Operating instructions
K-114 BT Interface converter

Contents

Product description

The K-114 BT interface converter is recommended to communicate with digital products from KELLER, such as pressure transmitters, manometers, or autonomous data loggers.

The interface converter supports two modes of operation:
– Communication via Bluetooth
– Communication via USB

The K-114 BT converter converts the serial signals of an RS485 interface into either Bluetooth or USB format. The converter can be supplied with power autonomously, via the integrated battery, or via a USB interface. In this way, the converter also supplies power to the connected devices. The battery can be charged via the USB interface. The converter measures available supply voltage and power consumption of connected devices. These signals can be evaluated and displayed using the supplied software. Bias or termination resistors may be activated if necessary in order to improve communication via the RS485. The device is configured using the „K114_Config" software.

Bluetooth

General

The K-114 BT interface converter has a Bluetooth Classic 3.0 interface and a typical range of up to 10 m (device class 2). The partner device (master/PC) must support Bluetooth Classic 2.1 or higher.

Function

When the device is switched on, the Bluetooth module is activated automatically and the interface converter is visible to other Bluetooth devices. The K-114 BT must be paired with the receiving device before a connection can be established. Once a Bluetooth connection has been established, the interface converter can no longer be accessed by other Bluetooth devices.

If you want to communicate via the USB interface of the converter, any existing Bluetooth connections must be terminated. If Bluetooth communication is established, any existing USB connection is interrupted.

The computer must have an internal Bluetooth module or a Bluetooth USB dongle (Bluetooth Classic 2.1 or higher)

- To establish a Bluetooth connection with the K-114 BT, open the window „Devices and Printers" in the Control Panel.

→ Ensure that the K-114 BT converter is switched on (Power LED is illuminated).
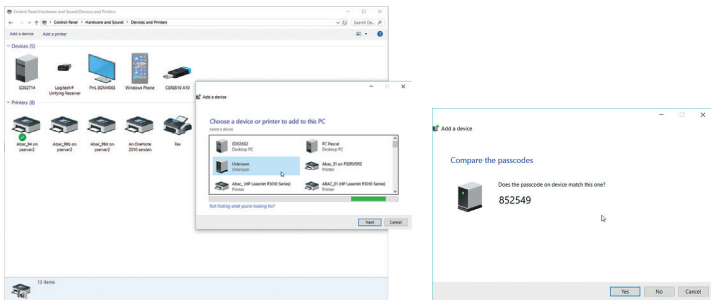
- Click on „Add a device" to search for Bluetooth devices. This may take a few minutes. The K-114 BT converter with the correct serial number should appear in the list.

→ The computer may not find the converter on the first attempt. If this happens, please check that the converter is switched on and is not too far away from the computer.

- Double-clicking on the converter symbol opens a new window with the automatically generated coupling code. Click on „Next" to couple the K-114 BT converter with the computer. A virtual COM port is now created that can be used to communicate with the connected device.
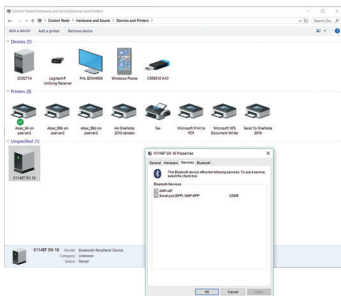
- The virtual COM port numbers generated can be found by navigating to „Devices and Printers" / „K-114 BT SNxxxx".
  Right-click on the logo under „Properties" / „Services" to find the generated COM port.

→ This procedure need only be completed once. The generated virtual COM port remains available for further sessions. In other words, as soon as this port is accessed, the BT connection is established automatically.

USB

General

In order to operate the interface converter via USB, the interface driver „Driver K-114" must first be installed on the computer. The driver software is included on the KELLER software CD and can be downloaded for free from www.keller-druck.com.

Communication

If the device is connected via Bluetooth, any communication via the USB interface is automatically interrupted. Once the Bluetooth connection is deactivated, it is again possible to communicate via the USB interface.

Battery/charging

In order to protect the battery in the device, the user should switch off the converter after use. In battery operation, the K-114 BT switches off automatically after communication has been inactive for 30 minutes.

The battery can be charged via the USB interface. Care must be taken to ensure that the battery can be charged both via a normal USB port and a DCP (dedicated charging port) or USB adapter. This has the benefit that instead of being charged with 500 mA or 100 mA (USB port), the battery can be charged with up to 1 A (DCP), reducing the charging time.

Charging and operating times (90%):

Charging time	Value	Unit
Charging time @ 100 mA (USB/low-powered port)	≈ 22,5	[h] hours
Charging time @ 500 mA (USB/high-powered port)	≈ 4,5	[h] hours
Charging time @ 1 A (DCP)	≈ 2,5	[h] hours

Table 1: Battery charging times

Operating time	Value	Unit
Operating time without load	≈ 3	[d] days
Operating time with „LEO 3"	≈ 2	[d] days
Operating time with a device with a power consumption of 20 mA	≈ 18	[h] hours

Table 2: Operating times with the battery

Technical specifications

Property	Parameter	Condition	Value	Unit
Battery capacity			≥ 2300	mAh
Voltage			3,7	V
Type			Li-ion	
Bluetooth version			3.0 Classic	
Range			up to 10 m (class 2)	
USB plug type			Mini USB male	
USB version			2.0	
External power supply	USB		5 ± 5%	VDC
End consumer power supply	U-Out		15 VDC ± 5%	
End consumer power supply	I-Out		> 100	mA
Voltage measurement input	U-In		0–12	VDC
Accuracy of voltage measurement input	U-In	RI ≥ 100 kΩ	0.3	%FS
Resolution of voltage measurement input	U-In		< 0.004	V
Current measurement	I-Out		0–150	mA
Accuracy of current measurement	I-Out		0,3	%FS
Resolution of current measurement	I-Out		< 0.04	mA
RS485 configuration parameters	Bus address		253	
RS485 bus devices		1/4 unit load	up to 128	
RS485 transmission rate			9600 (default) / 115200	baud
RS485 cable length			0,75	m
Protection			IP 40	
Storage and operating temperature			-10…+50	°C
Dimensions (H x W x D)			95 x 28 x 65	mm
Weight			150	g

RS485 interface

For Bluetooth communication and the internal controller (bus address: 253), the converter supports the baud rate of 9600 baud (default) or 115200 baud, 8 data bits, 1 stop bit and no parity. This transmission speed must be configured on the master (PC) and on the K-114 BT.

Property	Bluetooth / RS485	USB / internal controller (bus address 253)	configurable
Baud rate	9600 (default) / 115200 baud	9600 (default) / 115200 baud	Yes
Data bits	8	8	No
Stop bits	1	1	No
Parity	no parity	no parity	No

The desired baud rate can be configured using the „K114Config" software.

Further connection parameters are possible for communicating via the USB interface with the RS485.

Property	USB / RS485	configurable
Baud rate	freely selectable, up to 250 kbps	Yes
Data bits	7,8	Yes
Stop bits	1,2	Yes
Parity	Odd, even, mark, space, no parity	Yes

The K-114 BT converter communicates with the connected devices via an RS485 (half-duplex mode) bus. The internal battery supplies power to the devices connected to the K-114 BT. KELLER products operate with fail-safe drivers, which output a logical high at the receiver outlet in the event of short-circuited, open or non-terminated inputs in order to avoid invalid signal states. KELLER products also feature slew rate limitation, which limits the edge steepness of the driver output. This prevents high-frequency emissions from devices and data lines. A maximum of 128 bus devices can be connected to this RS485 master.

Product overview

Product	Connection	Product number	Plug compatible with
K-114 BT	Screw terminals (MC 1,5 / 6-ST-3,81)	309010.0119	all digital KELLER products with cable outlet, series 3X, series 4X, DCX
K-114 BT A	Fischer plug (S 103 A054-130 [male])	309010.0101	DCX-16 /-22-25 PVDF / -38, LEO Record, LEX 1, ARC-1
K-114 BT B	Binder cable connector (series 680 [female] 5-pole)	309010.0120	Series 30X / 40X, LEO 3, dV-22 PP, dV-2 PS*, Castello*

*Requires additional cable option

Pin assignment for the converters and connections

K-114 BT
Pluggable screw terminal
MC 1,5 / 6-ST-3,81

+Vcc | RS 485-A | GND | RS 485-B | U-IN | Erde / Schirm

K-114 BT A
Fischer connector
S 103 A054-130 (male)

2: +U-IN
1: GND
3: +Vcc
Earth/shield
5: RS485-B
4: RS485-A

K-114 BT B
Binder cable connector
Series 680 (female) 5-pole

3: +Vcc
2: +U-IN
4: RS485-A
1: GND
5: RS485-B
Earth/shield

LED display
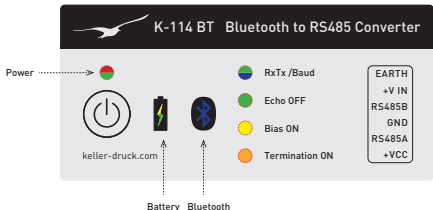
Power
Displays the power status of the K-114 BT

🔴 Device not recognised by PC (K-114 BT interface driver not installed), error
Note: Upon initial installation, the LED glows red for a few seconds until the converter has been registered on the PC.

🟢 K-114 BT is connected via USB and is being powered/charged

((🟢)) K-114 BT is being powered by the internal battery

(🟢) K-114 BT is in standby mode (only possible in USB operation)

⚪ K-114 BT is switched off

Battery
Indicates the battery status

⚡ Battery capacity below 20%

((⚡)) Battery capacity below 10% or charging error

((⚡)) Battery charging

⚡ Battery not charging (full)

Bluetooth

Indicates which communication mode the device is in

Bluetooth ready (communication via Bluetooth possible)

(( )) Bluetooth connected (communication via USB is not currently possible)
300 ms

Bluetooth off/error

RxTx/baud

Displays the status of the reception and transmission line (RxTx) with the set baud rate

Is transmitting and/or receiving data via RS485 bus at 9600 baud

Is transmitting and/or receiving data via RS485 bus at 115200 baud

Echo off

Displays the status of the function „Echo OFF"

Echo activated

Echo deactivated

Bias ON

Displays the status of the function „Bias ON"

Bias resistors (560 Ω) activated for RS485A and RS485B

No bias resistors activated

Termination ON

Displays the status of the function „Termination ON"

Termination resistor 120 Ω activated

Termination resistor not activated

Caution:In battery-operated end devices, this function can lead to errors due to the increased power load.
→ Recommendation: do not activate this function

Error analysis support

```
                          ┌──────────────┐
          red             │  POWER LED   │            off
        ┌─────────────────┤              ├─────────────────┐
        │                 └──────┬───────┘                 │
        ▼                        │ green                   ▼
┌──────────────────┐             │            ┌──────────────────────────┐
│ → Check/install  │             │            │ Device is out of         │
│   K-114 BT       │             │            │ operation (it            │
│   software driver│             │            │ may have switched itself │
│ → Internal error │             │            │ off)                     │
│                  │             │            │ → Press the Power Button │
│                  │             │            │   to turn the device on  │
└──────────────────┘             │            └──────────────────────────┘
```
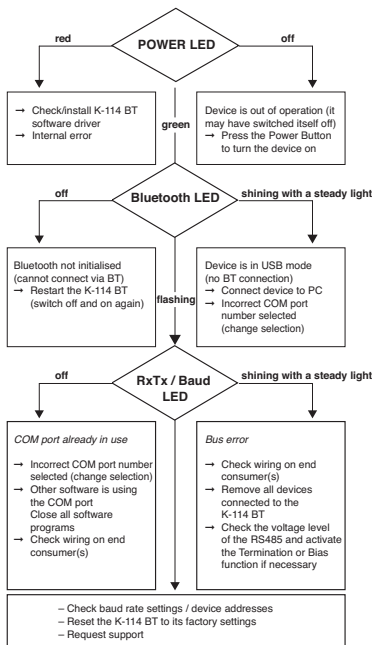
```
                          ┌──────────────┐
          off             │ Bluetooth LED│   shining with a steady light
        ┌─────────────────┤              ├─────────────────┐
        │                 └──────┬───────┘                 │
        ▼                        │ flashing                ▼
┌──────────────────┐             │            ┌──────────────────────────┐
│ Bluetooth not    │             │            │ Device is in USB mode    │
│ initialised      │             │            │ (no BT connection)       │
│ (cannot connect  │             │            │ → Connect device to PC   │
│ via BT)          │             │            │ → Incorrect COM port     │
│ → Restart the    │             │            │   number selected        │
│   K-114 BT       │             │            │   (change selection)     │
│   (switch off and│             │            │                          │
│   on again)      │             │            │                          │
└──────────────────┘             │            └──────────────────────────┘
```

```
                          ┌──────────────┐
          off             │ RxTx / Baud  │   shining with a steady light
        ┌─────────────────┤     LED      ├─────────────────┐
        │                 └──────────────┘                 │
        ▼                                                  ▼
```

COM port already in use	*Bus error*
→ Incorrect COM port number selected (change selection)	→ Check wiring on end consumer(s)
→ Other software is using the COM port Close all software programs	→ Remove all devices connected to the K-114 BT
→ Check wiring on end consumer(s)	→ Check the voltage level of the RS485 and activate the Termination or Bias function if necessary

– Check baud rate settings / device addresses
– Reset the K-114 BT to its factory settings
– Request support

System requirements for software K114Config

Processor	min. Pentium 75 MHz	Internet connection	recommended (for support)
Screen resolution	min. 1024 x 768		
Memory	min. 16 MB RAM	Operating system	Windows XP, 7, 8, 10
Hard disk space	min. 20 MB recommended		

Factory configuration K-114 BT

These are the recommended settings for fault-free operation of KELLER products.

Converter bus address	253 (cannot be changed)
Baud rate	9600 baud
Echo off	off
Bias network	off
Termination	off

Function overview
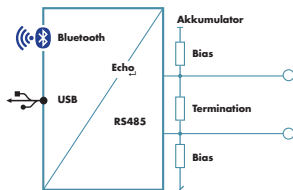
Echo OFF
The data sent by the PC (Tx) is not sent back.

Bias network
Prevents undefined bus levels in the event of inactive line drivers.

Termination
Prevents reflections on the signal lines.

Software K114Config

The software K114Config is a configuration and diagnostic tool for the converter K-114 BT. It can be used to configure the baud rate of the converter, as well as to select the echo function and to switch on the bias resistors or the termination resistor. If an end consumer is connected, a full diagnostic test can be run to determine the power consumption and applied signal voltage and a communication test can be performed.

Installation

First, install the K-114 BT driver on your computer, then launch the K114Config software. (Software CD included in scope of delivery or available as a free download from www.keller-druck.com)

Execution

Launch the program „K114Config" and select the corresponding COM port. Then navigate to the K-114 configuration view (top-right of the tab).
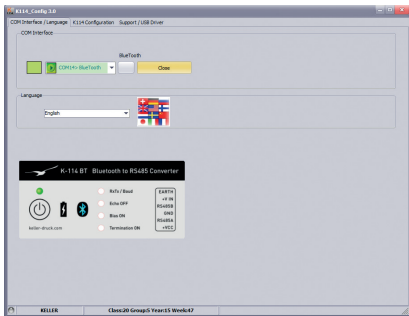
Voltage and current measurement

The latest configuration and measurements are continuously displayed and updated.
The RS485 connection to a connected device can be checked by pressing the button „Test communication".
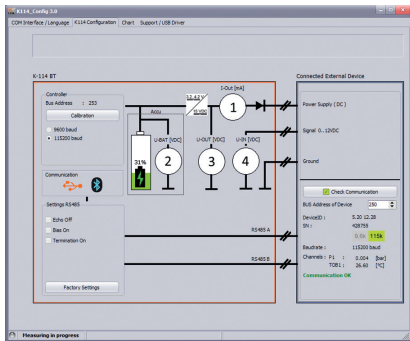
No.	Symbol	Function	Description
1	I-OUT	Supply current to external consumers	Range 0…150 mA
2	U-BAT	Voltage of the internal battery	3,1…4,2 V
3	U-OUT	Supply voltage to external consumers	~ 15 V
4	U-IN	Voltage input	Range 0…12 VDC

Warnings and messages in the software

The following warnings and messages in the „K-114 Config" software notify the user that an invalid state has arisen. The message is displayed in the top line of the window „K-114 Configuration".

Battery almost empty
If the charging capacity of the battery drops below 20%, the user is notified that the battery is low on power.

Battery low, connect charger
This final warning appears when the capacity drops below 10% and instructs the user one last time to charge the device before it switches off automatically.

U-OUT outside of range
This message appears if the voltage U-OUT is less than 14,25 VDC. As an initial measure, remove the external devices until the error disappears.

Short circuit/overload at output
This message appears if the output current I-OUT exceeds 125 mA. This indicates that the load is too high: please check the power supply connection. As an initial measure, remove the external devices until the error disappears.

U-IN outside of measurement range
The measurement range for U-IN is 0…12 VDC. The message informs the user that the upper limit of the measurement range that can be represented (> 15VDC) has been reached. The measurement voltage U-IN actually applied may therefore be greater than the displayed value.

If problems arise when using the converter, please refer to the chapter „Error analysis support" for help. If the problem persists after you have followed the instructions in this chapter, please contact www.keller-druck.com
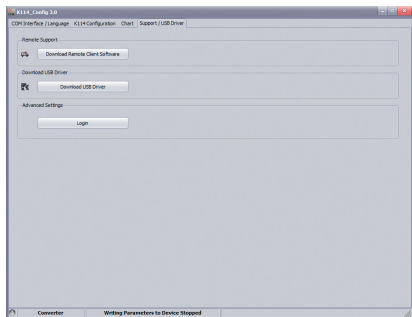

The function „Download remote maintenance software" automatically begins the download of a remote desktop program. Launch it once it has downloaded. After sending a connection code, our technical support team will log into your computer and provide help directly on your screen.

Recording K-114 BT measurements

The measurements I-OUT, U-IN, U-OUT and U-BAT can be recorded and stored via the software ControlCenter-Series30 (CCS30). Read the CCS30 manual to find out more about this.

In order to display the data for the K-114 controller using the software, you must enter bus address 253 in CCS30 and start the search for the device. You can display and store measurements via the „New measurement" function.
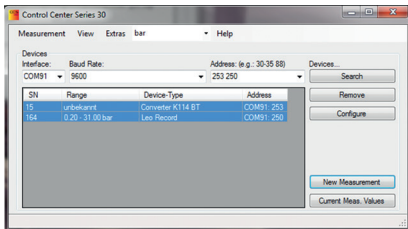
K-114 BT Information

Technical documentation and software

The required documentation and software packages (Manuals, Driver K-114, K-114 Config) are downloadable free of charge at www.keller-druck.com. Simply enter the product name in the search box and click Search.

Environment

Do not operate in explosion hazard areas (EX zones). Keep away from flammable sources and strong electromagnetic fields. Select an installation site where ambient temperature never exceeds or falls below a temperature range of -10 °C to + 50 °C .

Safety information

Please only use original accessories to prevent injuries and health risks.

The K-114 BT has a radio module with the following frequencies and output powers:

Technology	Frequency range	Maximum TX-Power
Bluetooth 3.0	2.412 – 2.480 GHz	2.6 dbm

Disposal

The product must not be disposed of with ordinary domestic waste at the end of its service life. To prevent any damage to health or the environment caused by improper disposal, this product must be separated from other waste and properly recycled in order to ensure that the raw materials are processed sustainably.

EU-Konformitätserklärung	**EU Declaration of Conformity**	**Déclaration UE de conformité**
Für das folgende Erzeugnis	Herewith we declare, that the following product	Nous attestons que le produit
Konverter K-114 BT	Converter K-114 BT	Convertisseur K-114 BT
wird hiermit bestätigt, dass sie den Anforderungen folgender EU-Richtlinien entspricht:	meet the basic requirements, which are established in the guidelines of the European Community:	répond aux exigences prévues par les directives de la Communauté Européenne :
RED-Richtlinie 2014/53/EU RoHS-Richtlinie 2011/65/EU	Directive RED 2014/53/EU Directive RoHS 2011/65/EU	Directive RED 2014/53/UE Directive RoHS 2011/65/UE
Dieser Konverter wurde entsprechend den folgenden Normen geprüft:	As criteria, the following norms for this converter are applied:	Le convertisseur répond aux normes:

EN 60950-1:2006 + A11:2009 + A1:2010 + A12:2011 + A2:2013
EN 301 489-1:V2.1.1 EN 301 489-17:V31.1 EN 300 328:V1.9.1

Diese Erklärung wird verantwortlich für den Hersteller:	This declaration is given for the manufacturer	La présente déclaration est fournie pour le fabricant

KELLER AG für Druckmesstechnik, St. Gallerstrasse 119, CH-8404 Winterthur

abgegeben durch die	in full responsibility by	par

KELLER GmbH, Schwarzwaldstrasse 17, DE-79798 Jestetten

Jestetten, 5. November ǀ novembre 2018

Hannes W. Keller – Geschäftsführender Inhaber ǀ Managing Owner ǀ Président Directeur Général
mit rechtsgültiger Unterschrift ǀ with legally effective signature ǀ dûment autorisé à signer

$C\epsilon$