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Service Manual
Price calculating balance

KERN RFC

Version 1.0

02/2018

GB



RFC-SH-e-1810

GB

KERN RFC
Price calculating balance

Version 1.0 03/2018

Service manual

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1 Basic Information

The device must be repaired only by trained specialist staff or personnel with professional formation (such as a repair-specialist accredited by law concerning verification). The service manual is obligatory for repair work. After repair, original conditions of the device have to be restored. Only original spare parts should be used.

Instructions about conformity-evaluated scales:

Repair must be carried only at 100% compliance with the type approval. A violation of this specification will result in a loss of the type approval! After successful repair the balance will have to be reverified before it can be used again in a statutorily regulated field.

Detailed instructions about conformity-evaluated scales:

Repair must be carried only at 100% compliance with the type approval. A violation of this specification will result in a loss of the type approval!

After successful repair the balance will have to be reverified before it can be used again in a statutorily regulated field.

2 Introdution

This service manual covers the RFC series and is edited for the authorized servicing personnel.
Note all rights are reserved. Copying any part of this manual is prohibited without our permission.

In this lineup it is an eco product, Therefore, it is not intended to represent the repair manual in detail, since the construction of the balance is very simple. It is therefore only referring to the list of related to disposal spare parts.

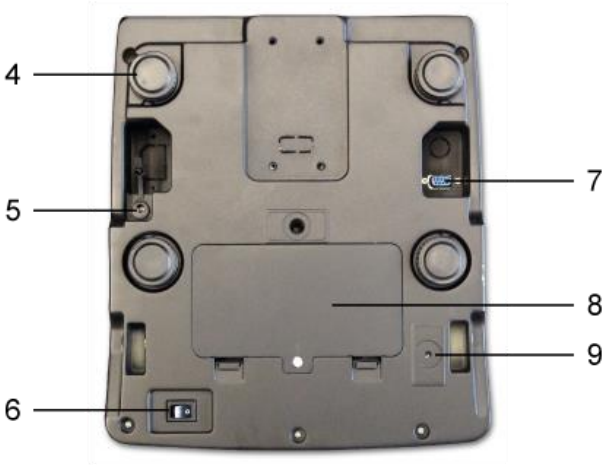
3 Appliance overview

Models without vertical display:



Models with post-mounted display:

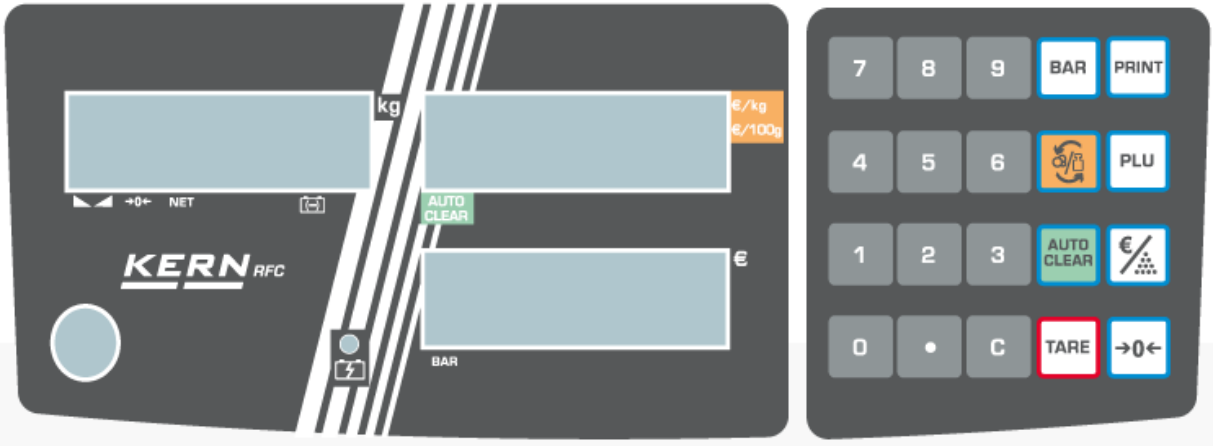




1. Weighing pan
2. Bubble level
3. Post-mounted display
4. Footscrews
5. Mains adapter connection
6. ON/OFF switch
7. RS 232 interface
8. Battery compartment
9. Adjustment switch

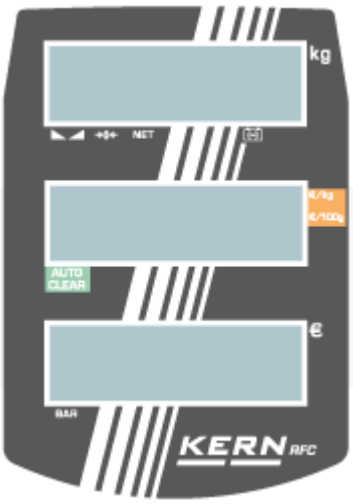
3.1 Overview of display

Operator and secondary display (standard on the backside of models without post-mounted display):





Additional post-mounted display for models with tripod:



3.2 Display weight

Here, the weight of your goods is displayed.

Indicator ▼ next to symbol displays:

	Rechargeable battery very low
NET	Net weight
	Stability display
a	Zeroing display

3.3 Display basic price

Basic price, can be switched over from € / kg or € / 100 g.

Indicator ▼ next to symbol displays:

€/kg	Basic price in €/kg
€/100 g	Basic price in €/100 g
AUTO CLEAR	Set basic price is deleted automatically when balance is unloaded

3.4 Display sale price

Here the sales price is displayed in Euro [€].

Indicator ▼ next to symbol displays:

BAR	Calculating the change (see chap. 10.3)

3.5 Battery loading status display



red	Charging storage battery
green	Rechargeable battery completely reloaded

3.6 Keyboard overview



Selection	Function
0 ~ 9	• Numerical keys, PLU-keys • In menu: Invoke parameter
C	• Delete
PLU	• Save basic price (press key for a long time), see chap. 10.2 • Call-up basic price (press and hold key for a short time), see chap. 10.2
	• Switch-over unit € / kg ⇆ € / 100g
PRINT	• Issue to external device • In menu:Parameter selection
BAR	• Calculating the change, see chap. 10.3
TARE	• Taring, see chap. 9.3 • In menu: Storing settings
AUTO CLEAR	• For activated function, the set basic price is automatically deleted when the balance is unloaded.
	• Enter basic price per piece (without weighing)
→0←	• Zeroing • In menu: Back to weighing mode
•	• Decimal point

4 Basic Information (General)

4.1 Proper use

The balance you purchased is intended to determine the weighing value of material to be weighed. It is intended to be used as a “non-automatic balance”, i.e. the material to be weighed is manually and carefully placed in the centre of the weighing pan. As soon as a stable weighing value is reached the weighing value can be read.

4.2 Improper Use

Do not use balance for dynamic weighing. In the event that small quantities are removed or added to the material to be weighed, incorrect weighing results can be displayed due to the “stability compensation“! (Example: Slowly draining fluids from a container on the balance.)

Do not leave permanent load on the weighing pan. This may damage the measuring system.

Impacts and overloading exceeding the stated maximum load (max) of the balance, minus a possibly existing tare load, must be strictly avoided. Balance may be damage by this.

Never operate balance in explosive environment. The serial version is not explosion protected.

The structure of the balance may not be modified. This may lead to incorrect weighing results, safety-related faults and destruction of the balance.

The balance may only be used according to the described conditions. Other areas of use must be released by KERN in writing.

4.3 Warranty

Warranty claims shall be voided in case

- Our conditions in the operation manual are ignored
- The appliance is used outside the described uses
- The appliance is modified or opened
- Mechanical damage or damage by media, liquids, natural wear and tear
- The appliance is improperly set up or incorrectly electrically connected
- The measuring system is overloaded

4.4 Monitoring of Test Resources

In the framework of quality assurance the measuring-related properties of the balance and, if applicable, the testing weight, must be checked regularly. The responsible user must define a suitable interval as well as type and scope of this test. Information is available on KERN’s home page (www.kern-sohn.com with regard to the monitoring of balance test substances and the test weights required for this. In KERN's accredited DKD calibration laboratory test weights and balances may be calibrated (return to the national standard) fast and at moderate cost.

5 Basic Safety Precautions

5.1 Pay attention to the instructions in the Operation Manual



Carefully read this operation manual before setup and commissioning, even if you are already familiar with KERN balances.

5.2 Personnel training

The appliance may only be operated and maintained by trained personnel.

6 Transport and storage

1.1 Testing upon acceptance

When receiving the appliance, please check packaging immediately, and the appliance itself when unpacking for possible visible damage.

6.1 Packaging / return transport



- ⇨ Keep all parts of the original packaging for a possibly required return.
- ⇨ Only use original packaging for returning.
- ⇨ Prior to dispatch disconnect all cables and remove loose/mobile parts.
- ⇨ Reattach possibly supplied transport securing devices.
- ⇨ Secure all parts such as the glass wind screen, the weighing platform, power unit etc. against shifting and damage.

7 Unpacking, Setup and Commissioning

7.1 Installation Site, Location of Use

The balances are designed in a way that reliable weighing results are achieved in common conditions of use.

You will work accurately and fast, if you select the right location for your balance.

On the installation site observe the following:

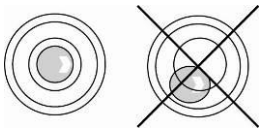
- Place the balance on a firm, level surface;
- Avoid extreme heat as well as temperature fluctuation caused by installing next to a radiator or in the direct sunlight;
- Protect the balance against direct draughts due to open windows and doors;
- Avoid jarring during weighing;
- Protect the balance against high humidity, vapours and dust;
- Do not expose the device to extreme dampness for longer periods of time. Non-permitted condensation (condensation of air humidity on the appliance) may occur if a cold appliance is taken to a considerably warmer environment. In this case, acclimatize the disconnected appliance for ca. 2 hours at room temperature.
- Avoid static charge of goods to be weighed or weighing container.

If electro-magnetic fields or static charge occur, or if the power supply is unstable major deviations on the display (incorrect weighing results) are possible.In that case, the location must be changed.

7.2 Unpacking

Carefully remove the balance from the packaging, remove plastic cover and setup balance at the intended workstation.

8 Placing



Level balance with foot screws until the air bubble of the water balance is in the prescribed circle.

8.1 Scope of delivery / serial accessories:

- Balance, see chap. 3
- Mains adapter
- Protective cover
- Operating manual

8.2 Mains connection

Power is supplied via the external mains adapter. The stated voltage value must be the same as the local voltage.

Only use KERN original mains adapter. Using other makes requires consent by KERN.

8.3 Storage battery operation (optional)

The optionally supplied battery is charged with the supplied power supply.
Before the first use, the battery should be charged by connecting it to the mains power supply for at least 15 hours.

- If an arrow [▼] appears on the weight display above the battery symbol (-), the capacity of the rechargeable battery will soon be exhausted. The balance will be ready to operate for about another 10 hours, then it will switch off automatically. Charge the battery with the help of the supplied power pack.
- If in the weight display appears „**bat Lo**“ followed by a flickering display, the capacity of the rechargeable battery is below the prescribed minimum. The balance will be ready to operate for about another 5 minutes, then it will switch off automatically. Charge the battery with the help of the supplied power pack.

The LED display informs you during loading about the loading status of the rechargeable battery.

red: Battery is almost discharged

green: Rechargeable battery completely reloaded

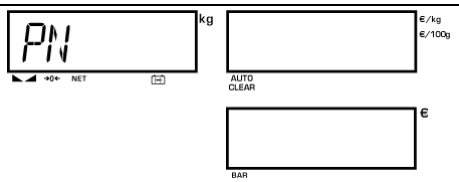
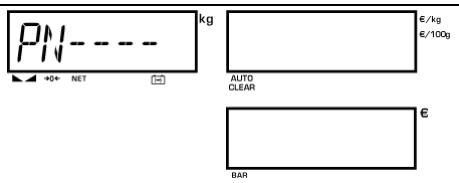
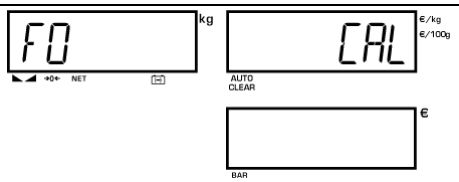
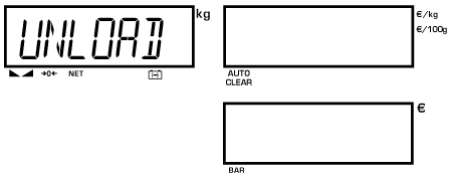
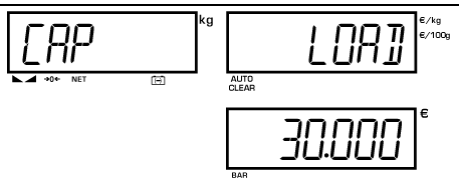
9 Adjustment

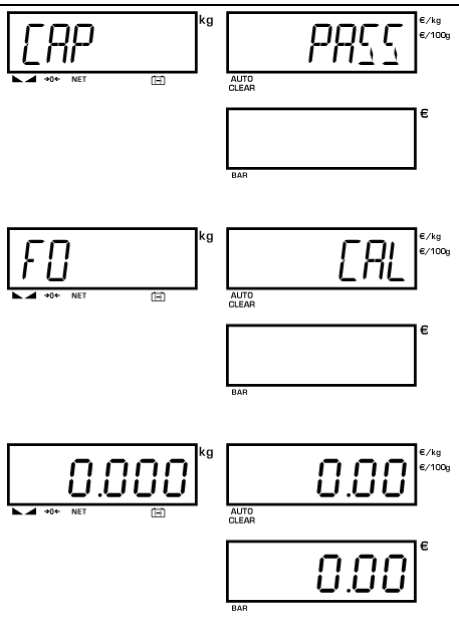
As the acceleration value due to gravity is not the same at every location on earth, each balance must be coordinated - in compliance with the underlying physical weighing principle - to the existing acceleration due to gravity at its place of location (only if the balance has not already been adjusted to the location in the factory).This adjustment process must be carried out for the first commissioning, after each change of location as well as in case of fluctuating environment temperature.To receive accurate measuring values it is also recommended to adjust the balance periodically in weighing operation.

The adjustment is locked for verified balances. Carrying out adjustment requires that the seal is destroyed and the adjustment switch is confirmed in step 3 when turning on the scale. For position of adjustment switch, see chap. 6.8.1

Attention:
After destruction of the seal the balance must be re-verified by an authorised agency and a new verification wire/seal mark fitted before it can be reused for applications subject to verification.

Procedure when adjusting:
Observe stable environmental conditions. A warming up time (see chapter 1) is required for stabilization. Ensure that there are no objects on the weighing pan. Arrange adjustment weight, details see chap.1 „Techn. data“

To turn on/off operate the on/off switch at the underneath side on the right of the scale and keep pressed for a little while. During the selftest press TARE and keep pressed until Pn is displayed.	
Use the numeric keys to enter the standard password 0000. Pn---- is displayed.	
Confirm password with TARE, the adjustment function F0 CAL will be displayed.	
Press adjustment switch on the lower side of the balance.	
Press TARE, UnLoAd will be displayed. Ensure that there are no objects on the weighing pan.	
Press TARE again, CAP LOADxx will be displayed.	 (example)

Set the displayed adjustment weight with the help of PRINT.Place the adjustment weight.Wait for the stability display appears, then press TARE.PASS will be displayed.Remove the adjustment weight.F0 CAL appears on the display.Now the process of adjustment is successfully completed.Return to weighing mode using →0←	

In case of an adjustment error or incorrect adjustment weight, the display will show an error message (FAKLH), then repeat adjustment process.

10 Verification

General hints:

According to EU directive 2014/31/EU balances must be officially verified if they are used as follows (legally controlled area):

a) For commercial transactions if the price of goods is determined by weighing.
b) For the production of medicines in pharmacies as well as for analyses in the medical and pharmaceutical laboratory.
c) For official purpose.
d) For manufacturing final packages.

In cases of doubt, please contact your local trade in standard.
After verification the balance is sealed at the indicated positions.

Verification of the balance is invalid without the "seals".

Verification notes

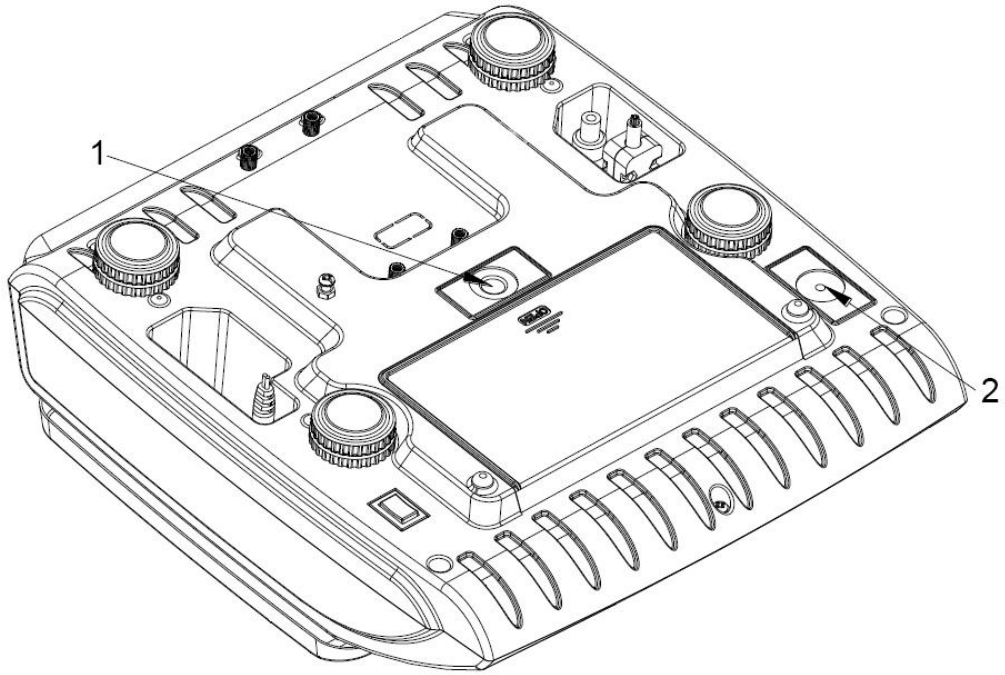
An EU type approval exists for balances described in their technical data as verifiable. If a balance is used where obligation to verify exists as described above, it must be verified and re-verified at regular intervals.

Re-verification of a balance is carried out according to the respective national regulations. The validity for verification of balances in Germany is e.g. 2 years.
The legal regulation of the country where the balance is used must be observed!

Balances with obligation to verify must be taken out of operation if:

- **The weighing result of the balance is outside the error limit.**Therefore, in regular intervals load balance with known test weight (ca. 1/3 of the max. load) and compare with displayed value.
- **The reverification deadline** has been exceeded.

10.1 Adjustment switch and seals



1. Seal of approval
2. Adjustment switch

10.2 Checking the balance verification settings

For the adjustment, the balance must be switched over to service mode.

In the service mode the parameters of the balance can be modified.

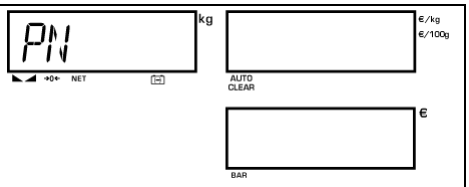
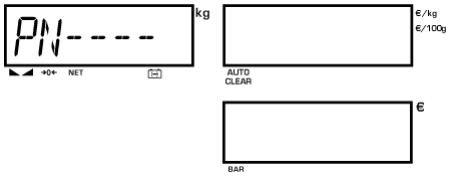
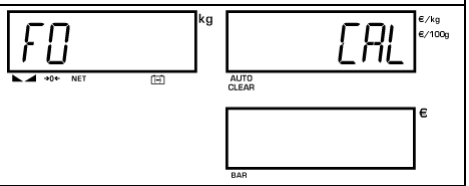
If this happened accidentally, please contact KERN.

In verified scales the service mode is locked individually for each switch. To disable the access lock, destroy the seal and actuate the switch.

Attention:
After destruction of the seal the balance must be re-verified by an authorised agency and a new verification wire/seal mark fitted before it can be reused for applications subject to verification.

11 The menu

11.1 Access to menu

To turn on/off operate the on/off switch at the underneath side on the right of the scale and keep pressed for a little while. During the selftest press TARE and keep pressed until the password inquiry "P in" appears.	
Using numeric keyboard, enter the standard password "0000". "P in ----" is displayed.	
Confirm with TARE password, the adjustment function F0 CAL will be displayed.	
Press adjustment switch on the lower side of the balance	

11.2 Navigation in the menu:

Use the numeric keys PRINT or PLU to scroll up or down in the menu.

Confirm selected function by pressing TARE. Select desired setting with PRINT or PLU and acknowledge by TARE.

Exit menu:

Press the →0← button as often as necessary until the zero display appears. The balance is now again in weighing mode.

11.3 Menu overview

Function		Settings	Description
PRINT or PLU and TARE		PRINT or PLU and TARE	
F0	**CAL**		Adjustment function
F1	**rES**		Resolution
Press adjustment switch		rES dUAL-i	
		rES dUAL-r	
		3000	
		6000	
F2	**CAP**		Weighing range (max)
		30KG	
		3KG	
		6KG	
		15KG	
F3	**PdECi**		Decimal point price
		PdSL 0.00	
		PdSL 0.000	
		PdSL 0.0000	
		PdSL 0	
F4	**PdESC**		not documented
		PdESC Fix	
		PdESC FLoAt	
F5	**SPEEd**		A/D converter
		SLow	
		MEdiuM	
		FASt	
F6	**Min Coin**		Interval size currency
		Coin 1 Coin	
		Coin 2 Coin	
		Coin 5 Coin	
		Coin 10 Coin	
F7	**SCSiUE tArE**		Multi-Tare function
		S tArE oFF	
		S tArE on	
F8	**iSn**		Internal value
		iSnxxxxx	

F9	**GrA**			Gravity
		GrA x.xxxxx		
F10	**rESEt**			Back to factory setting
F11	**rS232**			Interface RS232
		ModE	oFF	
			Cont	Continuous data transfer
			StC	Stable value continuous
			toLEdo	Log Type 1
			nCiECr	Log Type 2
			nCiGEn	Log Type 3
			tEC	Log Type 4
			EASY	Log Type 5
			PrintEr	Printout via printer
			tPuP	Printout by pressing PRINT
			LP50	Printout by pressing PRINT
			PoS	not documented
		bAUd		Baud rate
			9600	
			19200	
			38400	
			115200	
			1200	
			2400	
			4800	
		Pr		
			8n1	8 data bits, no parity, 1 stop bit
			7E1	7 data bits, even parity, 1 stop bit
			7o1	7 data bits, odd parity, 1 stop bit

12 Instant help

In case of an error in the program process, briefly turn off the balance and disconnect from power supply. The weighing process must then be restarted from the beginning.

Fault	Possible cause
The displayed weight does not glow.	• The balance is not switched on. • The mains supply connection has been interrupted (mains cable not plugged in/faulty). • Power supply interrupted. • Batteries are inserted incorrectly or empty • No batteries inserted.
The displayed weight is permanently changing	• Draught/air movement • Glass doors not closed • Table/floor vibrations • Weighing pan has contact with other objects. • Electromagnetic fields / static charging (choose different location/switch off interfering device if possible)
The weighing result is obviously incorrect	• The display of the balance is not at zero • Adjustment is no longer correct. • The balance is on an uneven surface. • Great fluctuations in temperature. • Electromagnetic fields / static charging (choose different location/switch off interfering device if possible)

Should other error messages occur, switch balance off and then on again. If the error message remains inform manufacturer.

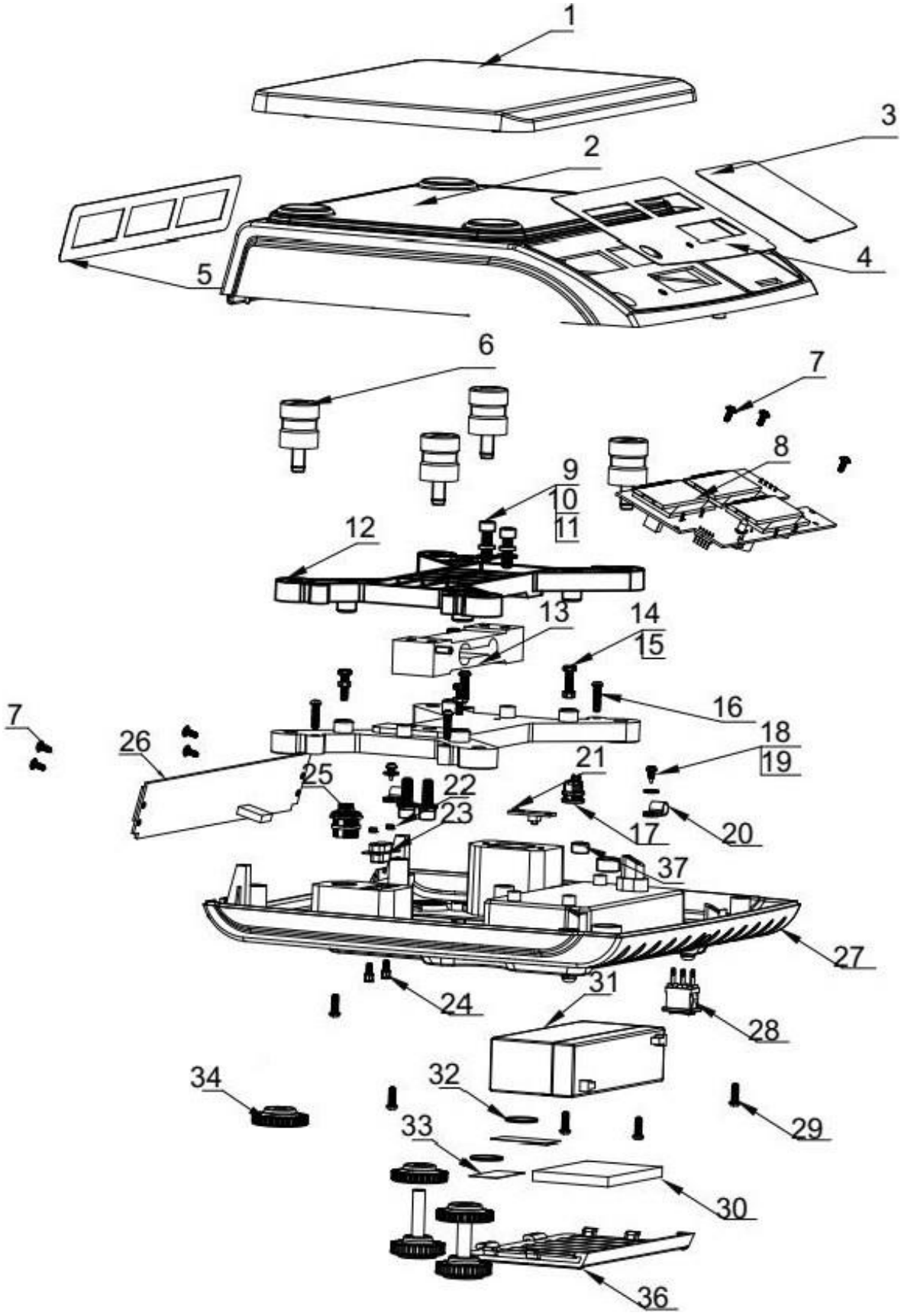
13 Error messages

Error Message	Description	Solution
-----	Maximum load exceeded	Unload or reduce weight
Err 1	Incorrect date	Enter the date by using format “yy;mm:dd”
Err 2	Incorrect time	Enter the time by using format “hh:mm:ss”
Err 4	Zero setting error	Zero setting range exceeded due to switching on.(4%max) Make sure platform empty.
Err 5	Key board error	Check the keys and connecter.
Err 6	A/D value out of range	Make sure platform empty and check the pan is installed proper. Check the load cell connectors.
Err 7	Percentage Error	Please check input data, must be > 0.5d
Err 8	Calibration weight error	Check the test weights for calibration or linear calibration
Err 9	Unstable Reading	Check any air variation, vibration, RF noise and touching some where. Check the load cell and connecters.
Err 10	Wireless communiation failure	Check wireless settings or change Com settings from the wireless
Err 11	Communication protocol error	Check communication settings
Err 12	Accumulation error	Max accumulation times 99 / 999 / weight 999999
Err 13	Lack of unit weight	Check unit weight entry data, must be >0.5d
Err 14	Lack of sample	Check counting samples entry, must be >20d
Err 15	Gravity error	Check the gravity settings. Gravity range must be 0.9xx ~ 1.0xx
Err 16	Paper error	Check the printer paper
Err 17	Tare out of range	Minus weight or overload. Remove the load and restart scale again.
Err 18	Pre-tare error	Check the pre-tare value
Err19	Initialize zero error	Calibration the scale.
Err P	Printer error	Check the printer settings or connections

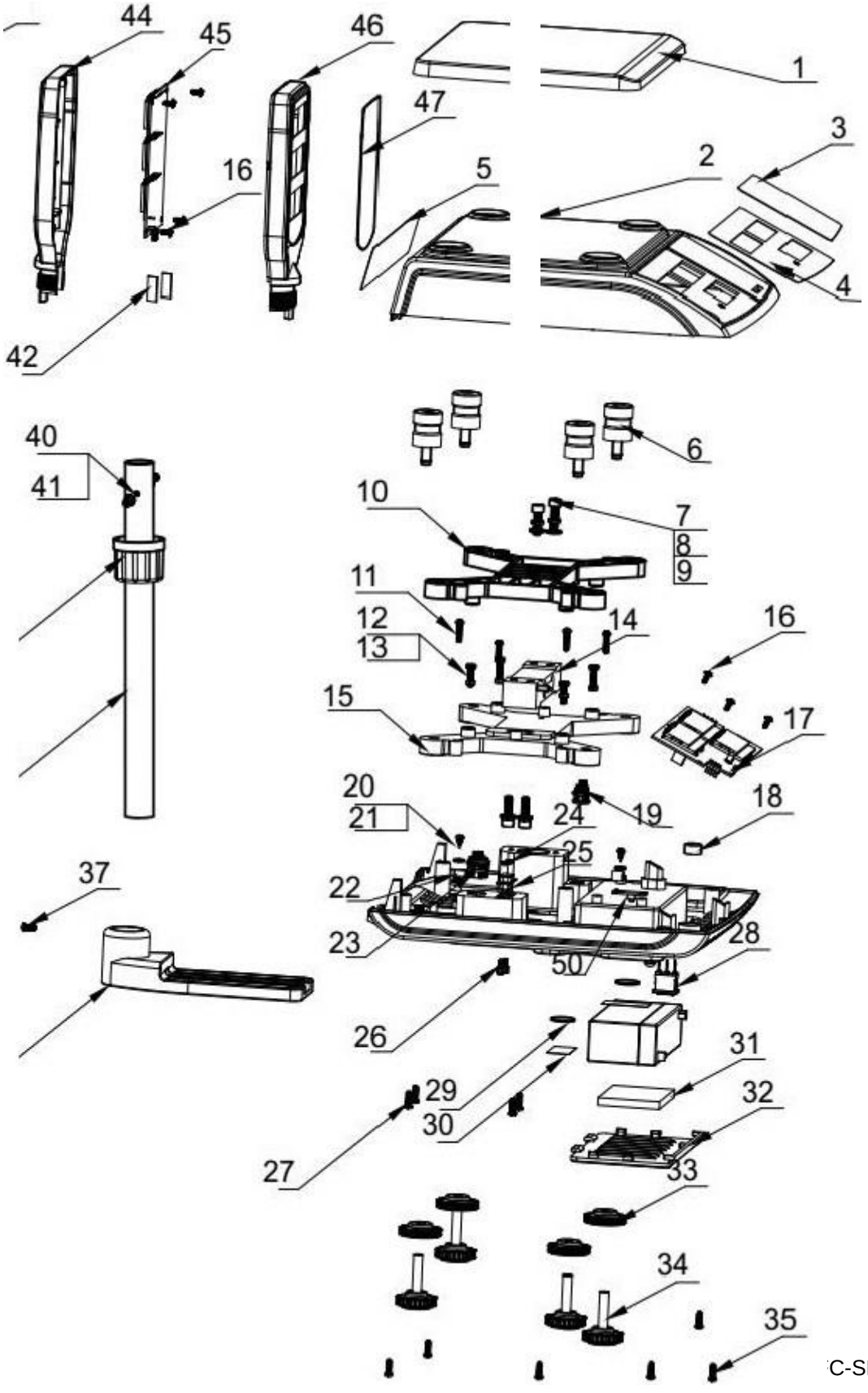
Err 1	Approval setting error	Check the PCB jumper settings. Must be connect jumper pin to K1 (BW series)
--ol--	Over range	Remove the load. Re calibrate
--lo--	Underload	Minus weight, check the platform and restart or calibrate.
Fai l h / fai l l / fai l	Calibration Error	Check the test weights & Re calibrate
Ba lo / lo ba	Battery low	Re charge battery, check the voltages.

14 Drawing

14.1 without pole



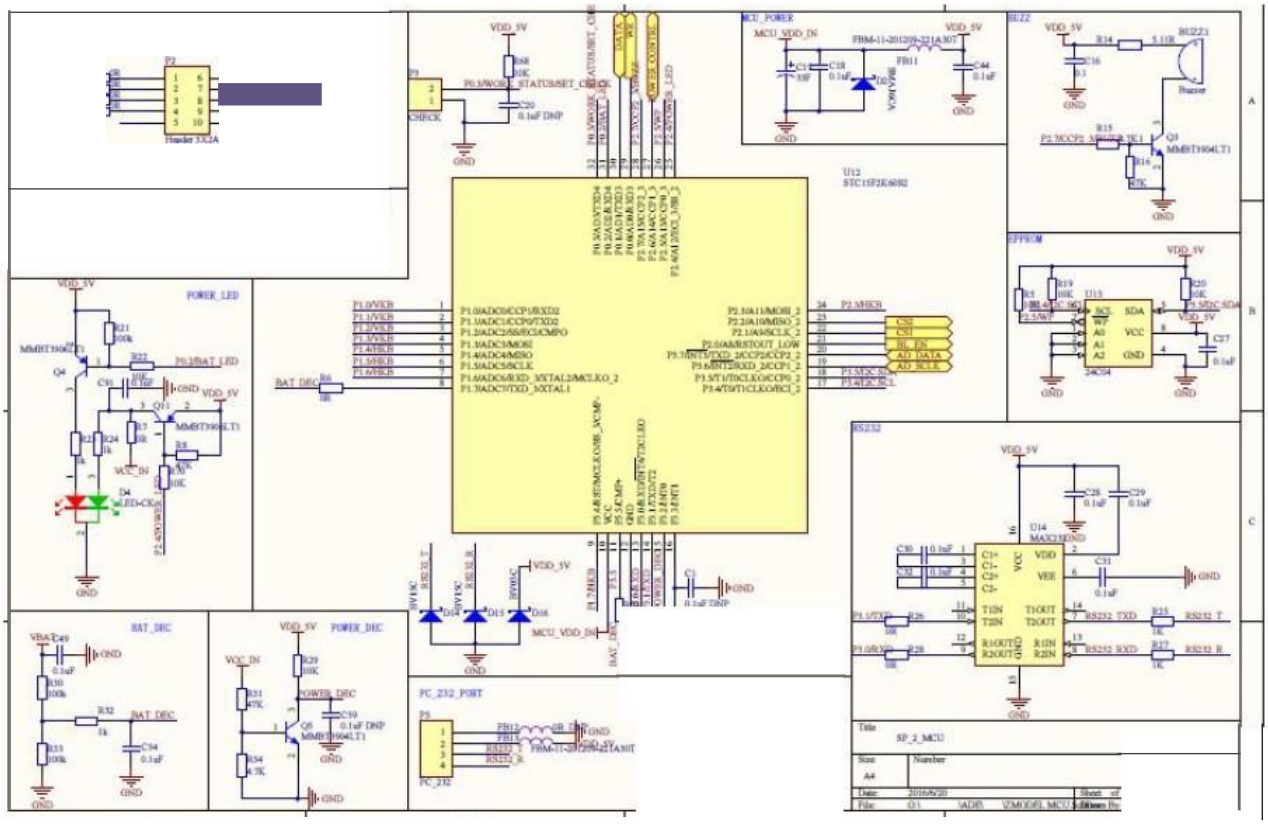
14.2 with pole



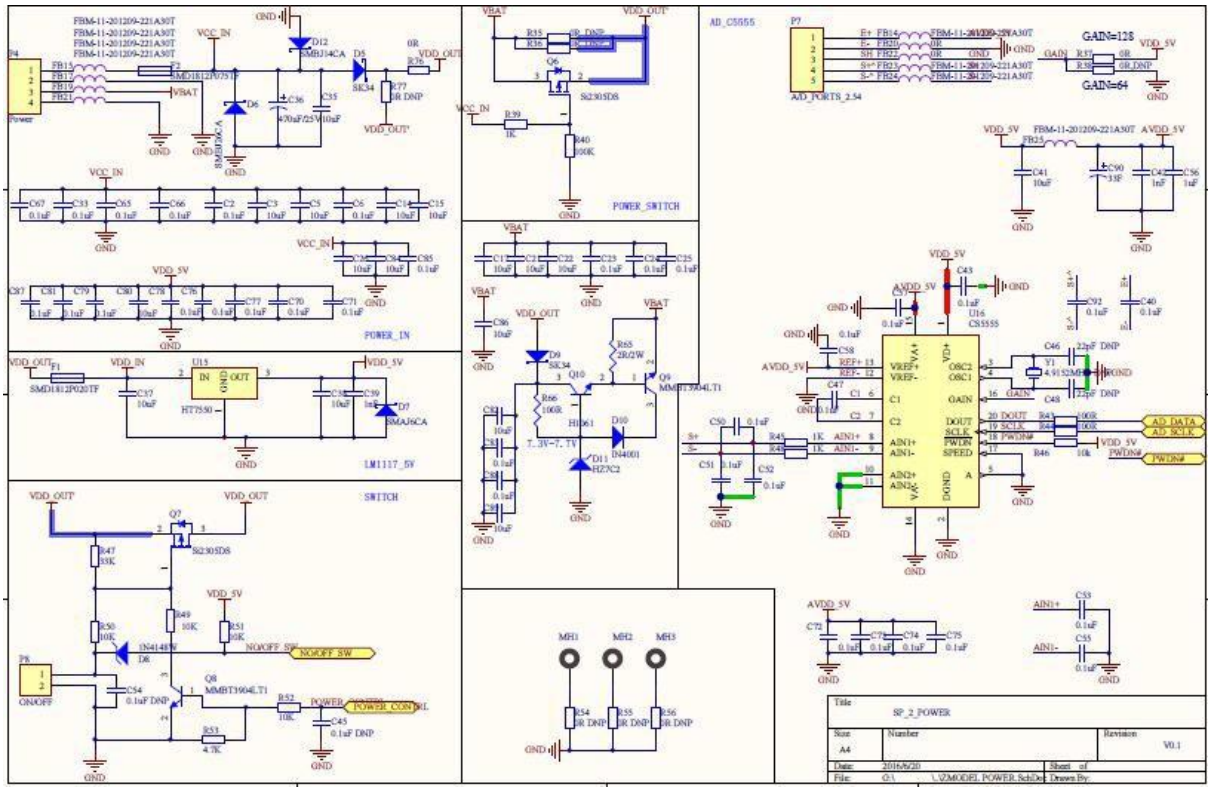
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15 Circuit diagram

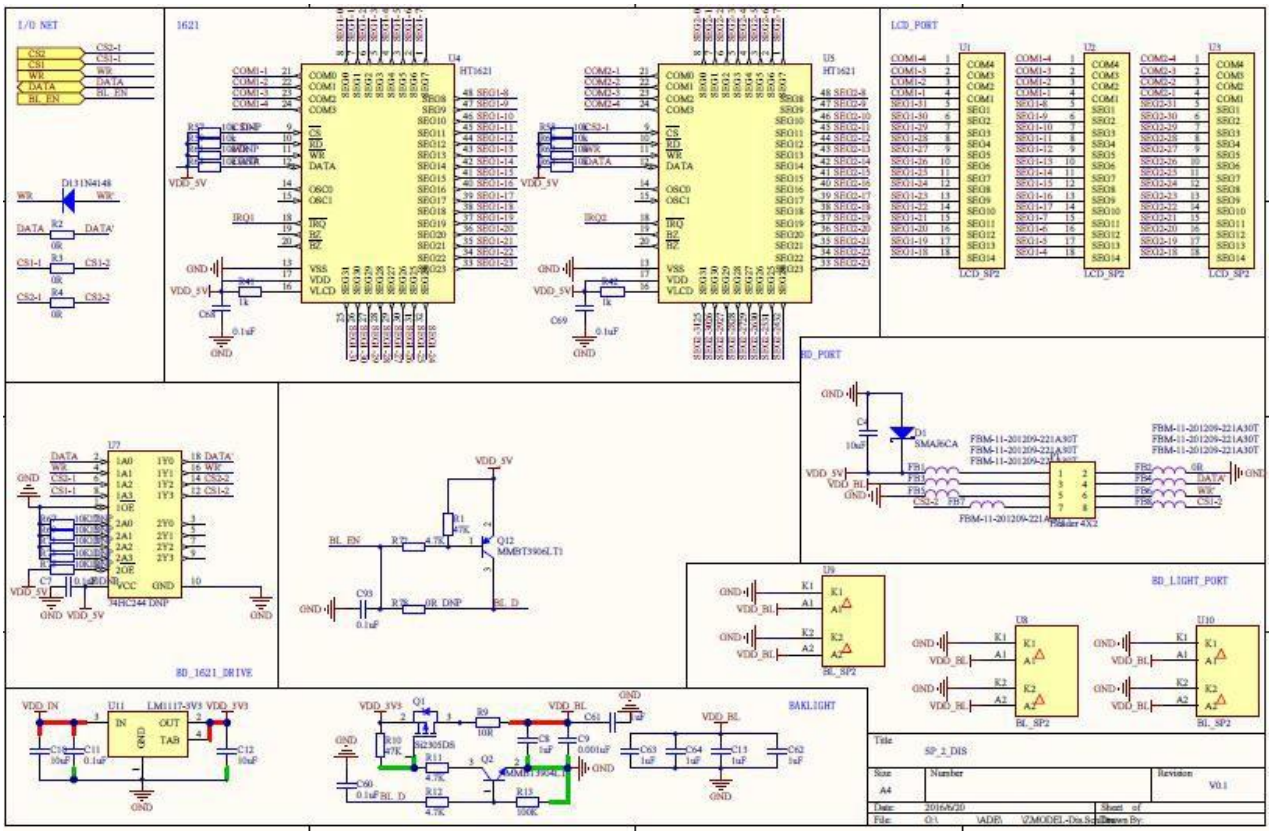
15.1 MCU



15.2 Power



15.3 Display board



16 Trouble shooting

Problem	Possible cause	Common solutions
Display is blank, No turn on test	Mains power is turned off Power supply not plugged in Power supply faulty Internal battery not charged Display turned off	Check power is going to the scale and switch is on. Verify the voltage going to the scale matches the power supply labels on the power module or scale.
Display blank after turn on test, Error message Display is locked	Pan not installed Unstable weight Load cell damaged Mechanics damaged	Check the pans are installed correctly. Try turning the scale on again.
OL or FULL appears on display	Maximum capacity exceeded Load Cell or mechanics damaged Power supply faulty	Check the pans are installed correctly. Try turning the scale on again.
UL or NULL displayed	Weight on scale below permissible limit Pan has been removed Pan support not seated properly Power supply faulty Load Cell or mechanics damaged	Check the pans are installed correctly. Try pressing Zero key. Try turning the scale on again.
Display is unstable	Drafts or air currents Obstruction under pan Sample is moving (animal weighing) Vibrations through table Temperature changed dramatically Power supply faulty	Verify the scale is in a acceptable location and on a good table. Verify the power supply is correct for the scale.
Weight value incorrect	Calibration error, Recalibrate Linearity error, set Linearity Unit calibrated with inaccurate weight Balance not level Obstruction between sample and cover Wrong unit of weight displayed	Calibrate again, paying special attention to the mass used, the stability of the scale, and the weighing units required. If linearity can be set by the user it will be described in the user manual. Check pan is installed correctly. Verify installation is acceptable.

	Over load Stops hitting pan support or hitting bottom of load cell	
Cannot use Full Capacity	Shipping screw not removed if applicable Electronic problem on A/D Parameters set incorrectly Load Cell or mechanics Damaged	Look for obstruction under pan, shipping screws, and verify pan installation. Check the weighing units used.
Not Linear	Overload stops hitting too soon Load cell or mechanics damaged A/D damaged	Look for obstruction under pan, shipping screws, and verify pan installation. If linearity can be set by the user it will be described in the user manual.
Off Center Loading error	Adjust mechanics Overload Stops not correct Load Cell damaged	Look for obstruction under pan, shipping screws, and verify pan installation.
Battery will not charge	Mains voltage not present or too low Charging circuit failure Battery Failure	Verify the batteries are rechargeable types. Check power supply voltage is correct.

17 Maintanace

17.1 General

If the scale does not operate properly, find out the problem as possible. Determine whether the problem is constant or alternate. Be aware that problems can be caused by mechanical or electrical influences.

Check the following.

- Water
- Corrosive materials
- Vibrations or temperature or wind
- Physical damage

Check the scale cables for damage, and check all connections and connectors for any loose contact or incorrect connection

17.2 Cleaning

- Disconnect the power before cleaning.
- Use a cloth with mild suds and light cleaning agents.
- Make sure that fluid not able to get into the device.
- Use a clean and soft cloth for rub off.

17.3 Determine the Problem

Determine whether the problem is in the PCB or the Load Cell

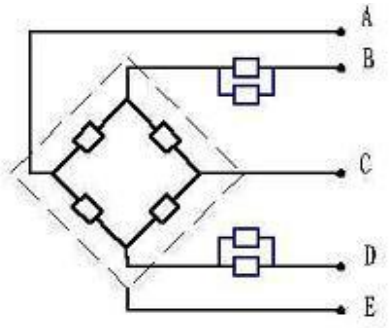
- Remove power from the system, and disconnect the load cell connection from the PCB
- Connect the PCB to a load cell simulator
- Reapply power and test the PCB

If problem goes away, its source is probably in the Load cell. Check the wiring, connector, load cell and mechanical components of the load cell.
If problem persists, its source is probably in the PCB. Check the PCB voltages, connectors, cables and function programs

17.4 Check the Load cell

- Remove power from the system, and disconnect the PCB from the Load cell.
- Check the moisture, or foreign material inside.
- Make sure all leads are connected and correctly.
- Check load cell for proper input and output resistances

17.5 Load Cell Connections



Signal + Green
Supply + Red

Signal - Black

Supply - White
Shield

Measuring Points	Resistance
Red (+ Exc) to White (–Exc)	420 ±20Ω
Green (+Sig) to Black (–Sig)	350Ω ±5Ω

17.6 Check PCB Voltages

If the problem is in the PCB, use a multimeter to check the following voltages

17.7 AC Power

Check the AC power socket out put voltage.

- Voltage must be a -20% and +10% of the normal AC voltage.

17.8 Adaptor Voltage

Check the adaptor output cable connecter voltage

- Voltage must be minimum 9VDC and maximum 15VDC

17.9 PCB Input Voltage

Check the PCB input power connecter voltage

- Voltage must be minimum 9VDC in to the pin AD+

17.10 Check Battery Voltage and Charging Voltage

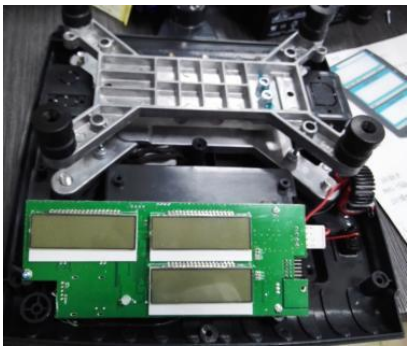
1. Check the Battery Voltage,
   - Voltage must be minimum 6VDC. If below the 6VDC connect the adaptor for charging
   - The battery voltage below the 5.5VDC, replace the battery and install new 6V/3.2Ah battery.

2. Check the Battery Charging Voltage;
   - Remove the battery connection terminals (Red and Black) from the battery.
   - Connect the power and turn on the scale
   - Voltage into the terminal minimum 6.5VDC

17.11 Replace Main Board



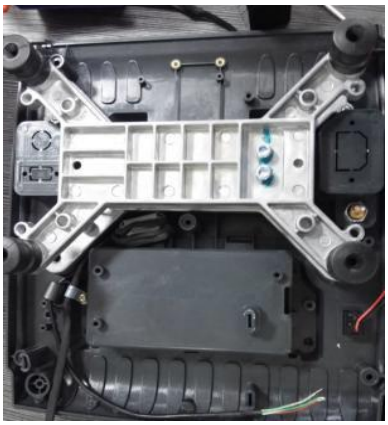
- Release 5 pcs screw from bottom of the scale by using cross screw driver.
- Open the top cover, the main board lie on bottom cover, use cross screw driver loose 3 screw for main board, pull out all connector on the main board, then you can bring out main board carefully.
- Install the new main board, plug all connector at last,After check anything，try to turn on the power，if anything is OK，close the top cover，replace main board completely.



17.12 Replace Load Cell

- Release 5 pcs screw from bottom of the scale by using cross screw driver, and remove 4 adjustable foot





- Open the top cover, use cross screw driver to release 4 pcs screw for load cell bracket,
- Pull out the connector of load cell signal cable release the screw and core for load cell signal cable. Then you can put the whole load cell bracket (with load cell) out of the scale.
- Using screw driver release 4 pcs screw for load cell.
- Install the new load cell and fix 4 pcs internal hexagon screw again (Attention: fix tight enough as you can), then solder the connector for load cell signal cable, and install the hold bracket again. After check anything, try to turn on the power and show the internal counts, if internal counts looks OK, close the top cover, change load cell completely.

17.13 Replace Battery



Remove battery cover from the scale.
bring the battery from scale, use iron solder off wire, bring new battery, use iron to solder the battery,
(Attention: red line to positive electrode, black line to minus electrode),
after check anything, plug the connector for power and try to turn on the power, if scale work correctly, replace battery completely.