TESA TECHNOLOGY

*Instruction manual*

English

# *BPX and TWIN Station interface boxes*

HEXAGON METROLOGY

## CONTENTS

## 1 INTRODUCTION

First of all, we thank you for the purchase of an interface box intended for use with TESA's probes. In order to help you obtaining the best from its operational possibilities, we advise to read this manual carefully beforehand.

Moreover, a strict adherence to the safety precautions is the guarantee for reliable measurement results over a long period of use.

## 2 SAFETY PRECAUTIONS

– Use only the power supply and the charger supplied with the BPX box or TWIN Station.
– Do not attempt to dismantle the box, except for those parts listed in this manual. Otherwise you may damage the unit or cause a failure.
– Do not expose the probes to excessive force or to shocks. These sensitive instruments must be handled with care (refer to the probe's instruction manual).
– Do not drop or expose your interface box to shocks. Although robust, the built-in measuring system may be damaged, thus leading to incorrect measured values.

## 3 OVERALL DESCRIPTION

Both BPX box and TWIN Station are key components of our product line dedicated to multigauging measurement.

Each unit permits inductive probes made by TESA to be connected to any system featuring a USB interface and used for data processing.

Their modern design, which is based on the latest technologies, allows for a flexible, fast and independent run of the measuring functions.

Their robust construction provides the security as required in the most demanding surroundings and production areas.

The choice of the system for data processing is left to the user. Once connected to a host computer fitted with a USB port, each unit will be capable to run the following:

– TIS software provided with the BPX box / TWIN Station and used for setting, defining the measurement functions and measuring.
– Restricted interface for all settings and commands.
– Command library allowing for a direct dialogue.

The software is designed to meet the various needs in multigauging measurement, while offering optimum flexibility in terms of inspection means. Each measuring function can easily be defined.

All trained users will appreciate the possibility to partly merge the TIS software, even to directly communicate with each box running their own software.

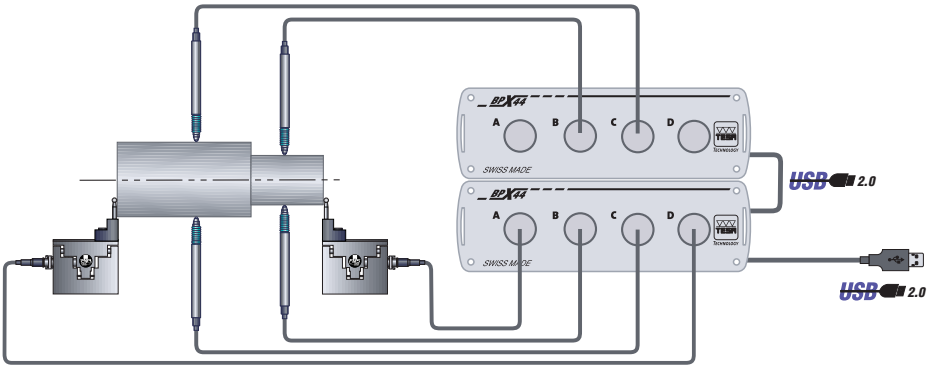
These interface boxes of the latest generation stay ahead due to their key features, i.e.:

– **Robust** – Resistant aluminium housing, also flexible for assembly by means of the convenient accessory.
– **Reliable** – Use of start-of-the-art components combined with a Swiss manufacturing for high quality standard.
– **Modular** – Full compatibility with various technologies, thus offering a solution that meets the user's needs.
– **Universal –** Unlimited use of each interface box.

## 4 MEASURING (EXAMPLES)

### Typical multigauging measurements

The synchronization of up to 64 probes linked together using a number of stackable BPX interface boxes allows synchronized static or dynamic measurement. Input/Ouput signals can be used for measurement command and result classification.




### Dynamic measurement through a wireless connection

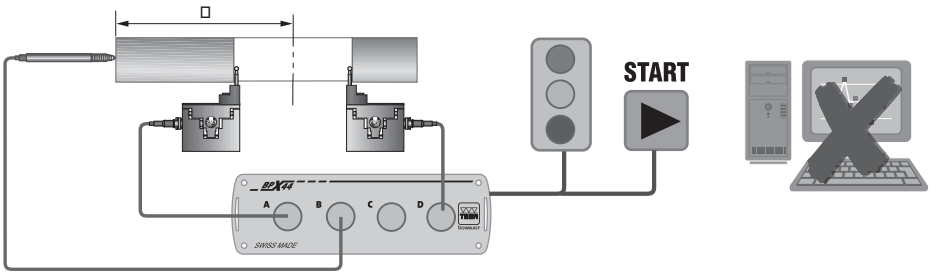
When the probe cable is restricting the movement of the operator, or generates a measurement error due to its displacement, precision and freedom are significant advantages of a wireless connection.

Each TWIN Station is able to connect up to 8 wireless probes. When used simultaneously with probes from additional BPX boxes or TWIN Station, these probes are synchronized.


**Measurement in stand-alone mode**

The BPX box is capable to operate independently in extreme surrounding conditions, or if the measurement results in a simple value classification.

Once properly configured, the BPX box can be disconnected from the PC and used alone through the signal inputs/outputs only.




## 5 SALES PROGRAMME

| Order No. | Description | Signal inputs/outputs |
|---|---|---|
| 05030010* | BPX 44 | 4 TESA half-bridge probes<br>4 TESA half-bride probes, linearized |
| Including: | | |
| 04761054 | Power supply | 100 to 240 V~, 50-60 Hz |
| 04761055 | EU and CH cable | |
| 04761056 | US cable | |
| 05030012* | TWIN Station | 8 TESA wireless probes |
| 05060009 | Mounting brackets (4 items) | |

*Delivery scope
- Interface box
- Instruction manual
- CD-ROM (drivers and TIS software)
- USB cable, 1,80 m long (used to connect the BPX boxes to each other or for connection to the PC.

## 6 DATA PROCESSING SYSTEM

A single or several BPX or TWIN Station interface boxes can be connected to a host computer fitted with a USB interface.

The port used for data transmission is a virtual COM port.

### 6.1 TIS software

This software allows for a correct setting of each peripheral device as well as both interface boxes and probes. Running it will also enable you to conveniently define the measuring functions, capture the measured value and export the results.
In addition, the BPX box lets the operator configure the stand-alone mode (no PC) and monitor the signal inputs and outputs.

Minimum profile requirements for used PC:
– Windows XP sp3
– .NET Framework 3.5
– Hard disk, 1GB
– Image resolution to 900 x 600 pixels

For further information about the TIS software, please refer to the instruction manual available on the CD-ROM delivered.

### 6.2 User's interface

The User's interface makes it possible for the main tabs provided with the TIS Software to be downloaded in another programme. Running TIS partly allows for easy control of the settings made for both BPX and TWIN Station, including the assignment of the measuring channels and functions, without the need for the measurement to be taken.

This software tool is intended for systems used for data processing or data acquisition, which do not provide the core structure needed to handle complex measuring functions.

Additional information is available upon request.

### 6.3 Command library

The command library enables a direct communication with the BPX or TWIN Station. This solution is convenient for those programmers/ integrators who want to use a proprietary interface.

Additional information is available upon request.

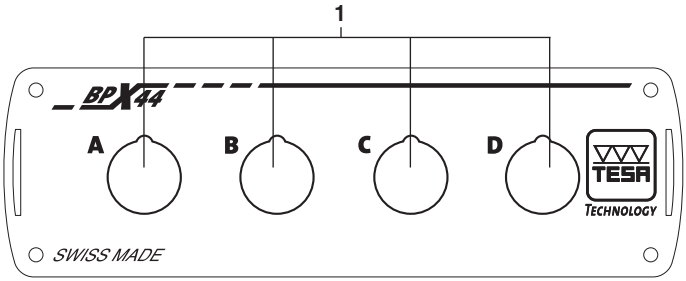
## 7 BPX STATION

BPX is a universal electronic interface used for connecting half-bridge probes made by TESA. This box incorporates a multiplexer permitting a series connection of several boxes as well as a monitoring of input and output signals.

### 7.1 Technical Data

| | |
|---|---|
| Measuring range, commutable<br>(common to two channels) | ±2000 µm/±200 µm<br>±5000 µm/±500 µm (long travel probes) |
| (Indication error range of the digital output<br>(at 20±1°C and ≤ 50% HR | ≤ ± (0.05 µm + 0.15%) of the measure range |
| Zero point drift<br>(at 20±1°C and ≤ 50% HR) | ≤ ± 0.05 % / °C |
| Sensibility drift<br>(at 20±1°C and ≤ 50% HR) | ≤ ± 0.05 % / °C |
| Acquisition time<br>– between 2 subsequent measurements<br>– for the synchronisation | <br>≤10 ms<br>≤1 ms |
| Data transfer duration<br>– from the serial digital output (USB) | Depends on the operating system of the PC |
| PC ports<br>– USB hub | USB 2.0<br>3 external ports (≤100 mA) |
| Input voltage of the power supply | 115 to 230 $V_{rms}$ – 50-60 Hz, -10% to 15% |
| Output voltage of the power supply | 7 V typ. at nominal load |
| Rated operating temperature | 20°C ±1°C |
| Operating temperature range | 10 to 40°C |
| Storage temperature range | -10 to 60°C |
| Overall dimensions | 55 x 172 x 155 mm (H x L x P) |
| BPX box weight | 1 kg |
| Degree of protection | IP40 according to IEC/CEI 529, DIN 40050<br>Robust aluminium housing |
| Electromagnetic compatibility | To IEC/EN 61326-1, US to CFR 47, part 15, subpart B, Class B digital device |
| Assembly | Using the mounting brackets (accessory) and the screws of the front / rear panel |
| Probe voltage and drive frequency | 2.8 $V_{rms}$ typ. – 13 kHz ±0,5% |
| Signal output for value classification | 3 relay digital outputs (max. 50 V, 500 mA) |

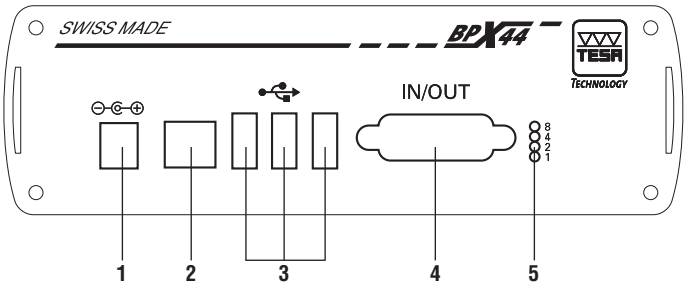
## 7.2 Elements at the front panel




Front panel of the BPX box

**1** Signal input connector for standard TESA half-bridge probes (A, B, C and D)

## 7.3 Elements at the rear panel




Rear panel of the BPX box

**1** Mains connector for the power supply (required to operate the box).

**2** USB type B connector, (to the PC or to other BPX box).

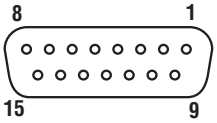
**3** USB type A connector, (for additional BPX boxes or TWIN Station).

**4** IN/OUT connector.

**5** LEDs (box ID number or error message).

## 7.4 IN/OUT connector

The 15-pin female connector, type D-sub, serves for transmitting any emitted analogue signal from the input channel, but also for monitoring all digital input and output (IN/OUT) signals.




BPX Sub-D 15p female connector

| Pin | Signal | Functions |
|---|---|---|
| 4 | OUT1 | Yellow for rework |
| 5 | OUT3 | Red for scrap |
| 6 | +U | Output, about 7 V, 50 mA max. |
| 7 | IN com | Red for scrap |
| 8 | GND | Mass, 0 V |
| 9 | DRXD | – |

| Pin | Signal | Functions |
|---|---|---|
| 10 | DTXD | – |
| 11 | OUT com | Shared output |
| 12 | GND | Mass, 0 V |
| 13 | OUT2 | Green for good |
| 14 | IN1 | Input |

### 7.5 Operating mode

BPX box can operate in two different modes, depending on its state when disconnected from the PC and power supply.

There are two operating modes:

**1** Standard mode
**2** Stand-alone mode

### 7.5.1 Standard mode

This mode requires a PC with the TIS software installed. The software manages the BPX and TWIN Station connected.

To connect the BPX, proceed as described hereunder.

**Connect the power supply first, then the USB cable**

| Procedure | Description |
|---|---|
| Connect the power supply | LEDs 1, 2 , 4 and 8 blink. |
| Connect the USB cable | The PC detects the USB-Hub on the BPX.<br>If the BPX has never been connected to the PC previously, this BPX box will be identified as a new peripheral device, thus requiring for the installation of the driver TESA BPX/BPW. Once this driver is installed and the BPX detected, the LED's stop blinking and indicate the ID box number. |
| ***Note***<br>*If the power supply is removed* | One or several LEDs will blink. In this case, the BPX box is able to communicate, but unable to measure. |

**Connect the USB cable first, then the power supply**

| Procedure | Description |
|---|---|
| Connect USB cable | All LEDs blink.<br>The PC detects the USB-Hub on the BPX. |
| Connect power supply | If the BPX has never been connected to the PC previously, this BPX box will be identified as a new peripheral device, thus requiring the installation of the driver TESA BPX/BPW. The LEDs 1, 2, 4 and 8 then display ID box number. |
| ***Note*** *- If the power supply is removed* | One or several LEDs blink. In this case, the BPX box is able to communicate, but unable to measure. |

### 7.5.2 Stand-alone mode

This mode is intended to operate the BPX Box independently from the PC. All setting operations - i.e. setting the master value, collecting the measured value and displaying the result classification - are done through the pins on the 15-pin D-Sub connector.

Since a series connection is not allowed in this mode, only one BPX box can be used. The highest number of probes accepted for the measurement is 4.

Once the parameters defined and the stand-alone mode activated in this TIS software, the BPX box can be disconnectd from the PC and work in stand-alone mode. The input/output signals ensure its control.

The BPX then requires only the connection of the power supply (no USB-cable).

If the set to master procedure has not been done, LEDs 1, 2 blink and LED 8 is on. In this case follow the set to master procedure before proceeding with any actual measurement.

**Signal input/output functions**

| Pin | Signal | Note |
|---|---|---|
| 4 | OUT1 | Yellow for rework |
| 5 | OUT3 | Red for scrap |
| 13 | OUT2 | Green for good |
| 14 | IN1 | Start – Setting<br>(long pressure) |
| 6 | + U | Output, ≈7 V, up to 50 mA |

A longer impulse of the input signal triggers the set to master.

⎍ Short impulse = 0,5 to 2 seconds
⎍⎍ Long impulse = 5 seconds

| | **Set to master** (impulse of 5 sec.) |
|---|---|
| OUT 1 | _____XXX_____ |
| OUT 2 | _____XXX_____ |
| OUT 3 | _____XXX_____ |
| IN 1 (impulse) | _⎍⎍_____⎍⎍⎍⎍⎍⎍⎍____ |
| Measurement | _____ |

1. Maintain the IN impulse during 5 s to set to master (zeroing).
2. Release the IN impulse when all LEDs become ON with LED 8 flashing.
3. After release of the IN impulse, all LEDs remain ON for 5 s before switching OFF: the set to master has been done properly.

BPX is now in continuous measurement mode: the OUT signals are activated according to the predefined tolerances and classification of the measured values. BPX remains in this measurement mode as long as there is no other impulse IN. To deactivate the continuous measurement mode, a short IN impulse will trigger a (static or dynamic – depending on the BPX stand-alone configuration) measurement.

---

| | **Static measurement** |
|---|---|
| OUT 1 | _____X_____:_____X_____ |
| OUT 2 | _____X_____:_____X_____ |
| OUT 3 | _____X_____:_____X_____ |
| IN 1 (impulse) | _⎍_____:__⎍_____ |
| Measurement | ___⎍_____:____⎍_____ |

The first impulse disables the continuous measurement mode, triggers a measurement and activates the outputs according to the classification of measured value. The second impulse triggers another measurement and activates the outputs according to the classification of measured value.

---

| | **Dynamic measurement** |
|---|---|
| OUT 1 | _____X__:_____X_ |
| OUT 2 | _____X__:_____X_ |
| OUT 3 | _____X__:_____X_ |
| IN 1 (impulse) | __ ⎍ ____ ⎍____:_⎍_____⎍____ |
| Measurement | ___⎍_⎍_⎍_____:___⎍_⎍_⎍____ |

The first impulse disables the continuous measurement mode, triggers a dynamic measurement, which stops at the second impulse. The second impulse stops the dynamic measurement and activates the outputs according to the classification of measured values. The third impulse triggers another dynamic measurement which only stops at the next impulse. And so on.

**Deactivating the stand-alone mode**

To leave the stand-alone mode, the instructions below must be followed:

**1** Connect the USB cable.
**2** Connect the power supply.

Proceeding in the reverse order causes the BPX box to remain undetected by the PC.

**Connect the USB cable first, then the power supply – correct procedure**

| Procedure | Description |
|---|---|
| Connect the USB cable | All LEDs are OFF.<br>Neither the USB-Hub nor the BPX box can be detected by the PC. |
| Connect the power supply | The LED 8 is ON. Another LED may additionally lit up, depending on the status of the BPX box. Both the USB-Hub and BPX box are detected. |

## 8 TWIN STATION

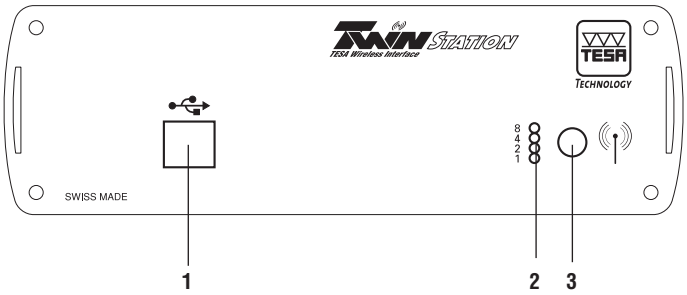
### 8.1 Technical data

| | |
|---|---|
| Power supply | USB cable |
| USB port | 2.0 |
| Acquisition time<br>– between two subsequent measurements<br>– for the synchronisation | <br>≤20 ms<br><br>≤2 ms |
| Rated operating temperature | 20°C ±1°C |
| Operating temperature range | 10 to 40°C |
| Storage temperature range | -10 to 60°C |
| Overall dimensions | 55 x 172 x 155 mm (H x L x D) |
| Twin Station Weight | 0,8 kg |
| Degree of protection | IP40 according to IEC/CEI 529, DIN 40 050<br>Robust housing in aluminium |
| Electromagnetic compatibility | EU to IEC/EN 61326-1, US to CFR 47, part 15, subpart B, Class B digital device |
| RF communication<br><br>– Frequency band<br>– Typical transmitter output power<br>– Typical sensitivity | According to ETSI EN 300 440 – 2 (CH and UE)<br>FCC 15.249 (US and Canada)<br>2,402 up to 2,480 GHz (40 channels)<br>0 dBm<br>-80 dBm (0,1% BER) |
| Assembly | By means of the screw used to lock each front face (available as optional accessory) |

### 8.2 Elements at the front panel


Front panel of the TWIN Station

### 8.3 Elements at the rear panel




**1** USB connector, type B (to the PC, USB multiplexer or BPX box).
**2** LEDs (box ID number or error message).
**3** SMA antenna connector, band 2.4 GHz.

Rear panel of the TWIN Station

## 9 LIGHT EMITTING DIODES (LEDs)

The LEDs can either identify the interface box or indicate a warning/error message. When the BPX box operates in the stand-alone mode, they indicate the status of the BPX box.

- ● LED is ON
- ❍ LED is OFF
- ✳ LED is blinking

### 9.1 LED status on both BPX box and TWIN Station

Every BPX box or TWIN Station can be identified by its ID number. The assignment of an existing number to a replacement box makes the maintenance easier while the measurement programme remains unchanged.

| Interface boxes | BPX44 in standard mode and TWIN Station Interface | |
|---|---|---|
| **LED 8** | ● ON / ❍ OFF | ✳ blinking |
| **LED 4** | Indicates the box ID number (1 to 15) | Indicates the number of the relevant error message (1 to 15) |
| **LED 2** | | |
| **LED 1** | All LEDs OFF = 16 | |

**Example**

| | BPX44 in standard mode and TWIN Station | | | | | | |
|---|---|---|---|---|---|---|---|
| **Box ID number** | 1 | 2 | 3 | 4 | 8 | 15 | 16 |
| **LED 8** | ❍ | ❍ | ❍ | ❍ | ● | ● | ❍ |
| **LED 4** | ❍ | ❍ | ❍ | ● | ❍ | ● | ❍ |
| **LED 2** | ❍ | ● | ● | ❍ | ❍ | ● | ❍ |
| **LED 1** | ● | ❍ | ● | ❍ | ❍ | ● | ❍ |

### 9.2 Status of LEDs and output signals OUT on the BPX box used in stand-alone mode

LEDs indicate the operating status of the BPX box.

| | BPX44 in stand-alone mode | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Stand-by | Set to master to be done | Set to master done | Rework | Good | Scrap | M1 | M2 |
| **LED 8** | Default ● ON ❍ OFF if the IN1 signal is activated | | | | | | | |
| **LED 4** | ❍ | ❍ | ● | ❍ | ❍ | ● | ❍ | ● |
| **LED 2** | ❍ | ✳ | ● | ❍ | ● | ❍ | ● | ● |
| **LED 1** | ❍ | ✳ | ● | ● | ❍ | ❍ | ● | ❍ |

M1: Not used

M2: Out of range, set to master failed

| | Status of the OUT signals in stand-alone mode | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Stand-by | Set to master to be done | Set to master done | Rework | Good | Scrap | M1 | M2 |
| **OUT 1** | ❍ | ● | ● | ● | ❍ | ❍ | ● | ❍ |
| **OUT 2** | ❍ | ● | ● | ❍ | ● | ❍ | ● | ● |
| **OUT 3** | ❍ | ❍ | ● | ❍ | ❍ | ● | ❍ | ● |

M1: Incoherent pulse (too short or too long)
M2: 1 (or more) probes out of range during set to master or measuring.

Stand-by means that the BPX is waiting for a set to master or measuring command.

---

### 9.3 LED status related to an error message

Both BPX box and TWIN Station have their own status to indicate their operating status (and error messages included). This status can be requested through the PC. In case of error, the box is regarded as the «slave».

| | BPX44 in standard mode and TWIN Station | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Error message number** | E1 | E3 | E5 | E9 | E14 | E15 | A9 | A11 |
| **LED 8** | ❍ | ❍ | ❍ | ✳ | ✳ | ✳ | ● | ✳ |
| **LED 4** | ❍ | ❍ | ✳ | ❍ | ✳ | ✳ | ❍ | ❍ |
| **LED 2** | ❍ | ✳ | ❍ | ❍ | ✳ | ✳ | ❍ | ✳ |
| **LED 1** | ✳ | ✳ | ✳ | ✳ | ❍ | ✳ | ✳ | ✳ |

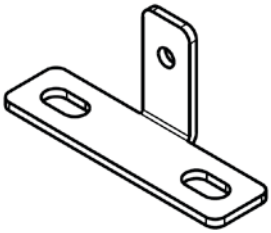
**Error messages**

**E1** Power supply missing.
**E3** BPX hardware problem.
**E5** Corrupted probe memory (BPX).
**E9** Fatal error, unexpected event.
**E14** BPX or TWIN not initialized.
**E15** USB communication error, driver not installed.
**A9** BPX in stand-alone mode: the USB cable is connected, but the power supply is missing.
**A11** BPX is in stand-alone mode, the set to master has to be done as described in chapter 7.5.2

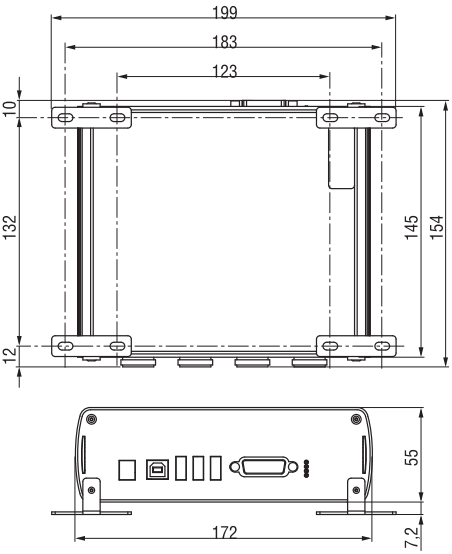
## 10 ASSEMBLY AND CONNECTION

### 10.1 Assembly

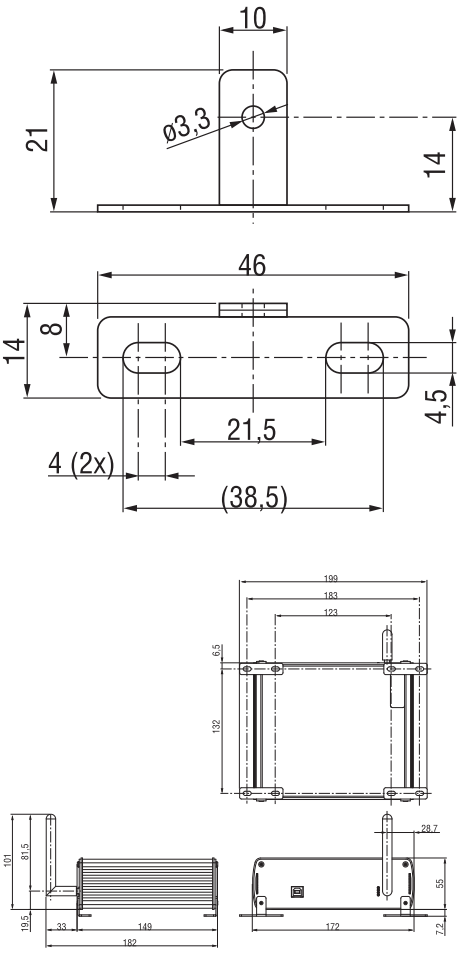
The box may simply be placed onto a flat surface. The rubber seal avoid slipping. The mounting brackets available as an option allow for the box to be fixedly mounted on any surface or the stacking of several BPX or TWIN Station.



Mounting brackets 05060009 (4 pièces)




05030010 BPX




05030012 TWIN Station

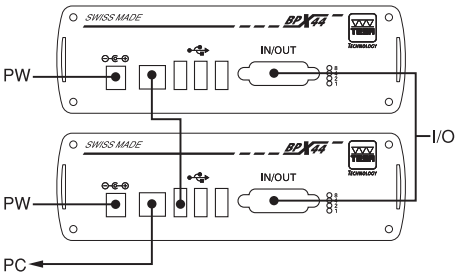
## 10.2 Connection

The connection is flexible, according to the measurement application and the various locations. All BPX boxes in use must be individually powered. Use only one connector for data transmission to the PC to ensure the synchronization of the boxes. Choose the parallel connection for each box instead of a series connection that is limited to 4 boxes only.

If only TWIN Station are used (without any BPX box), connect them to a multiplexor USB-Hub. Use then a single connector for data transmission from the USB-Hub to the PC, to ensure their synchronization.

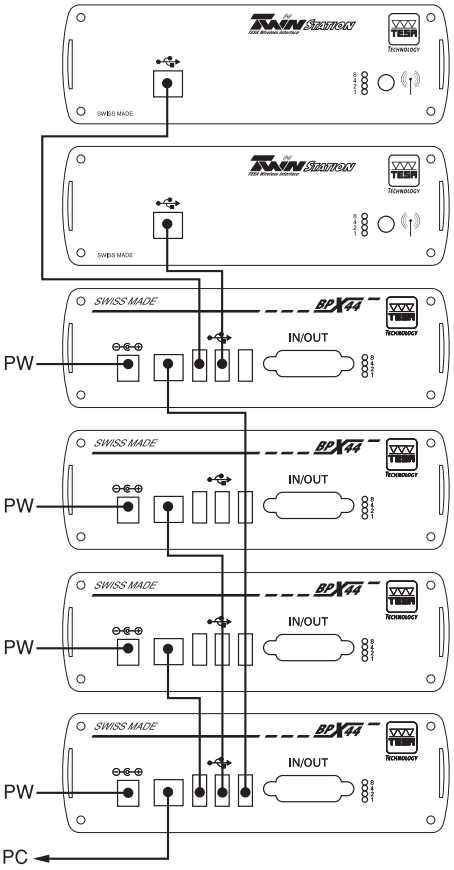
### Connection of 2 BPX boxes

Remember to use the charger provided by TESA for the power supply.

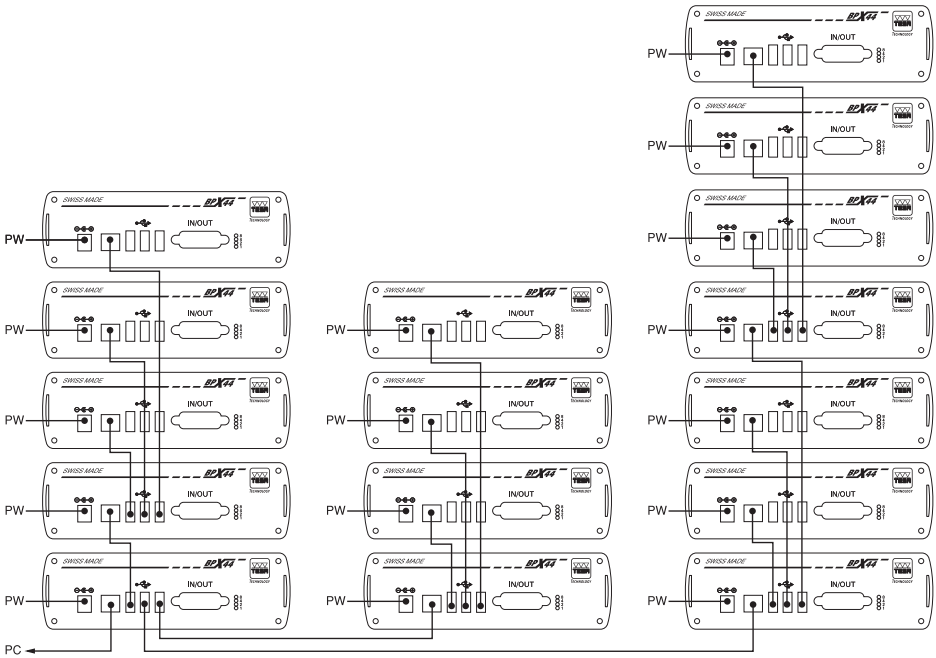



PW = Power Supply

### Connection of 4 BPX boxes and 2 TWIN Station



## Connection of 16 BPX boxes



## 11 RECYCLING

Each product must be treated separately. It is therefore important to comply with the rules in force in your country as regards recycling.

## 12 GUARANTEE

We guarantee each product against any fault of design, manufacture or material for a period of 12 months from the date of purchase. Any repair work carried out under the guarantee is free of charge. Our responsibility is limited to the repair of the relevant product or, if we consider it necessary, to its free replacement.

The following are not covered by the guarantee: batteries and damage due to incorrect handling, failure to observe the instruction manual, or attempts by any non-qualified party to repair the product; any consequences whatever which may be connected either directly or indirectly with the product supplied or its use.

*(Extract from our General Terms of Delivery, December 1st, 1981)*

## 13 DECLARATION OF CONFORMITY AND CONFIRMATION OF TRACEABILITY OF ALL INDICATED VALUES

We thank you for your confidence in purchasing our products, which have been thoroughly checked in our factory.

We declare under our sole responsibility that each product is in conformity with all technical data as specified in our sales literature (instruction manual, leaflet, catalogue).

In addition, we certify that the measuring equipment used to check the products refers to national master standards. Traceability of the measured values is guaranteed by our Quality Assurance.

**Notice**

For the USA and CANADA:
This device complies with Part 15 of the FCC Rules and with RSS-210 of Industry Canada.
Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications made to this equipment not expressly approved by TESA may void the FCC authorization to operate this equipment. Radiofrequency radiation exposure Information:
This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance of 20 cm between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Under Industry Canada regulations, this radio transmitter may only operate using the antenna that has been delivered by the manufacturer.

**Quality Assurance**

## NOTES