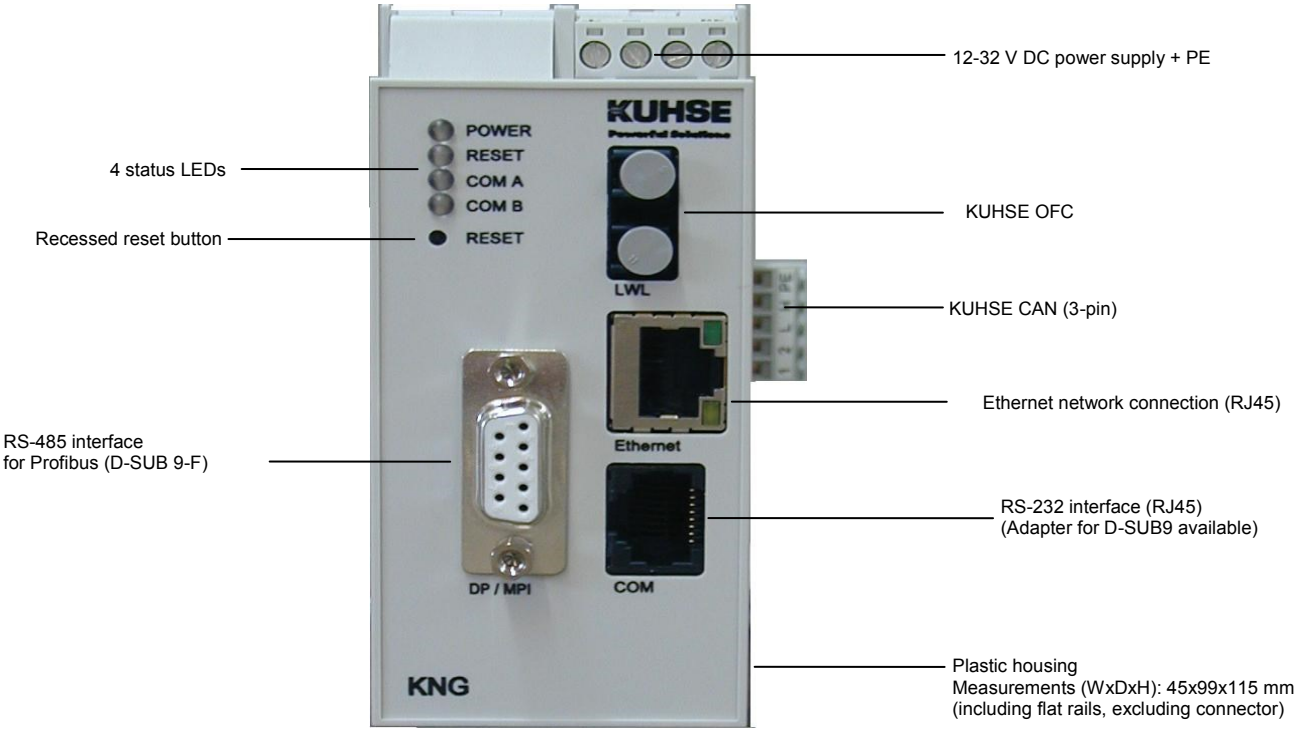

Diagram 2: Overview of the displays and connections

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).

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 for 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	Ground (signal ground)
5	RXD
6	TXD
7	Connected internally (connection identification)
8	

Table 2: RS-232 interface connections

An adapter cable on the D-SUB9 connector is available for the RS-232 interface. This is included with all device variants that require this connection.

Pin	Connection (signal)
1	DCD
2	TXD
3	RXD
4	DTR
5	Ground (signal ground)
6	Not connected
7	Connected internally via KNG
8	
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 (RxD/TxD-P)
Pin (8)	Signal line A (RxD/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 bus connection with connector

4.6. Connecting the KEA Profibus gateway

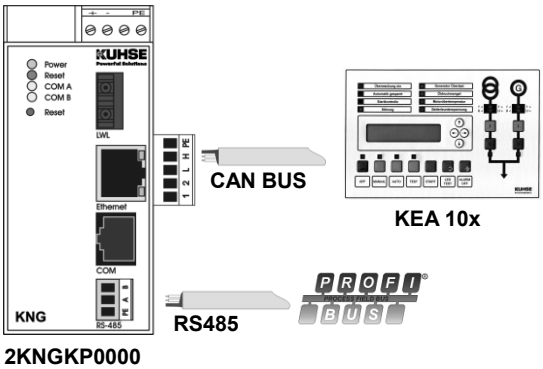

Diagram 4: Connecting the KEA Profibus gateway

As shown in the diagram, the KEA Profibus gateway (2KNGKP0000) 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 Profibus DP also takes place using a shielded two-wire cable. This is connected via a connector (D-Sub 9-M e.g. standard Siemens Profibus connector or Phoenix Contact) to the RS-485 connection on the upper side of the KNG device.

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 error 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 (KEA Profibus gateway)

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

LED	Behaviour	Meaning	Frequency
COM A	On	Communication with KEA is running without errors	n/a
	Flashing	Errors in communication with KEA, For example, parametrisation or CAN bus errors	100 Hz
	Off	Device error, please contact Kuhse	n/a
COM B	On	Communication with Profibus DP master occurs	n/a
	Off, flashing	Errors in communication with DP master, for example, parametrisation or Profibus errors	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.

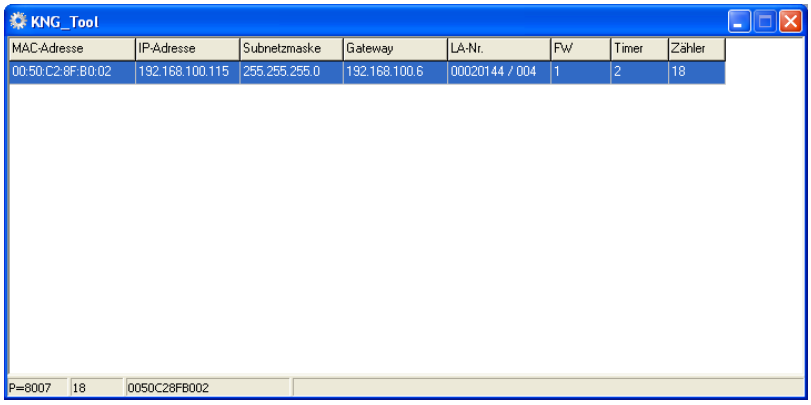

Diagram 5: "KNG Tool" service program

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 the "Parametrisation" chapter.

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.

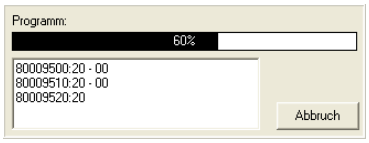

Diagram 6: Firmware update status

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 errors. 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 without a password set up. We strongly recommend that you set up a 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 Profibus 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
Profibus DP address		7	3..126
CAN	Connected device	KEA 10x	KEA 10x
	Machine number (KEA)	1	1..31

Table 8: KNG parametrisation

The specified parameters can be changed using the KNG Tool according to the specified limits. The context menu entries "Set DP Address" or "CAN Bus Settings" are available for this. 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. Data point list (Profibus)

8.1. Overview

Direction	Data	Block type	Inbound (address)	Outbound (address)
From Kuhse	Error messages	4 Words input	00-07	
	Status messages	2 Words input	08-11	
	Analogue values I	16 Words input	12-43	
	Analogue values II	16 Words input	44-76	
	Analogue values III	6 Words input	76-87	
	Counter values	5 Words input	88-97	
	Status	1 Word input	98-99	
To Kuhse	Digital outputs *	2 Words output		00-03
	Commands	16 Words output		04-35

Table 9: Overview of data point list

* The digital outputs are not available in the standard design. A corresponding enhancement module is intended but not yet available.

All address entries refer to the Siemens S7 notation. The count therefore corresponds to the byte addresses.

Notation of individual bits: Bit 15 = MSB, bit 00 = LSB

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 from the KEA (from KUHSE)

8.2.1. Error messages (DW00 – DW06)

	DW 00	DW 02
Bit 15	Alarm 16	Generator phase sequence
Bit 14	Alarm 15	Mains phase sequence
Bit 13	Alarm 14	Generator switch case
Bit 12	Alarm 13	Mains switch case
Bit 11	Alarm 12	Switch off generator fault
Bit 10	Alarm 11	Mains off fault
Bit 09	Alarm 10	Synchronisation fault
Bit 08	Alarm 9	Feedback
Bit 07	Alarm 8	Power controller fault
Bit 06	Alarm 7	Overspeed
Bit 05	Alarm 6	Aborted start
Bit 04	Alarm 5	Motor does not shut down
Bit 03	Alarm 4	Battery undervoltage
Bit 02	Alarm 3	Alarm 19
Bit 01	Alarm 2	Alarm 18
Bit 00	Alarm 1	Alarm 17

	DW 04	DW 06
Bit 15	Generator overfrequency	Reserve alarm 64
Bit 14	Generator underfrequency	Reserve alarm 63
Bit 13	Generator overvoltage	Reserve alarm 62
Bit 12	Generator undervoltage	Reserve alarm 61
Bit 11	Mains overfrequency	Reserve alarm 60
Bit 10	Mains underfrequency	Reserve alarm 59
Bit 09	Mains overvoltage	Reserve alarm 58
Bit 08	Mains undervoltage	Reserve alarm 57
Bit 07	Generator thermal overload	Reserve alarm 56
Bit 06	Generator unbalanced load	Reserve alarm 55
Bit 05	Generator overcurrent 2	Reserve alarm 54
Bit 04	Generator overcurrent 1	Reserve alarm 53
Bit 03	Mains thermal overload	Reserve alarm 52
Bit 02	Mains unbalanced load	Reserve alarm 51
Bit 01	Mains overcurrent 2	Reserve alarm 50
Bit 00	Mains overcurrent 1	Reserve alarm 49

Table 10: Data point list (error messages)

8.2.2. Status messages (DW08 - DW10)

DW 08		DW 10
Bit 15	Test operating mode	Reserve message 24
Bit 14	Automatic operating mode	Reserve message 23
Bit 13	Manual operating mode	Reserve message 22
Bit 12	Operating mode off	Reserve message 21
Bit 11	Generator switch is on	Reserve message 20
Bit 10	Mains switch is on	Reserve message 19
Bit 09	Unit running	Reserve message 18
Bit 08	Unit available	Reserve message 17
Bit 07	Reserve alarm 72	Reserve message 16
Bit 06	Reserve alarm 71	Reserve message 15
Bit 05	Reserve alarm 70	Reserve message 14
Bit 04	Reserve alarm 69	Reserve message 13
Bit 03	Collective fault all alarms	Emergency stop pressed
Bit 02	Collective fault shutdown	Remote start
Bit 01	Collective fault warning	Peak load requirement
Bit 00	Cos phi regulator fault	Mains failure

Table 11: Data point list (status messages)

8.3. Analogue values from the KEA (from KUHSE)

DW	Analogue value	Dimension	Valence
DW 12	Mains voltage L1	V	1
DW 14	Mains voltage L2	V	1
DW 16	Mains voltage L3	V	1
DW 18	Mains frequency	Hz	0.01
DW 20	Mains power L1	A	1
DW 22	Mains power L2	A	1
DW 24	Mains power L3	A	1
DW 26	Actual mains power	kW	1
DW 28	Generator voltage L1	V	1
DW 30	Generator voltage L2	V	1
DW 32	Generator voltage L3	V	1
DW 34	Generator frequency	Hz	0.01
DW 36	Generator power L1	A	1
DW 38	Generator power L2	A	1
DW 40	Generator power L3	A	1
DW 42	Actual generator power	kW	1
DW 44	Battery voltage	V	0.1
DW 46	Speed	RPM	1

DW 48	Analogue value 1	Temperatures without decimal point; oil pressure with decimal point	
DW 50	Analogue value 2		
DW 52	Analogue value 3		
DW 54	Analogue value 4		
DW 56	Cos phi mains L1		0.01
DW 58	Cos phi mains L2		0.01
DW 60	Cos phi mains L3		0.01
DW 62	Apparent mains power	kVA	1
DW 64	Cos phi generator L1		0.01
DW 66	Cos phi generator L2		0.01
DW 68	Cos phi generator L3		0.01
DW 70	Apparent generator power	kVA	1
DW 72	Mains load	%	1
DW 74	Generator load	%	1
DW 76	User power	kW	1
DW 78	Apparent user power	kVA	1
DW 80	Reserve		-
DW 82	Reserve		-

Table 12: Data point list (analogue values)

8.4. Counter values from the KEA (from KUHSE)

DW	Counter value	Dimension	Valence
DW 84	MSW created work	kWh	65536
DW 86	LSW created work	kWh	1
DW 88	MSW operating hours	h	65536
DW 90	LSW operating hours	h	1
DW 92	MSW start counter		65536
DW 94	LSW start counter		1
DW 96	Reserve		

Table 13: Data point list (counter values)

8.5. Status values (from KUHSE)

DW	Value
DW 98 byte 00	Reserve
DW 98 byte 01	CAN data traffic (0 = OK, 1 = DT fault)

Table 14: Data point list (status values)

8.6. Digital outputs (to KUHSE)

	DW 00	DW 02
Bit 15-00	n/a	n/a

Table 15: Data point list (digital outputs)

The digital outputs are not available in the standard design. A corresponding enhancement module is intended but not yet available.

8.7. Commands to KEA (to KUHSE)

DW	Command and parameter	Value / valence
DW 04	Command #0 : Allowed power command	**$243C**
DW 06	Parameter #0 : Allowed power in kW	0..max., without decimal point
DW 08	Command #1 : Command for ZLT commands	**$2850**
DW 10	Parameter #1 : ZLT commands (cmd 8…1 /16…9)	E.g. ZLT command 1: $0100
DW 12	Command #2 : n/a	$0000
DW 14	Parameter #2 : n/a	0
DW 16	Command #3 : n/a	$0000
DW 18	Parameter #3 : n/a	0
DW 20	Command #4 : n/a	$0000
DW 22	Parameter #4 : n/a	0
DW 24	Command #5 : n/a	$0000
DW 26	Parameter #5 : n/a	0
DW 28	Command #6 : n/a	$0000
DW 30	Parameter #6 : n/a	0
DW 32	Command #7 : n/a	$0000
DW 34	Parameter #7 : n/a	0

Table 16: 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.

9. Technical data

9.1. Housing

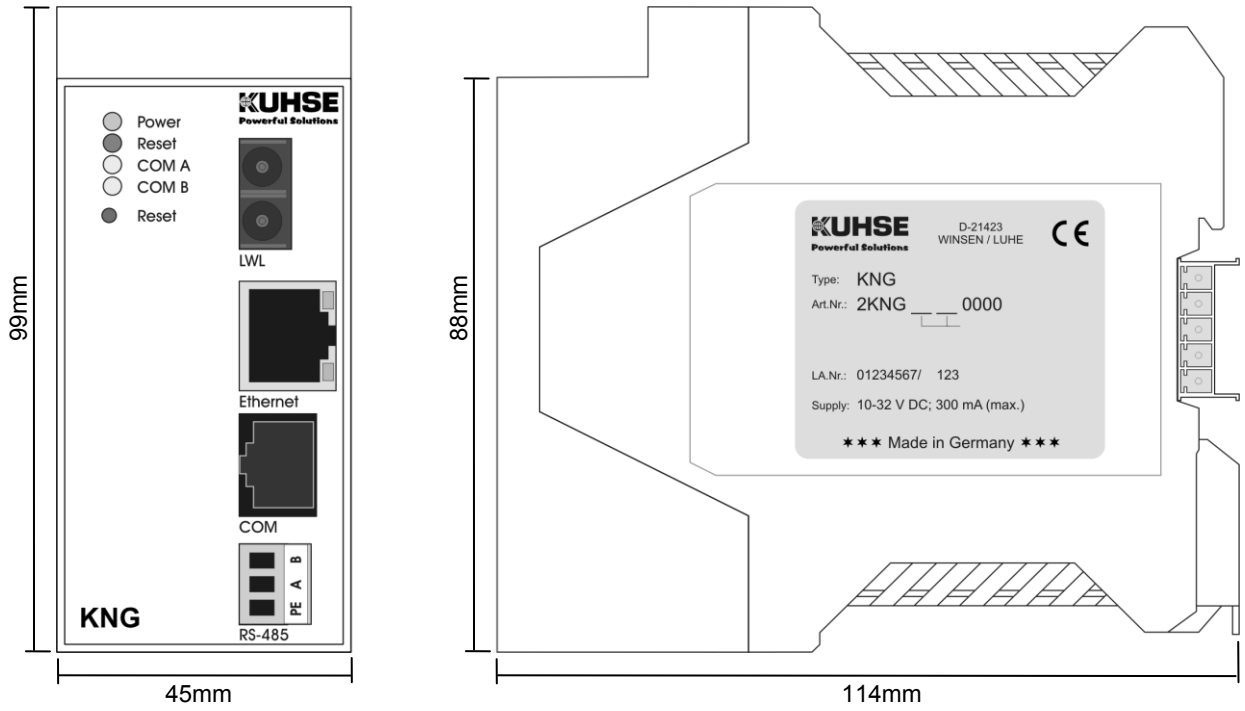

Diagram 7: KNG housing with measurements

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 17: 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.

9.2. Nominal/threshold values

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

Table 18: Nominal/threshold values