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**Service Manual**  
**Electronic Precision Balances**

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**KERN CH**

version 1.0

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**CH-SH-e-0110**



# KERN CH

version 1.0

## Service Manual

## Electronic Precision Balances

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# 1 Introduction

## 1.1 Features

- Tare function with indicator
- Display hold function
- Negative value indication
- Low battery indication
- Auto zero
- Auto off function
- Overload protection
- Internal adjusting by Variable Resistor
- Operated by 9 V alkaline battery

## 1.2 Simple span adjusting

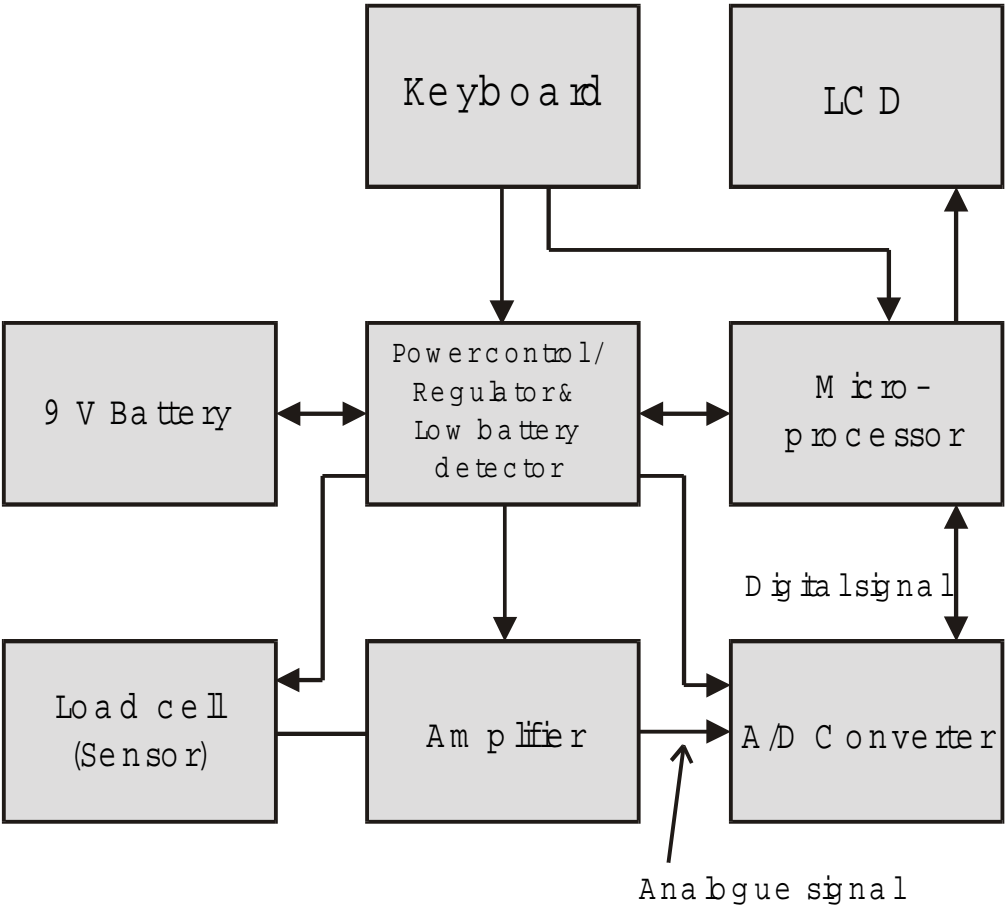
1. Remove the label on the rear of the balance.
2. Turn the balance on by pressing the **ON/TARE** key.
3. Hang the weight onto the balance. Adjust the Variable Resistor (VR2) until the balance reading matches with the weight.
4. Unload, reset to zero and repeat step 3 until there is no need to adjust VR2 to get accurate readings.

## 1.3 Internal adjusting procedure

1. Remove the four screws and the rear housing of the balance.
2. Connect **J4** on the analogue board.
3. With the balance on its weighing position, turn the balance on. The display will show the internal counts. Adjust **VR1** to set the reading within the range of 420 – 480.
4. Turn the balance off and disconnect **J4**. Turn the balance on again.
5. Hang a weight onto the balance. Adjust the Variable Resistor (VR2) until the balance readings matches with the weight.
6. Unload, reset to zero and repeat step 5 until there is no need to adjust **VR2** to get accurate readings.
7. Install the rear housing of the balance with the four screws.

**2 Functional block diagram / description**

**2.1 Functional block diagram**



## **2.2 Function description**

### **1. Load cell**

This is the heart of the whole system. The load cell itself is arranged as a bridge. The resistance change of the bridge elements is proportional to the load applied on the load cell. Therefore, the output of the load cell is an analogue signal which is proportional to the load applied on the balance.

### **2. Amplifier**

The analogue signal from the load cell is very small, of the order of micro-volt. Hence, a linear and stable amplifier is applied to amplify the analogue signal to an appropriate level.

### **3. A/D Converter**

In order for the analogue signal can be input to the microprocessor, this part converts the analogue signal to its digital equivalent. The operation of the analogue to digital converter is using a PULSE MODULATION technique and is controlled by the microprocessor.

### **4. Microprocessor**

The microprocessor controls all the functions of the balance, such as auto zero, A/D conversion, timings, weight calculation and display, overload indication, low battery indication, tare function, etc.

### **5. Display**

This is the part where the weight is shown out on the LCD display in digital form. The whole display is driven by the microprocessor.

### **6. Power regulator and low battery detector**

This part contains the ON/OFF power control. In order for the external power can be used by other parts of the balance, a regulator is used to regulate the supply. A low battery detector is employed to make sure that the power supply is strong enough for normal operation of the balance.

### **7. Keyboard**

The keyboard provides the user interface. **ON/TARE**, **Hold** and **OFF** keys are employed to operate the balance.

### 3 Troubleshooting

*Turn the balance on*



*Full segments on the display ?*

If no display, check battery; keyboard / overlay; connection between keyboard – analogue board, battery – analogue board.

If there are wrong segments, check fixing of the LCD frame, the zebra connector underneath the LCD.



*Display zero ?*

If display is **LO**, check the battery > 7,0 V.

If display is **E**, check the internal count.



*Proper readout ?*

If the reading is unstable, check the hook and the load cell.



*Is the reading correct ?*

If the reading is not accurate, perform a span adjusting.

If the balance cannot reach its full capacity, check the hook, the load cell and the internal zero point.

If zero is always displayed, check the internal zero point. Perform an internal adjusting if necessary.



*Normal operation.*

## 4 Replacement of PCBA

1. Disassemble rear housing of the balance.
2. Disconnect connections to keyboard, load cell, ground wire and battery from the PCBA. Disassemble the PCB screws. Replace it by a new PCBA and fix the screws. Connect connections from PCBA to keyboard, load cell, ground wire and battery again.
3. Perform an internal adjusting as described in section 1.
4. Assemble the rear housing of the balance.
5. Check the accuracy of the balance at different weights.

<b>CH 15K20</b>		<b>CH 25K50</b>		<b>CH 50K50</b>	
<i>weight</i>	<i>tolerance</i>	<i>weight</i>	<i>tolerance</i>	<i>weight</i>	<i>tolerance</i>
2,0 kg	0,02 kg	5,0 kg	0,05 kg	10,0 kg	0,05 kg
5,0 kg	0,02 kg	10,0 kg	0,05 kg	20,0 kg	0,05 kg
10,0 kg	0,02 kg	15,0 kg	0,05 kg	30,0 kg	0,05 kg
15,0 kg	0,04 kg	20,0 kg	0,05 kg	40,0 kg	0,10 kg
		25,0 kg	0,05 kg	50,0 kg	0,10 kg

6. Check other functions, such as TARE, Hold and Auto-Off.

## 5 Replacement of Load Cell Assembly

1. Disassemble the rear housing of the balance. Remove the overlay and keyboard to disassemble the screw fixing the load cell.
2. Disconnect wires to the PCBA. Remove shaft and hook from the load cell. Replace the load cell. Assemble shaft, hook, load cell fixing screw, keyboard and load cell. Connect wires to PCBA again.
3. Load the balance with full capacity.
4. Perform an internal adjusting as described in section 1.
5. Assemble the rear housing of the balance.
6. Check the accuracy of the balance at different weights.

<b>CH 15K20</b>		<b>CH 25K50</b>		<b>CH 50K50</b>	
<i>weight</i>	<i>tolerance</i>	<i>weight</i>	<i>tolerance</i>	<i>weight</i>	<i>tolerance</i>
<i>2,0 kg</i>	<i>0,02 kg</i>	<i>5,0 kg</i>	<i>0,05 kg</i>	<i>10,0 kg</i>	<i>0,05 kg</i>
<i>5,0 kg</i>	<i>0,02 kg</i>	<i>10,0 kg</i>	<i>0,05 kg</i>	<i>20,0 kg</i>	<i>0,05 kg</i>
<i>10,0 kg</i>	<i>0,02 kg</i>	<i>15,0 kg</i>	<i>0,05 kg</i>	<i>30,0 kg</i>	<i>0,05 kg</i>
<i>15,0 kg</i>	<i>0,04 kg</i>	<i>20,0 kg</i>	<i>0,05 kg</i>	<i>40,0 kg</i>	<i>0,10 kg</i>
		<i>25,0 kg</i>	<i>0,05 kg</i>	<i>50,0 kg</i>	<i>0,10 kg</i>

Check other functions, such as TARE, Hold and AUTO-OFF.





