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| | final | 1.0 |
| Titel : Operation manual, kronback tracers P4+ | | 07/09/2009 |

Operation manual



Kronback tracers P4+

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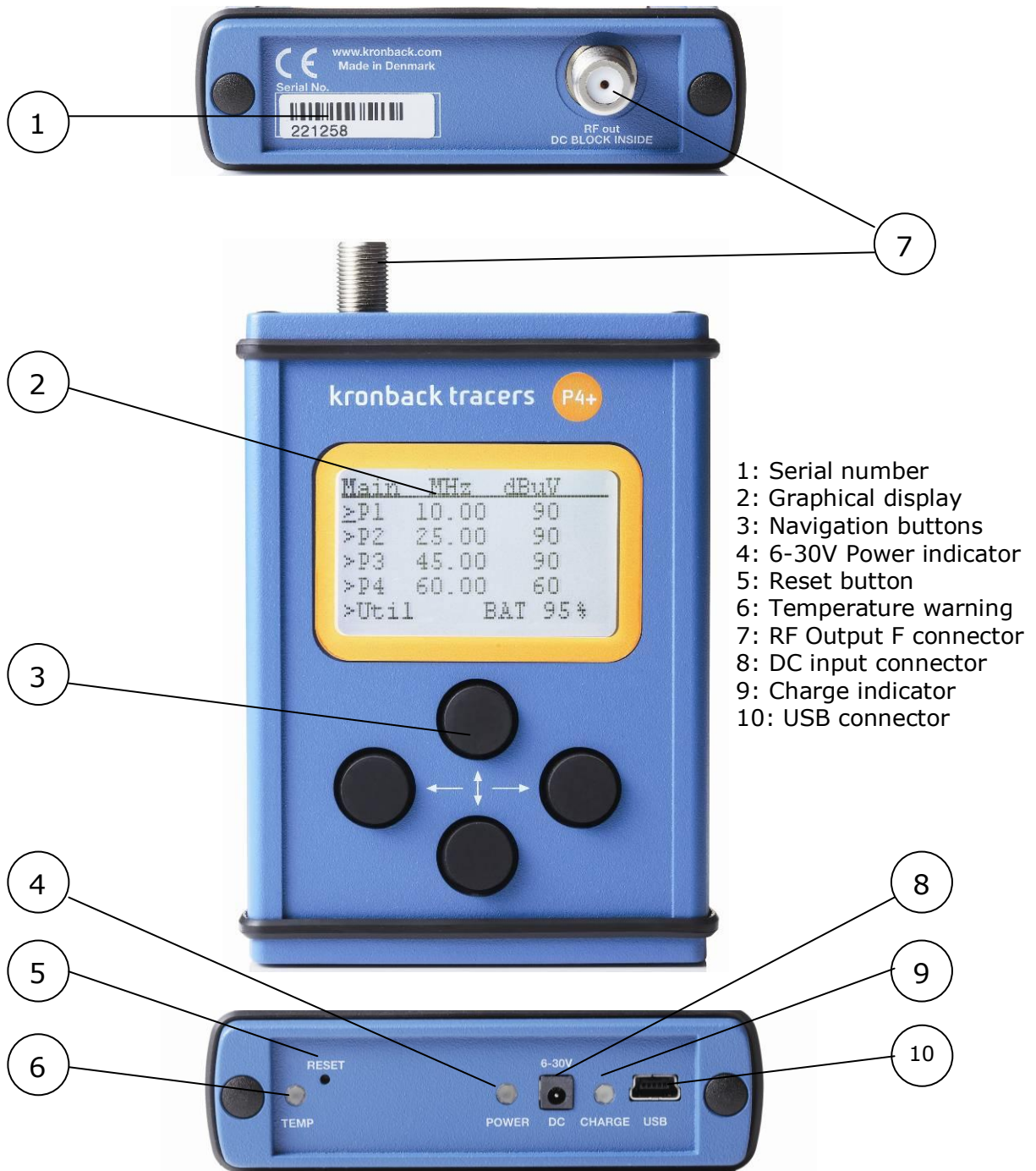
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1. Physical layout and connections



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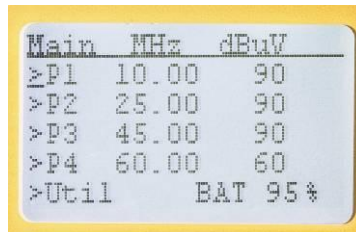
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1.1. Serial number



A 6 digit serial number label is placed on top of the P4+ chassis. The serial number is also available from the UTIL→STATUS menu.

1.2. Graphical display



A 128x64 dot matrix FSTN graphical display is used for displaying data and user interaction.

The Text display is organized as a 19 column, 6 lines text grid.

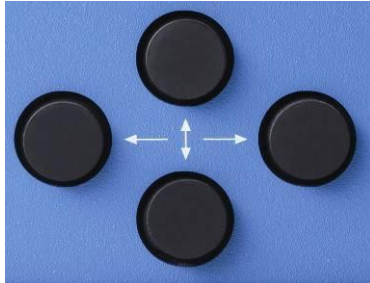
On top of each page the menu headline is displayed: Main, Preset, Pilot 2 Setup etc. Please refer to the software section of this manual for a description of each menu.

For improved readability in low light environments, backlight is turned on for 20 seconds after each key press

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1.3. Navigation buttons



4 navigation buttons are used for control.

The up down buttons are used to change values.

When the correct value is set, then use the right button to commit the value, or use the left button to cancel.

Pressing either button for more than 2 seconds activates power-down. When the P4+ is powered down, either button can be pushed to wake-up the unit.

When the P4+ is powered down all current settings are stored in the internal default register, Preset 0, to ensure that these settings are re-initiated after wake-up.

1.4. 6-30V power



The P4+ can be powered and charged from the 6-30V DC power input. This includes standard CAR 12V power.

When DC power is present, the auto-off function is deactivated.

The adjacent LED is indicating that correct voltage is present on the DC connector

| Mating connector | | diameter |
|------------------|--------|----------|
| ground | Ring | 2,75mm |
| +6 to +30V | Centre | 0,65mm |

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1.5. Reset button



With a small sized screwdriver or a paper clip the P4+ can be hardware reset using the recessed reset button.

1.6. Temperature warning



The temperature warning LED lights up if the internal temperature of the P4+ exceeds +60 °C.

1.7. RF output F-Type connector



The RF output F-type connector is mounted in the chassis in a double D-CUT hole. It handles a torque of minimum 40 INCH-LB (4,5 Nm)
The output is internally DC blocked up to 100V.

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1.8. Charge indicator



The charge indicator lights during charging of the battery. The battery can be charged from the DC 6-30V connector or from the USB connector. Charge time is dependent on which of the connectors that are used, and if the P4+ is in power down or active state.

| Charge time | State | |
|-------------|------------|---------|
| | Power down | active |
| DC | 2 hours | |
| USB | 3h30 | 6 hours |

1.9. USB connector



The USB connector is used for remote-control the P4+ as well as for firmware upgrades.

The P4+ uses a HID (Human Interface Device) USB profile. No PC-USB driver necessary. Contact Kronback Tracers support support@kronback.com for protocol and interface description.

The USB power can be used to charge the P4+. This can be done from a standard PC or from the power adapter shipped with the unit.

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2. Specifications

2.1. RF SPECIFICATIONS

2.1.1. FREQUENCY

Frequency range 2-67 MHz
Frequency steps 10kHz
Frequency error <1kHz
Residual phase noise >110dBc/Hz@10khz

2.1.2. LEVEL

Dynamic range
4 pilots 10 dBuV – 99 dBuV
2 pilots 10 dBuV – 105 dBuV
1 pilot 10 dBuV – 110 dBuV

Level steps 1 dB
Level error <0,5 dB
Return loss: >20dB

2.1.3. CONNECTORS

RF out: F-type 75 ohm, AC coupled, 100V DC isolation
Power supply connector; DC Type 0.7/2.35 mm
USB connector: USB type mini-B

2.2. INDICATORS

DC Power status
Charging status
Temperature warning, +60 °C

2.3. LCD DISPLAY

Backlight: White
LCD type 128x64 dot graphic FSTN/W-B
Positive transreflective
Viewing angle Horizontal >70 deg
Vertical >65 deg

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2.4. PHYSICAL SPECIFICATIONS

Height: 114 mm
Width: 83 mm
Depth: 23 mm
Weight: 250 g

2.5. ELECTRICAL

Supply Voltage: 6-30VDC
Max. power consumption: 1 watt
USB power: 5V
USB current draw: 500mA
Fuse: Internal autofuse

2.6. ENVIRONMENTAL

Operating temperature: 5 °C ~ 45 °C
Storage temperature: -20 °C ~ 55 °C
Operating humidity: 10% ~ 90%, non-condensing

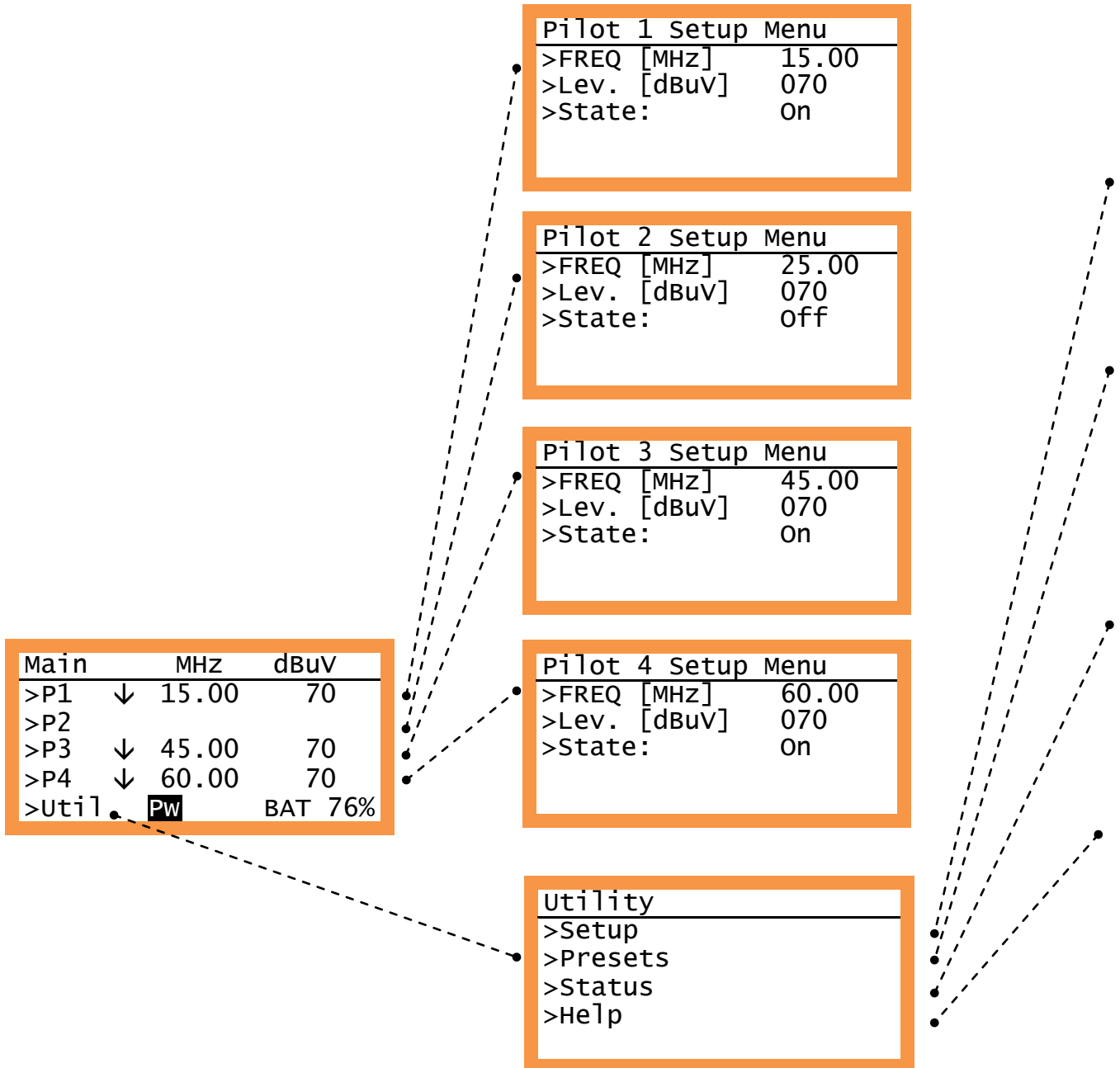
2.7. BATTERY

Type: Li-ion, rechargeable
Nominal Voltage: 3.7 V
Minimum Capacity 1.8 AH @ C/5 Rate @ 23 °C
Cycle Life > 500 cycles
Memory: No memory effect
Operating temp: -20 ° C to 60 °C
Safety: Meets UL1642 standard
Transportation: Excepted from regulations

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3. User interface

3.1. Navigation tree



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```

Setup
-----
>Auto Off [min] 10
>Password      OFF
>Pilot Mode    HOP
>Hop time[ms] 1000
  Pmax        110 dBuV

```

```

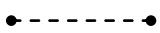
Presets
-----
>Load preset
>Save preset 1

```

```

Pre      MHz      dBuV
-----
>P1 ↓  15.00    70
>P2 ↓  25.00    70
>P3 ↓  45.00    70
>P4 ↓  60.00    70
>Load preset 1

```



```

Status
-----
Temp.      41 C
Firmware    040809a
Serial      221448
Batt. min   180

```

```

Help
-----
Kronback Tracers
www.kronback.com
support@
kronback.com
+45 46 907 909

```

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3.2. Main menu

| Main | | MHz | dBuV |
|-------|-----------|-------|---------|
| >P1 | ↓ | 15.00 | 70 |
| >P2 | ↓ | 25.00 | 70 |
| >P3 | ↓ | 45.00 | 70 |
| >P4 | ↓ | 60.00 | 70 |
| >Util | PW | | BAT 76% |

The main menu contains an overview of the settings of pilot tone 1 to 4 (P1 to P4). The frequency and level of each Pilot tone is displayed. The symbol ↓ is shown if the P4+ is in hopping mode.

The battery level is presented as a percentage of the full capacity. If the P4+ is charging, the text CHG is shown. If the unit is running on battery this text is changed to BAT. The percentage is however always presenting the fuel level of the battery. The corresponding charge or discharge time can also be viewed in the UTIL→STATUS menu.

The text **PW** is presented if the P4+ is password protected. Password protection is used to block the settings of the P4+ from being changed. Password protection is set in the UTIL→SETUP menu

4 different modes are available, and can be set from the UTIL→SETUP menu:

| Main | | MHz | dBuV |
|-------|-----------|-------|---------|
| >P1 | | 15.00 | 110 |
| >Util | PW | | BAT 76% |

1 tone mode, max 110 dBuV

| Main | | MHz | dBuV |
|-------|-----------|-------|---------|
| >P1 | ↓ | 15.00 | 105 |
| >P2 | ↓ | 25.00 | 105 |
| >Util | PW | | BAT 76% |

2 tone mode, max 105 dBuV

| Main | | MHz | dBuV |
|-------|-----------|-------|---------|
| >P1 | | 15.00 | 99 |
| >P2 | | 25.00 | 99 |
| >P3 | | 45.00 | 99 |
| >P4 | | 60.00 | 99 |
| >Util | PW | | BAT 76% |

4 tone mode, max 99 dBuV

| Main | | MHz | dBuV |
|-------|-----------|-------|---------|
| >P1 | ↓ | 15.00 | 110 |
| >P2 | ↓ | 25.00 | 110 |
| >P2 | ↓ | 45.00 | 110 |
| >P2 | ↓ | 60.00 | 110 |
| >Util | PW | | BAT 76% |

hopping mode, max 110 dBuV

The 1, 2 and 4 tone mode can be selected based on the need for maximum power and number of pilot tones. In hopping mode only 1 tone is active at a time, and is jumping between 4 frequencies and levels for less load of the upstream laser equipment.

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3.3. Pilot 1-4 setup menu

```
Pilot 1 Setup Menu
>FREQ [MHz]    15.00
>Lev. [dBuV]   070
>State:        On
```

The Pilot setup menu 1-4 defines each of the four pilot tones frequency, level and on/off state.

3.3.1. FREQ [MHz]

The frequency can be set from 2.00 to 67.00 MHz in steps of 10 kHz.

3.3.2. Lev. [dBuV]

Dependant of the pilot tone mode (1,2,4 and hop mode), the level of each pilot tone can be set between 0 and Pmax.

| Mode | Pmax [dBuV] |
|--------|-------------|
| 1 tone | 110 |
| 2 tone | 105 |
| 4 tone | 99 |
| HOP | 110 |

3.3.3. State

The state can be set to ON or OFF. If the state is set to ON the tone is active, and the pilot tone is present on the P4+ output. If the state is set to OFF the pilot tone is not present on the P4+ output, and frequency and level information is not presented in the MAIN menu.

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3.4. Utility menu



From the utility menu users can navigate to the setup, presets, status and help menu

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3.5. Setup menu

```

Setup
>Auto Off [min] 10
>Password      OFF
>Pilot Mode    HOP
>Hop time[ms] 1000
  Pmax        110 dBuV

```

3.5.1. Auto off [min]

To ensure optimal battery performance, the P4+ can be set to power down automatically after a period of inactivity. This period can be set from 1 to 99 minutes. It can also be set to OFF for continuous operation. If USB power is provided to the USB connector, the Auto off value automatically changes to **USB**, and the unit will remain powered on. If power is supplied to the DC 6-30 V connector, the Auto off value is automatically changed to **DC**, and the unit will remain powered on.

3.5.2. Password.

The P4+ can be locked by selecting YES, causing the P4+ to remain in the main menu until a password UNLOCK-sequence is entered. The UNLOCK-sequence is ←→←←←→→→ (left, right, 3xleft 3xright). Entering the UNLOCK-sequence causes the Password setting to be reset to OFF.

3.5.3. Pilot mode.

4 Pilot tone modes can be set: One, two, four tones or hopping mode. In hopping mode 1 tone jumps through a sequence of up to four frequencies and levels.

| Mode | No. of pilots | Pmax [dBuV] |
|--------|---------------|-------------|
| 1 tone | 1 | 110 |
| 2 tone | 2 | 105 |
| 4 tone | 4 | 99 |
| HOP | 1 | 110 |

3.5.3.1. Hop time [ms]

When HOP is selected, a submenu, Hop time, is used to set the hopping speed. Settings are 500 ms, 1000 ms or 2000 ms. The Hop time is defined as the active time for each pilot tone.

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3.6. Preset menu

```

Presets
>Load preset
>Save preset 1

```

3.6.1. Load preset

Load Preset opens the preset browsing menu. Using ↑↓ buttons in the load preset menu displays up to 3 presets that are stored in the P4+

| Pre | | MHz | dBuV |
|----------------|---|-------|------|
| >P1 | ↓ | 15.00 | 70 |
| >P2 | ↓ | 25.00 | 70 |
| >P3 | ↓ | 45.00 | 70 |
| >P4 | ↓ | 60.00 | 70 |
| >Load preset 1 | | | |

Preset browsing menu

When the desired preset is displayed it is activated by pressing →

3.6.2. Save preset

It is possible to save up to 3 presets in the P4+. Selecting save preset 1,2 or 3 stores the current P4+ Pilot tone setting in the selected preset. Auto Off and Password settings are not stored as a part of the preset.

3.6.3. Preset 0

When the P4+ is put to power-down state by pressing a navigation button more than 2 seconds, the active settings are automatically stored in the default register, Preset 0. After wake-up this register is reloaded, to ensure that the settings prior to the power-down are maintained.

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3.7. Status menu

| Status | |
|-----------|---------|
| Temp. | 41 C |
| Firmware | 010909a |
| Serial | 221448 |
| Batt. min | 180 |

3.7.1. Temp

The internal temperature of the P4+ is displayed in degrees Celsius (°C). When this temperature exceeds +60 °C, the TEMP warning LED in the P4+ button is activated.

3.7.2. Firmware

Presents the current firmware version of the P4+

3.7.3. Serial

Displays the serial number of the P4+. This number can also be found on the label on top of the unit.

3.7.4. Batt. min

During charging this value displays the time to full battery charge In minutes. During battery operation the value show the time in minutes until the battery is empty.

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3.8. Help menu



The help menu displays contact information for Kronback tracers support:

kronback tracers

Lautrupvang 15
 DK-2750 Ballerup
 Denmark
 Phone:(+45) 46 907 909
 Fax:(+45) 46 907 910
 Email: support@kronback.com
 Web: www.kronback.com