USB-BOX

Technical manual

V1.0

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Declaration of conformity

Declaration of conformity

Manufacturer: **EHP-Wägetechnik GmbH**

Address: **Dieselstrasse 8**

77815 Bühl (Baden)

Germany

hereby declares that the product: **Data receiver type USB-Box**

with all options complies with the following harmonized standards:

EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-4-11 in accordance with Directive 2004/108/EC (electromagnetic compatibility).

EN 61010-031 Part 1/ Safety requirements for electrical equipment for measurement, control and laboratory use

EN 62368-1 Communication equipment - Part 1: Safety requirements.

EN 60950-1:2006 in accordance with Directive 2006/95/EC (Low Voltage Directive).

The product is marked with the CE mark.

Bühl, October 2021   Markus Ebel / Technical Manager

This declaration is in accordance with DIN EN ISO/IEC 17050-1.

Notes to the manual

In this technical manual you will find the necessary information for operating the **USB-Box.**

▶   Please read the operating instructions before you put the product into operation. This will protect you and prevent damage to your equipment.

▶ Always keep this manual in a place where employees, service personnel etc. can read it. Present this manual to the inspector or the appointed specialist company at each periodic inspection.

Design features of this manual

Various elements of this manual have fixed design features. This allows you to easily distinguish the following elements:

Normal Text

● Enumerations

▶ Action steps

Table titles and *illustrations* are printed bold.

ⓘ   Tips contain additional information.

Design features of illustrations

If a reference is made to elements of an illustration or in the running text, they are given a number (1). The numbers in the running text always refer to the figure shown.

Figure 1 - Explanation design features

Technical Data

Power supply of the electronics	5V via USB
USB Specification	USB 1.1 | USB 2.0
Driver	WHQL verified Windows Driver
Frequency range	ISM 433,075 – 434,775 MHz
Radio range	Up to 500m with open view; approx. 100m in industrial environment
Connections	USB: Typ B Antenna: BNC
Nominal temperature range	-10°C…+40°C
Operating range	-20°C…+50°C
Protection class	IP 54

Figure 2 – Technical Data

Safety instructions

TO BE NOTED
● **The device may only be opened by a specialist!** ● **The device must be protected from heat and moisture!**

⚠ IMPORTANT SAFETY INSTRUCTIONS ⚠
To avoid the risk of an electric shock, do not remove the two side covers. There are no user-repairable parts in the device. Leave repairs to qualified customer service. There is a contact risk with non-insulated parts inside the device, which can lead to electric shocks. **Operating environment** Avoid installing this device in an insufficiently ventilated, humid or hot place. **Warning:** To completely disconnect the device, the USB connector must be pulled out of the USB-Box. To avoid fire hazard, the USB box should be disconnected from the PC before a long non-use period, for example during the company vacations. When disposing this product, do not mix it with ordinary household waste. There is a special collection system for used electronic products through which proper treatment, recovery and recycling is ensured in accordance with existing legislation.

Scope of delivery

● USB-Box

Figure 3 – USB-BOX

The following accessories are included in the scope of delivery:

● USB connection cable

● BNC antenna

● Installation CD incl. driver & software "USB-Box setup tool"

Warranty

The warranty is void in the event of:

- Non-intended use of the manufacturer's specifications in this operating manual.
- Mechanical damage, damage caused by moisture and liquids
- Wear and tear
- Use of non-original EHP spare parts

System requirements

The following system properties are required for the operation of the USB-Box:

•   Free USB 2.0 port

•   Operating system: Windows 10 or newer, compatibility with older operating systems not guaranteed

The USB-Box is equipped with the latest EHP radio technology IR500 - with a range of up to 500m in the free field and 28 freely selectable frequencies.

To ensure an interference-free radio connection between USB-Box and scale, the radio frequency must not be occupied by other radio users.

Driver installation

ⓘ The installation of the device drivers can only be performed with administration rights.

Connect the USB box to a free USB 2.0 port. The driver of the USB box is installed automatically under Windows 10. An active Internet connection is required for loading the installation data.
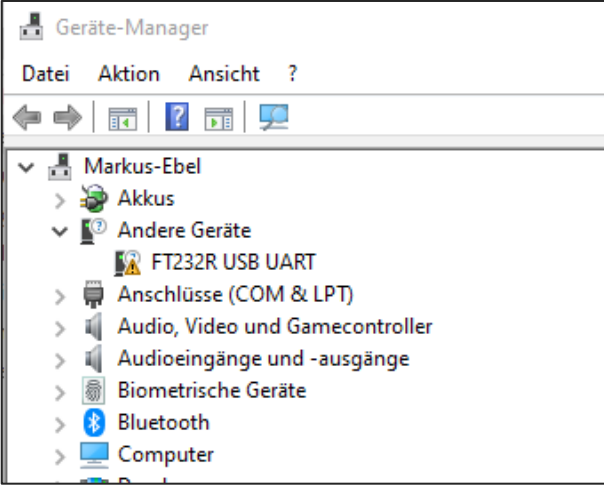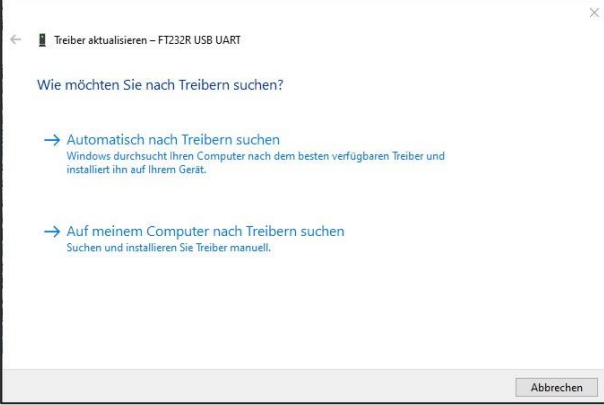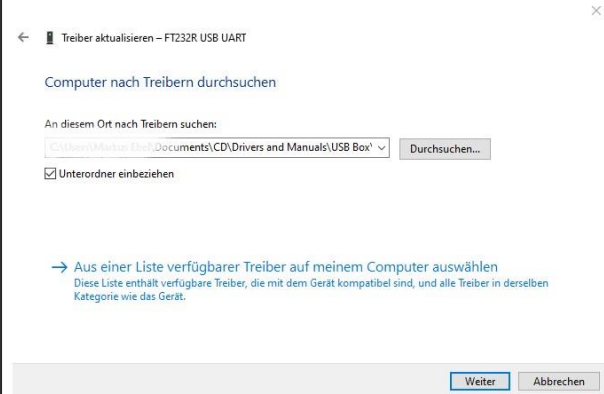
The successful installation can be checked under "Windows Device Manager" in the tab "Ports (COM&LPT)". Here is a new entry "COMxx" (xx= COM port no., is assigned automatically).
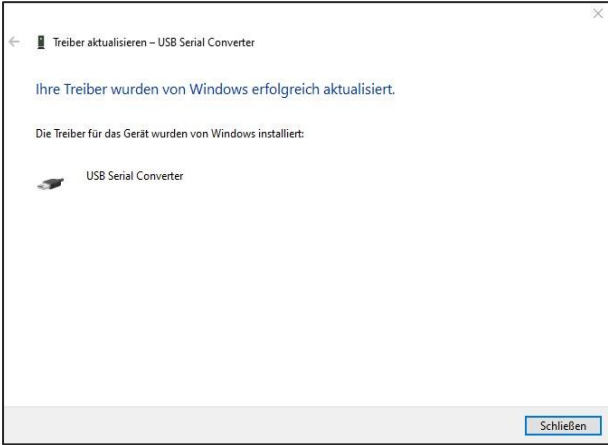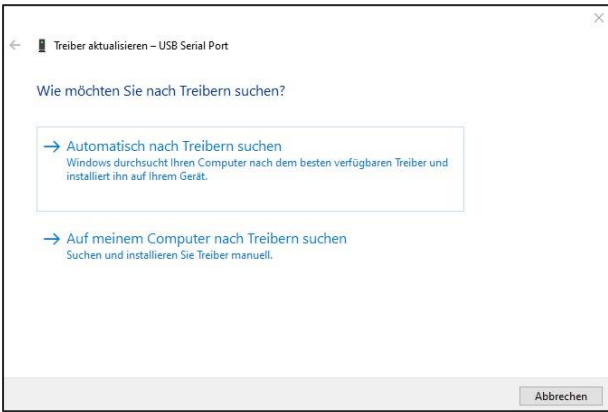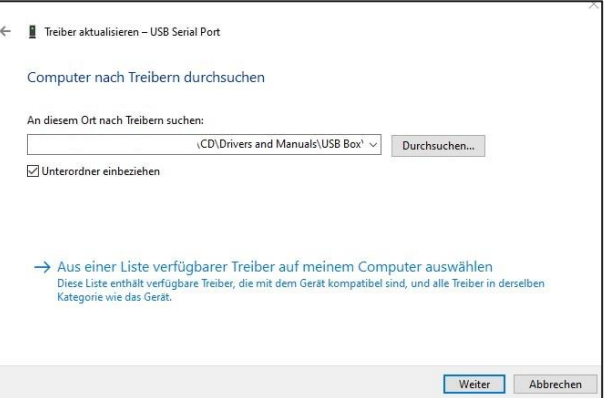
Manual driver installation

If the automatic installation fails, the driver for the USB box can also be installed manually:

Therefore, open the "Windows Device Manager". Under the tab "Other Devices" there is an entry "FT232R USB UART", marked with a yellow "!".

Install the driver manually using the supplied "EHP Drivers and Manuals" CD:

	Right-click the uninstalled device and select the "Update Driver" entry.
	Select the "Search for drivers on my computer" option.
	Select the driver from the CD in the "USB_Box/Driver" folder. Then click on "Next" to start the installation.

|	
Treiber aktualisieren – USB Serial Converter Ihre Treiber wurden von Windows erfolgreich aktualisiert. Die Treiber für das Gerät wurden von Windows installiert: USB Serial Converter Schließen	Confirm the successful driver installation with the "Close" button.
Geräte-Manager Datei Aktion Ansicht ? Markus-Ebel > Akkus > Andere Geräte USB Serial Port > Anschlüsse (COM & LPT) > Audio, Video und Gamecontroller	There is now a new device "USB Serial Port" in the Device Manager with a yellow ! in the tab "Other Devices". Click on it with the right mouse button and select the entry Update driver.
Treiber aktualisieren – USB Serial Port Wie möchten Sie nach Treibern suchen? → Automatisch nach Treibern suchen Windows durchsucht Ihren Computer nach dem besten verfügbaren Treiber und installiert ihn auf Ihrem Gerät. → Auf meinem Computer nach Treibern suchen Suchen und installieren Sie Treiber manuell. Abbrechen	Select the "Search for drivers on my computer" tab
Treiber aktualisieren – USB Serial Port Computer nach Treibern durchsuchen An diesem Ort nach Treibern suchen: \CD\Drivers and Manuals\USB Box\ Durchsuchen... ☑ Unterordner einbeziehen → Aus einer Liste verfügbarer Treiber auf meinem Computer auswählen Diese Liste enthält verfügbare Treiber, die mit dem Gerät kompatibel sind, und alle Treiber in derselben Kategorie wie das Gerät. Weiter Abbrechen	Select the path for the driver, which is located on the supplied CD in the folder USB_Box/Driver, then press "Next". Windows will now install the driver.

Confirm the successful driver installation with the "Close" button.
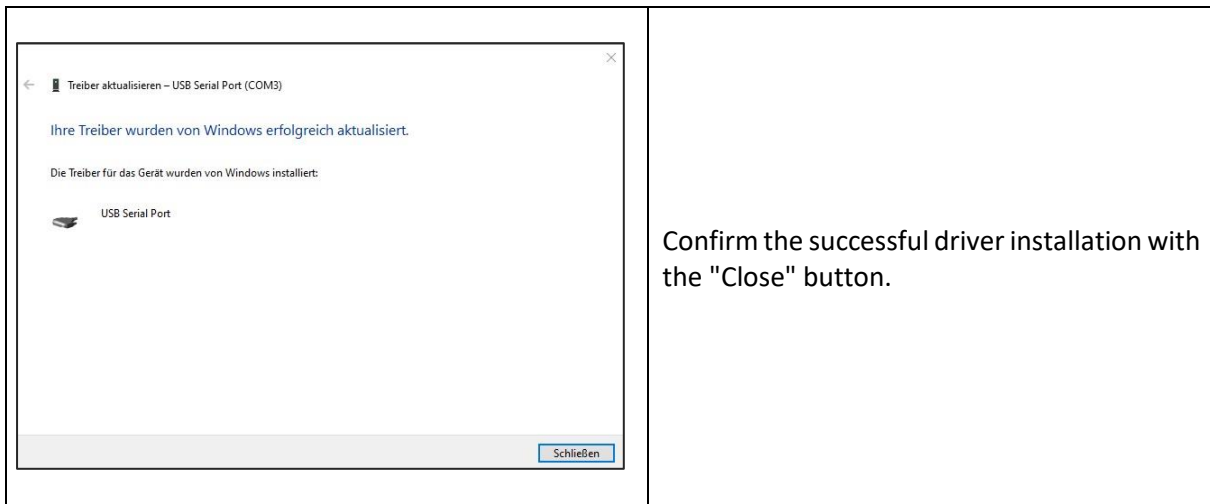
Table 1 - Manual driver installation

The successfully installed USB-Box now has an entry in the Device Manager our the "Ports (COM&LPT)" tab. Here you will find an entry "USB Serial Port (COMxx) → XX=COM Port No..

Note the COM port number for your later application. Restart the PC after successful installation.

ⓘ   If the USB-Box is connected to a different USB port on the same computer, Windows automatically installs a new COM port.

Radio connection

A radio frequency is preset between the EHP crane scale and the USB-Box. This corresponds by default to channel 01 (433.075 MHz). The radio frequency can be changed using the "EHP USB-Box Setup Tool" software. The tool is available on the driver & firmware CD or as download on ehp.de.

Radio frequency IR500

The following table shows the radio frequency of the respective channel numbers. When selecting the radio channel, make sure that it is not already occupied by other radio users (e.g. radio crane control).

Channel No.	Frequency in MHz	Channel Nr.	Frequency in MHz
01	433,075	15	434,000
02	433,125	16	434,075
03	433,175	17	434,150
04	433,225	18	434,225
05	433,275	19	434,300
06	433,325	20	434,375
07	433,400	21	434,425
08	433,475	22	434,475
09	433,550	23	434,525
10	433,625	24	434,575
11	433,700	25	434,625
12	433,775	26	434,675
13	433,850	27	434,725
14	433,925	28	434,775

Table 2 – Channel number & Frequency

EHP USB-BOX SETUP TOOL

With the help of the software, the functions and the radio connection of the USB-Box can be tested safely.

Installation

Copy the folder "USB-Box Setup Tool" from CD to the computer (assuming unrestricted read and write rights). Then open the program "EHP Setup Tool.exe".
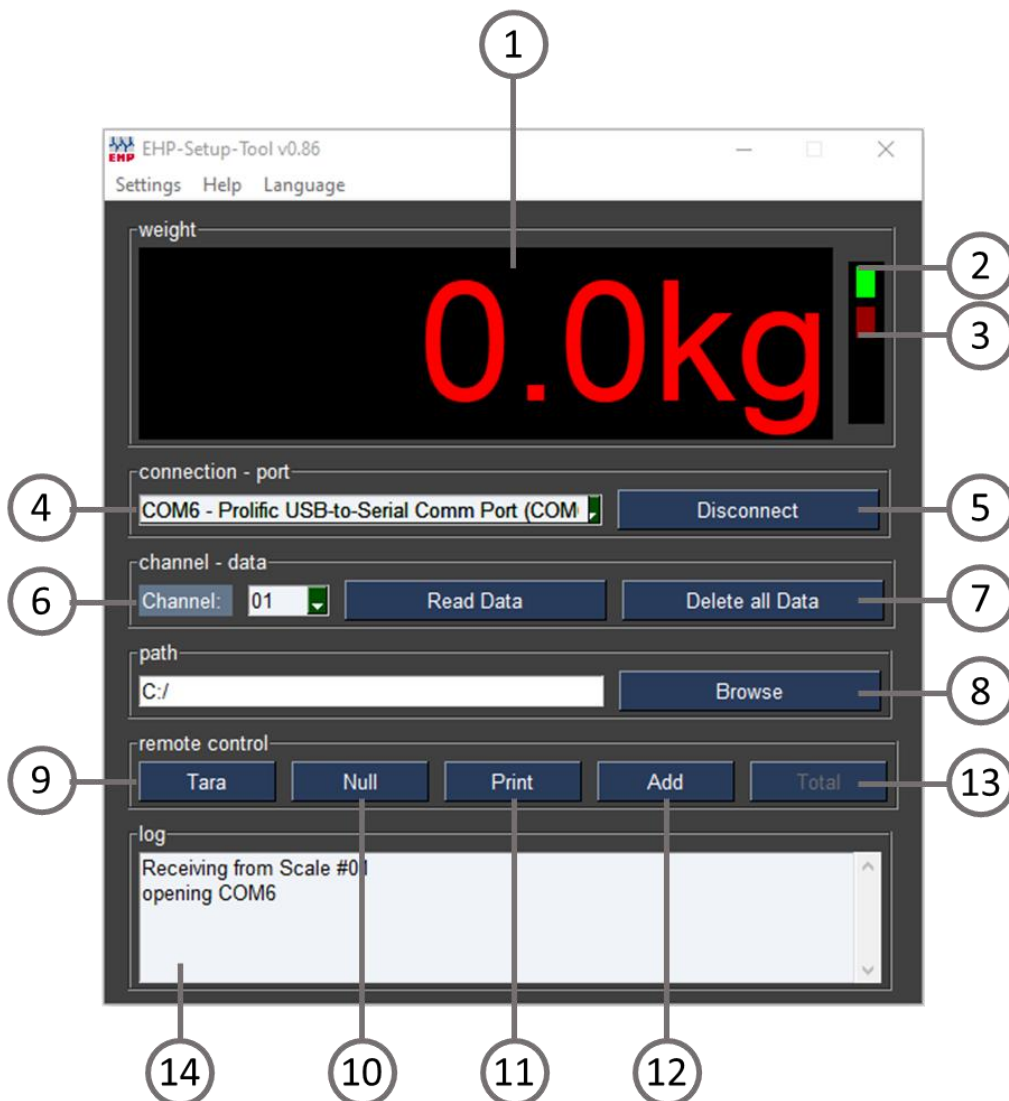
Program overview

Figure 4 - EHP USB-Box Setup Tool

User interface	
1	"Weight" shows the current weight of the scale when the connection is active; if there is no connection, the display is empty.
2	Lights green when the connection is active, lights red when the scale is not in radio range or is off, lights orange when the scale has no stable weight.
3	Flashes red with each data package received from the scale
4	"Connection - Port" Select the port of your USB box via scroll-down (see driver installation USB-Box).
5	"Connect/Disconnect" button establishes the connection between the software and the scale. Each time "Connect" is pressed; the current settings of the software are loaded into the USB-Box.
6	"Channel" set the channel used by your scale. You can find out the channel setting of your scale by pressing the test key on the scale (or remote control). See also chapter "Changing the scale channel setting".
7	"Read data / Delete all Data" these keys have no effect on the USB box.
8	"Path" select the path where the Setup Tool should save weighing data.
9	Switches tare function of the scale on/off
10	Resets the scale to zero
11	"Print".saves a single data record of a scale in the stored.
12	"Add" adds up weights with each keystroke.
13	„Total" adds the weights that were entered with "Add".
14	„Log" here you can see information about the weighing data exchanged between the scale and the PC.

Table 3 – User interface

Menu tab	
Settings	• "Save current settings as default" Saves all settings of the setup tool as default, the tool will start with these settings in the future. • "Change unit" Switches the display between kg and t. • "End" terminates the application
Help	• Displays EHP contact information
Language	• Change language (German/English)

Table 4 - Menu tab

Data format of the stored weighing data
The output format of the software is a CSV file. This is automatically saved under the name EHP.csv under the path stored in the application. The content is saved in the following format: "2021-09-06";"14:42:50";"01";"0.0";"0.0" "JJJJ-MM-TT";"HH:MM:SS";"WW";"NNNNN";"TTTTT"   JJJJ-MM-TT = Date HH:MM:SS = Time   **Data format of the stored weighing data:** WW = Scale No. NNNNN = Net weight of the scale TTTTTT = Tare weight oft he scale

Table 5 – Data format

Scale control commands

ⓘ In this chapter, the control commands of the balance are explained in more detail. This information is only relevant if weighing data is to be processed in an individual software program.

Error-free data exchange between the PC system and the scale is only possible under the following conditions:

- Scale is switched on
- USB-Box is connected
- USB-Box driver is installed
- Same radio channel set between scale and USB-Box

For optimal communication between scale and PC, send the commands listed here with a time difference of approx. 100ms 3x in succession.

Command (in Hex)	Function
xx 31 CE 03	Button 1 Tare
xx 32 CD 03	Button 2 Print
xx 33 CC 03	Button 3 Set Zero
xx 34 CB 03	Button 4 Add
xx 35 CA 03	Button 5 ½
xx 36 C9 03	Button 6 Total
xx 37 C8 03	Button 7 Test
xx 38 C7 03	Button 8 Off
xx 39 C6 03	Button 9 Activate, deactivate peak value or casting speed/sec.
xx 30 CF 03	Button 10 Pre-Tara
xx 0C F3 03	Button 11 Shift
xx 0D F2 03	Button 12 Enter

Table 6 –Commands

ⓘ "xx" corresponds to the scale number of the scale that is to be remote controlled.

The set scale number can be queried directly on the scale by pressing the "TEST" key. By pressing the key, a check of each individual light segment of the display (segment check) is carried out and further information on the balance is displayed.

The display flashes for approx. 5 seconds:

8 8 8 8 8   (Segment control)
L A H   (Software version)
1 2.x x   (Version number, Release)
x x   **(Scale number)**
C x x   (Frequency channel)
H x x   (Channel of IR control)
I n I t   (Self test of scale)

You can obtain this by pressing the "TEST" key on the scale. It is the first value displayed after the version number. E.G. "LAH; 12.21; 02; C10..." Scale number 02.

Channel setting of the USB box without EHP Setup Tool

Control command ASCII	Control command HEX	Function
00#fxx<ETX>	30 30 23 46 xx xx 03	Changing channel no. USB-Box (xx resp. xx xx stands for the channel number to be set)

Optionally, you can also set the channel of the USB box with your own software. Send the control command 3x with a time offset of 100ms.

ⓘ The channel switching must be done only once when starting the software.

ⓘ Frequent channel changes can lead to malfunctions of the USB box.

ⓘ A channel change is not possible with compound scales

28 Byte data protocol (EHP Scales)

The preconfigured data protocol of the scale has the following data format (28 Byte):

Byte #	ASCII	Explanation
1.	S	Start signal
2.	0 1 2 3 4	No decimal place (z.B. 19520) One decimal place (z.B. 1952.0) Two decimal places (z.B. 195.20) Three decimal places (z.B. 19.520) Four decimal places (z.B. 1.9520)
3.	Blank (20H) + -	No sign Plus Minus
4.	Digit 5	Ten-thousandths digit of the weight
5.	Digit 4	Thousandths digit of the weight
6.	Digit 3	Hundreds digit of the weight
7.	Digit 2	Tens digit of the weight
8.	Digit 1	Unit digit of the weight
9.	B N	Scale Tare OFF (Gross-Weight) Scale Tara ON (Net-Weight)
10.	E 1 2	Single range scale in range I in range II
11.	0 1	No stand still Stand still
12.	0 1 2 3 4 5 6 7 8 A X E C	No button is activated at remote control Button 2 (*Print*) Button 4 (*Add*) Button 6 (*Total*) Scale was switched off manually Scale was switched off by automatic switch-off function connection fault Test
13.	V H L	Scale battery charged Scale battery - pre-warning Scale battery - discharged/empty
14.	(1 – 99)	Digit 1 of scale number
15.	(1 – 99)	Digit 2 of scale number
16.	(X)	No set point =0, Set point 1 =8 Set point 2=4, Set point 3=2 Set point 4=1 Values of the setpoints that overlap are added together
17.	N J G	No overload Overload Preload too high

Byte #	ASCII	Explanation
18.	Digit 5	Highest order digit (left digit) during numeric code input
19.	Digit 4	
20.	Digit 3	
21.	Digit 2	
22.	Digit 1	Lowest order digit (right digit) during numeric code input
23.	Digit 5	Ten-thousandths digit of tare value
24.	Digit 4	Thousandths digit of tare value
25.	Digit 3	Hundreds digit of tare value
26.	Digit 2	Tens digit of tare value
27.	Digit 1	Unit digit of tare value
28.	03 H	Block end – sign (03 Hex)

Table 7 -28 Byte Datenprotokoll

Please note that you will only receive data if RTS (Request to Send) has been activated on the interface!

Confirmation (opt. handshake) for Print, Add- & Total
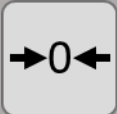
If the receipt confirmation for the Print, Add and Total commands is to be displayed on the scale electronics, the following command must be sent to the USB box: X<etx>

Reception is indicated at scale by flashing digits.

Change radio frequency & scale number at the scale

The USB protocol requires a matching scale and channel number between the USB-Box and the scale. You can only receive data from a scale if the number is identical with the retrieval commands of the USB-Box.

To change the scale & channel number, proceed as followed:

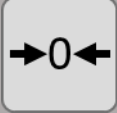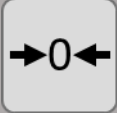|		
1		With the crane scale switched on, press the Power On and TEST buttons simultaneously to open the SETUP menu. EEEEE appears on the display
2		Then press the TEST key repeatedly until P13 appears in the display. Parameter P13 is used to set the radio frequency channel (Cxx).
3		Press TARE-key to activate the parameter. Then select a desired value with the TEST key, this corresponds to the channel number.
4		Confirm and close the parameter by pressing the ZERO key. The display alternately shows P13 and xx, where xx corresponds to the newly set channel number.
5		Press the TEST key repeatedly until P14 appears in the display. Parameter P14 is used to set the scale number.

6	TARE / TEST keys	Press the TARE key to activate the parameter. Then select a desired value with the TEST key, this corresponds to the scale number.
7	→0← ZERO key	Confirm and close the parameter by pressing the ZERO key. The display shows alternately P14 and xx, where xx corresponds to the newly set scale number.
8	TEST key	Press the TEST key repeatedly until P99 appears in the display. Parameter P99 is used to save the changed values.
9	TARE / ZERO keys	Press TARE key to activate the parameter. Confirm and close the parameter by pressing the ZERO key. Sto (Store) flashes several times in the display. This symbolizes that the parameter change has been successfully stored.
10	I O keys	To exit the SETUP menu, press the Power On and Power Off keys simultaneously or briefly interrupt the power supply by disconnecting the round plugs on the battery.

Table 8 – Change radio frequency & scale number

EHP service hotline

Do you need our support?

No problem - just call us free of charge!

Hotline: +49 7223 9366-0

Reach our technical experts from Monday to Thursday between 8 am & 4 pm (CET) and Friday between 8 am & 12 am (CET).

EHP Wägetechnik GmbH

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