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Service manual

Precision balances

KERN PNJ/PNS

Version 1.1

03/2020

GB





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Service manual

Content

1	Basic Information	- 3 -
2	Introduction	- 3 -
3	Keyboard overview	- 4 -
3.1	Overview of display	- 5 -
3.2	Removing the case	- 6 -
3.3	Attaching the case	- 7 -
4	Trouble shooting table	- 8 -
4.1	Initial inspection	- 9 -
5	Troubleshooting procedure	- 10 -
6	Inspection of electrical section (AJDP circuit board)	- 11 -
7	Adjustment	- 12 -
7.1	Adjustment with internal weight (only models PNJ)	- 12 -
7.2	Adjustment with external weight (only models PNS)	- 13 -
7.3	CALIBRATION OF BUILT-IN WEIGHT (REFCAL)	- 15 -
7.4	Resetting address data and linearity calibration	- 17 -
7.5	Resetting address data (coefficients)	- 18 -
7.5.1	Location for where to attach	- 18 -
7.5.2	How to read the data sheet	- 18 -
7.6	Linearity calibration	- 19 -
7.7	Corner Error Adjustment	- 20 -
7.8	Overload adjustment	- 22 -
8	Replacing the AJDP circuit board	- 23 -
8.1	How to remove the AJDP circuit board	- 23 -
8.2	Install the AJDP circuit board	- 25 -
9	Removing the mechanism unit	- 27 -

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!

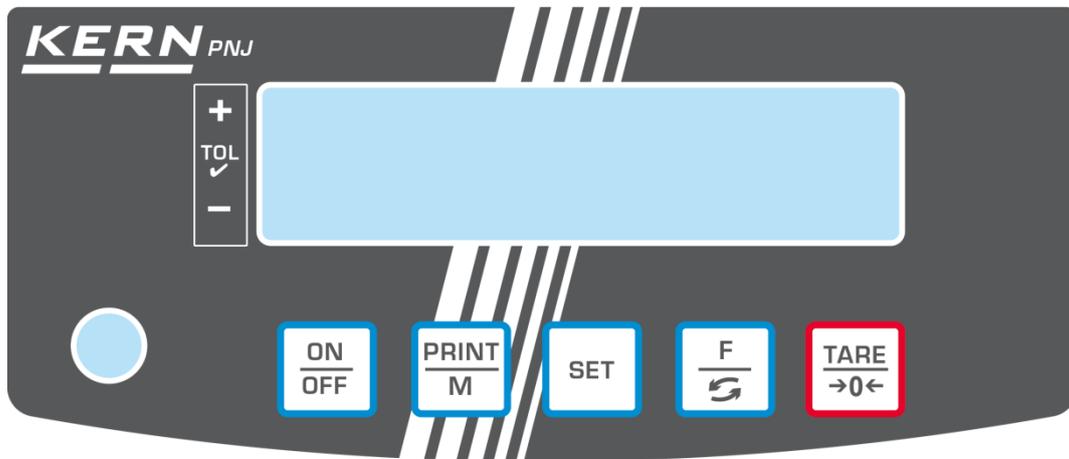
After successful repair the balance will have to be reverified before it can be used again in a statutorily regulated field.

2 Introduction

This service manual covers the PNJ/PNS 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.

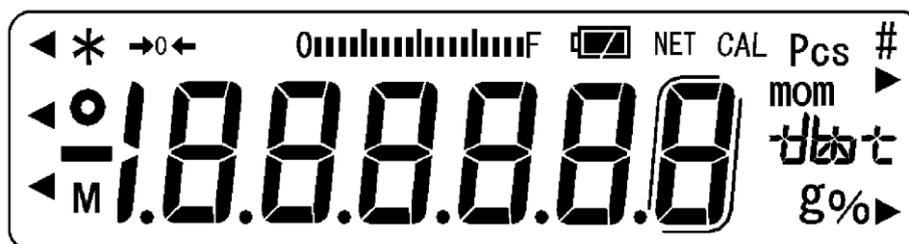
I

3 Keyboard overview



Button	Function
	➤ Turn on/off
	<ul style="list-style-type: none"> ➤ Transfer weighing data via interface ➤ Exit menu / back to weighing mode.
	➤ Save settings/back to weighing mode
	<ul style="list-style-type: none"> ➤ Switch-over weighing unit ➤ Menu access (longer pressing of the button) ➤ Scroll forward in menu
	<ul style="list-style-type: none"> ➤ Taring ➤ Zeroing ➤ Change menu settings

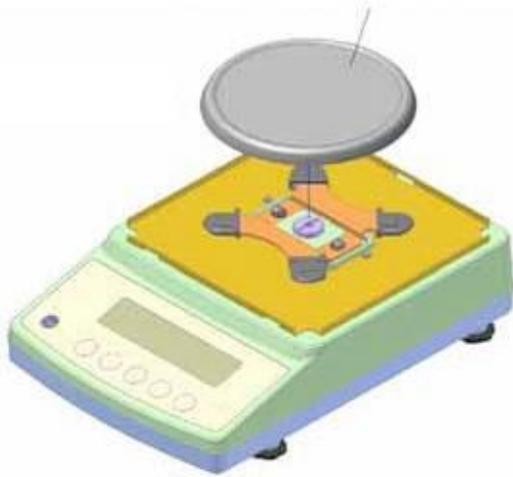
3.1 Overview of display



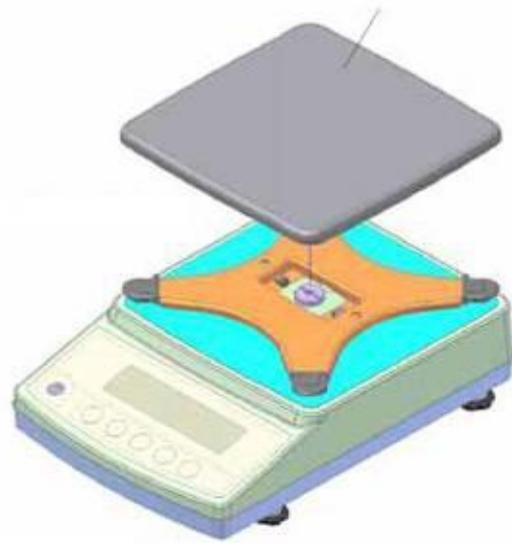
Display	Description
g	Weighing unit "gram"
→0←	Zero indicator
NET	Display net weight values
	Display of stable values
	The balance is in stand-by mode Illuminated during data transfer
Pcs	Application icon for piece counting
%	Application icon for percentage determination
◀	Tolerance mark during check weighing
(mom)	Weighing unit „Momme“
M	The balance processor is just processing a function.
CAL	Illuminates and flashes during an adjustment process
	Brackets for identifying non verified digits (only verified models)
	Capacity display The bar graph display moves from the left to the right and proceeds equally to the weight loaded onto the weighing balance. Its full width is reached at maximum load. This is an analogue display of the current allocation of the weighing area.
Units field 	[ct] (ct) Carat
	[oz] (oz) Ounze
	[lb] (lb) Pound
	[oz t] (ozt) Feinunze
	[dwt] (dwt) Penny weight
	[t] (t) Tael (Hong Kong)
	[t] upper right] (t] upper right) Tael (Singapore, Malaysia)
	[t] lower right] (t] lower right) Tael (Taiwan)
	[to] (to) Tola

3.2 Removing the case

Remove the weighing pan and the pan base.

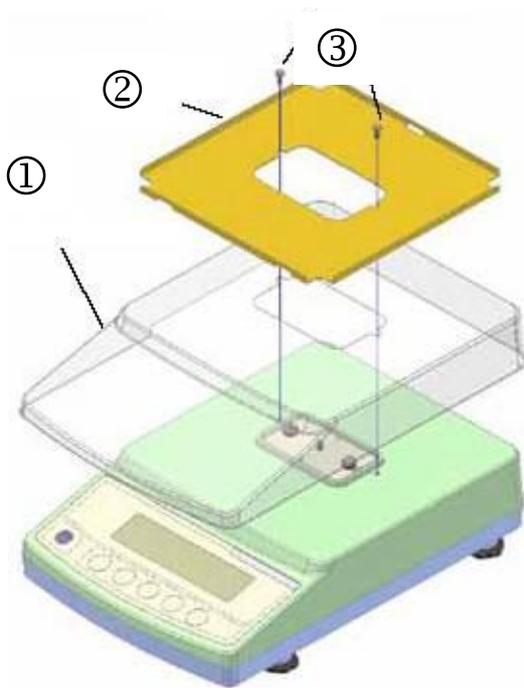


Circle pan (for capacity of 620 g or less)

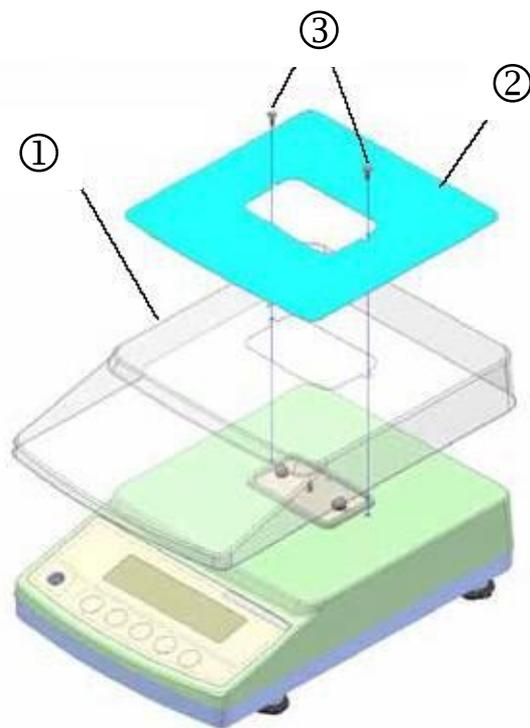


Square pan (for capacity of 1200 grams or more)

Remove the hexagon head bolts attached in two locations and then remove the protector and dust cover.



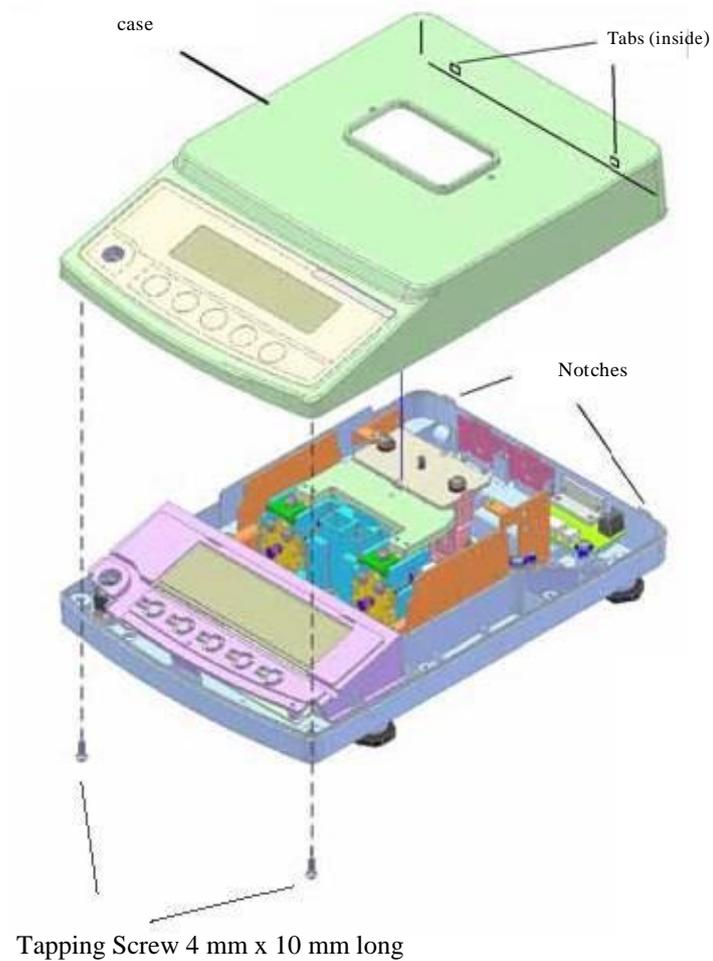
Circle pan (for capacity of 620 grams or less)



Square pan (for capacity of 1200 grams or more)

1. Dust cover
2. Protector
3. Hexagon bolts M3 x 8

Remove the tapping screws attached in two locations and then remove the case.



3.3 Attaching the case

Attach the case by performing the reverse of the procedure in "3.2.1 Removing the case."

4 Trouble shooting table

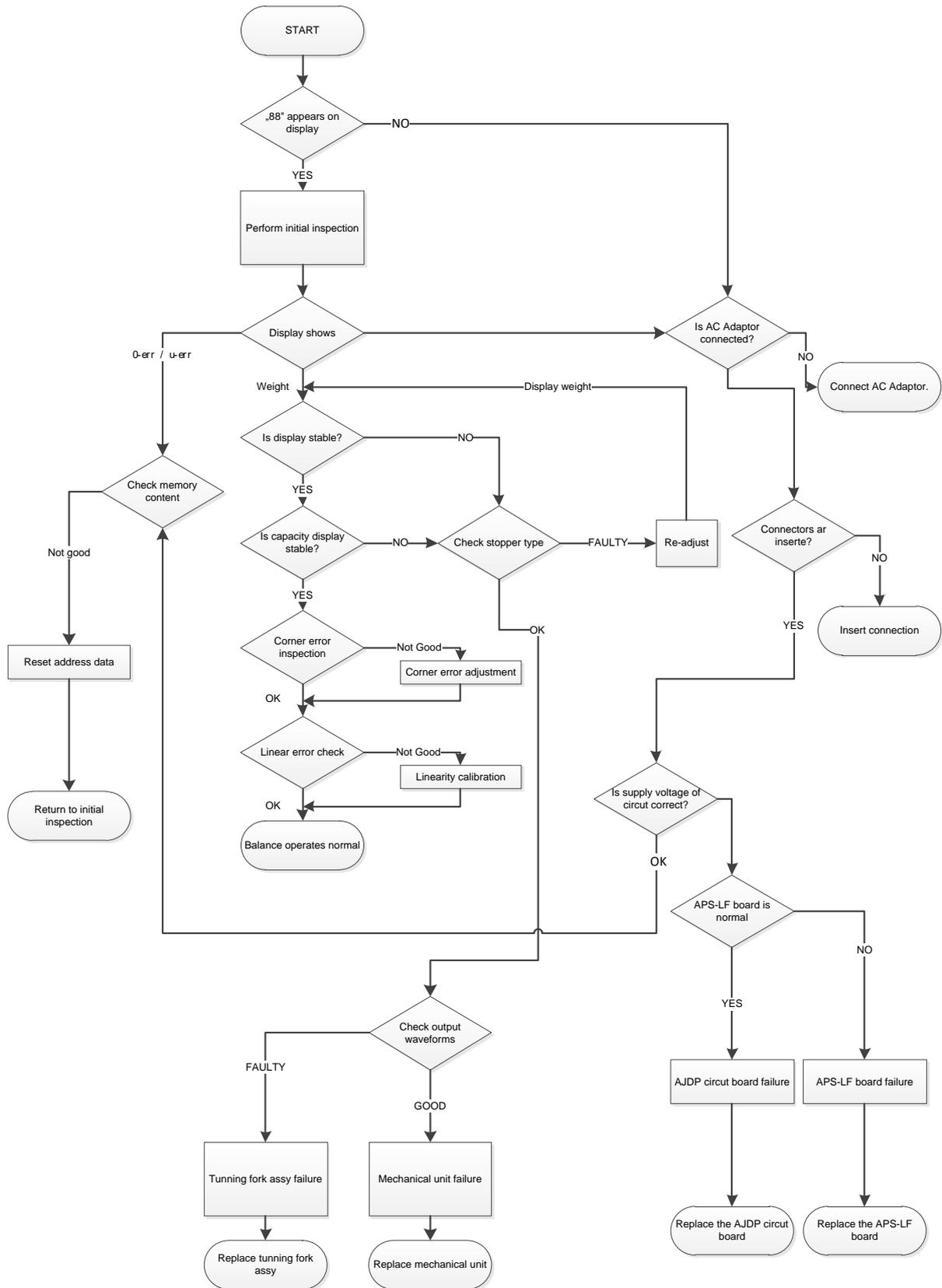
Symptom	Cause and troubleshooting	
Nothing appears on display.	<ol style="list-style-type: none"> 1. AJDP circuit board failure 2. AC adapter failure 3. Poor cable connection in scale 4. Uncharged battery 	<ol style="list-style-type: none"> 1. Replace the AJDP circuit board. 2. Replace the AC adapter. 3. Inspect inside of scale. 4. Charge the battery.
“u-Err” or “o-Err” appears after “AA---” appears.	<ol style="list-style-type: none"> 1. Use of an irregular weighing pan 2. Tuning fork assy failure or mechanical unit failure 3. AJDP circuit board failure 4. Incorrect setting of address data (During data entry) 5. Coefficient memories (address data) have changed by noises or static electricity 	<ol style="list-style-type: none"> 1. Check the weighing pan. 2. Replace the mechanical unit. 3. Replace the AJDP circuit board. 4. Check the address data. 5. Check the address data
Display value is unstable. Poor reproducibility Zero point fluctuates	<ol style="list-style-type: none"> 1. Weighing pan (pan base) is binding on something. 2. Foreign object inside scale 3. Tuning fork assy failure or mechanical unit failure 4. Effect from wind or vibration (Is the response speed too high?) 	<ol style="list-style-type: none"> 1. Check the weighing pan. 2. Inspect the inside of scale. 3. Replace the mechanical unit. 4. Reconsider the installation location and response speed.
“O-Err” appears on display before “Capacity + 9d” is reached.	<ol style="list-style-type: none"> 1. Sum of tare and weight exceeded capacity 2. Coefficient memories (address data) have changed by noises or static electricity 3. Incorrect address data setting (during data entry) 4. Span calibration utilized a weight with a large error 	<ol style="list-style-type: none"> 1. Check the tare. 2. Check the address data. 3. Check the address data. 4. Check the weight.
Span has large deviation.	<ol style="list-style-type: none"> 1. Tuning fork assy failure or mechanical unit failure 2. AJDP circuit board failure 3. Incorrect address data setting (during data entry) 4. Coefficient memories (address data) have changed by noises or static electricity 	<ol style="list-style-type: none"> 1. Replace the mechanical unit. 2. Replace the AJDP circuit board. 3. Check the address data. 4. Check the address data.
Poor linearity	<ol style="list-style-type: none"> 1. Tuning fork assy failure or mechanical unit failure 2. Incorrect address data setting (during data entry) 3. Coefficient memories (address data) have changed by noises or static electricity 4. Span calibration used a weight with a large error 	<ol style="list-style-type: none"> 1. Replace the mechanical unit. 2. Check the address data. 3. Check the address data. 4. Check the weight.

Corner error is too much	<ol style="list-style-type: none"> 1. Mechanism failure 2. The weighing pan (pan base) is binding on something. 	<ol style="list-style-type: none"> 1. Replace the mechanical unit. 2. Check installation of the weighing pan (pan base).
Display disappears during measurement.	<ol style="list-style-type: none"> 1. AJDP circuit board failure 2. AC adapter failure 	<ol style="list-style-type: none"> 1. Replace the AJDP circuit board. 2. Replace the AC adapter.
Display shows "b-Err" Display shows "d-Err"	<ol style="list-style-type: none"> 1. AJDP circuit board failure. 2. Coefficient memories (address data) have changed by noises or static electricity 	<ol style="list-style-type: none"> 1. Replace the AJDP circuit board. 2. Check the address data.
Display shows "L-Err"	<ol style="list-style-type: none"> 1. Sample weight is too light. (Number of weights; in the % (percentage weighing) mode) 	<ol style="list-style-type: none"> 1. Check the sample weight.
Display shows "I-Err"	<ol style="list-style-type: none"> 1. Balance weight was lighter than 50% of capacity during span calibration. 	<ol style="list-style-type: none"> 1. Check the balance weight.
Display shows "2-Err"	<ol style="list-style-type: none"> 1. Error exceeding 1% occurring in span calibration 	<ol style="list-style-type: none"> 1. Check the error.

4.1 Initial inspection

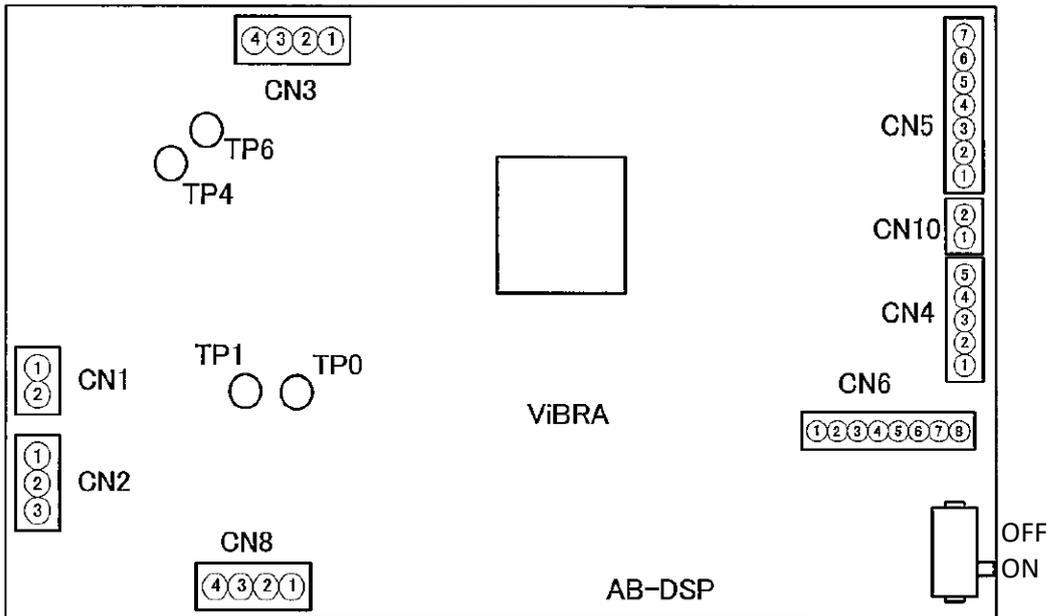
1. Check that no wind or vibration affects the scale.
2. Check that the pan base and the weighing pan are properly installed.
3. Check that there are no foreign objects below the weighing pan (pan base).
4. Check that a regular weighing pan is used.
5. Check that the stand on which the scale is placed is stable.
6. Check that the scale is level.
7. Check that an AC adapter is connected.
8. Check that the battery is sufficiently charged (in the battery option).

5 Troubleshooting procedure



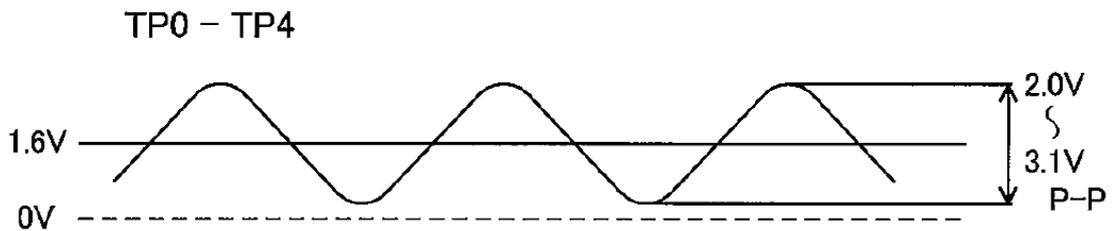
6 Inspection of electrical section (AJDP circuit board)

During inspection of the electrical section, remove the AJDP circuit board and check the board and check at CN1, CN4, TP4, and TP6.



1. Check the supply voltage
 - ① of TP0-CN1: +5.7 to +6.3 V
2. Check supply voltage within the circuit
 - ② of TP0-CN4: +4.75 to +5.25 V
 - TP 0 to TP 1: +3.0V ~ +3.6V

2. Check the signal waveform



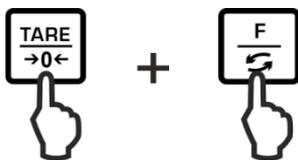
7 Adjustment

7.1 Adjustment with internal weight (only models PNJ)

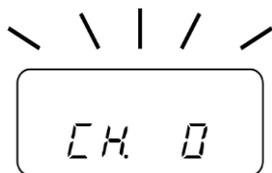
The internal adjustment weight is available at all times for starting adjustment via keyboard stroke.



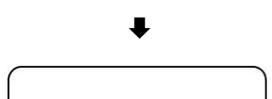
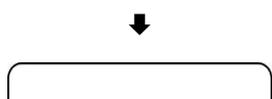
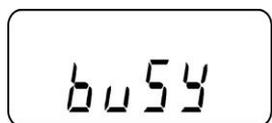
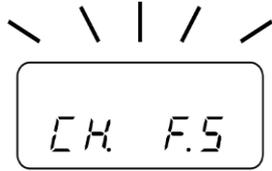
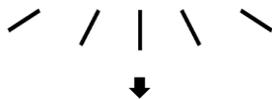
Press the **F**-key and keep pressed until „Aut.CAL“ is displayed.



With pressed **TARE** key, press the **F**-key, then release both keys at the same time.



The motor noise of the loading system for the internal adjustment weight can be heard, the internal adjustment is started.



After successful adjustment the balance automatically returns to weighing mode.

In case of an adjustment error (e.g. objects on the weighing pan) the display will show an error message, repeat adjustment.

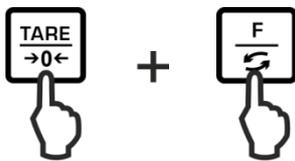
The adjustment protocol output is started upon connection to an optional printer and activated GLP function (see chap. Fehler! Verweisquelle konnte nicht gefunden werden.).

7.2 Adjustment with external weight (only models PNS)

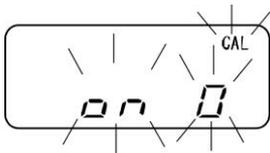
Carry out adjustment as near as possible to the balance's maximum weight (recommended adjustment weight see chap. 1). Info about adjustment weights can be found in the manual for the scale chapter 1



Press the **F**-key and keep pressed until „CAL“ is displayed.



With pressed **TARE key**, press the **F**-key, then release both keys at the same time.



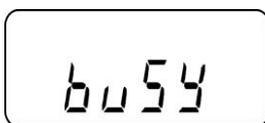
Ensure that there are no objects on the weighing pan.



With display „on FS“ place the required adjustment weight carefully in the center of the weighing pan.



The adjustment process is started.



After successful adjustment the balance automatically returns to weighing mode.



In case of an adjustment error (e.g. objects on the weighing pan) the display will show an error message, repeat adjustment.

example



Take away adjustment weight.

- Observe stable environmental conditions. Stabilisation requires a certain warm-up time.
- Ensure that there are no objects on the weighing pan.
- When the **PRINT**-key is pressed during the adjusting procedure, [STOP] will be displayed and adjustment interrupted. The balance returns to weighing mode.
- At the models with internal adjustment weight (KERN PNJ) the adjustment with external weight is not possible.
- The following error messages may be displayed during adjustment.

1-Err Wrong adjustment weight (< 50% max)

2-Err Divergence last external adjustment > 1%

3-Err Weighing pan loaded

4-Err Divergence from last internal adjustment > 1%

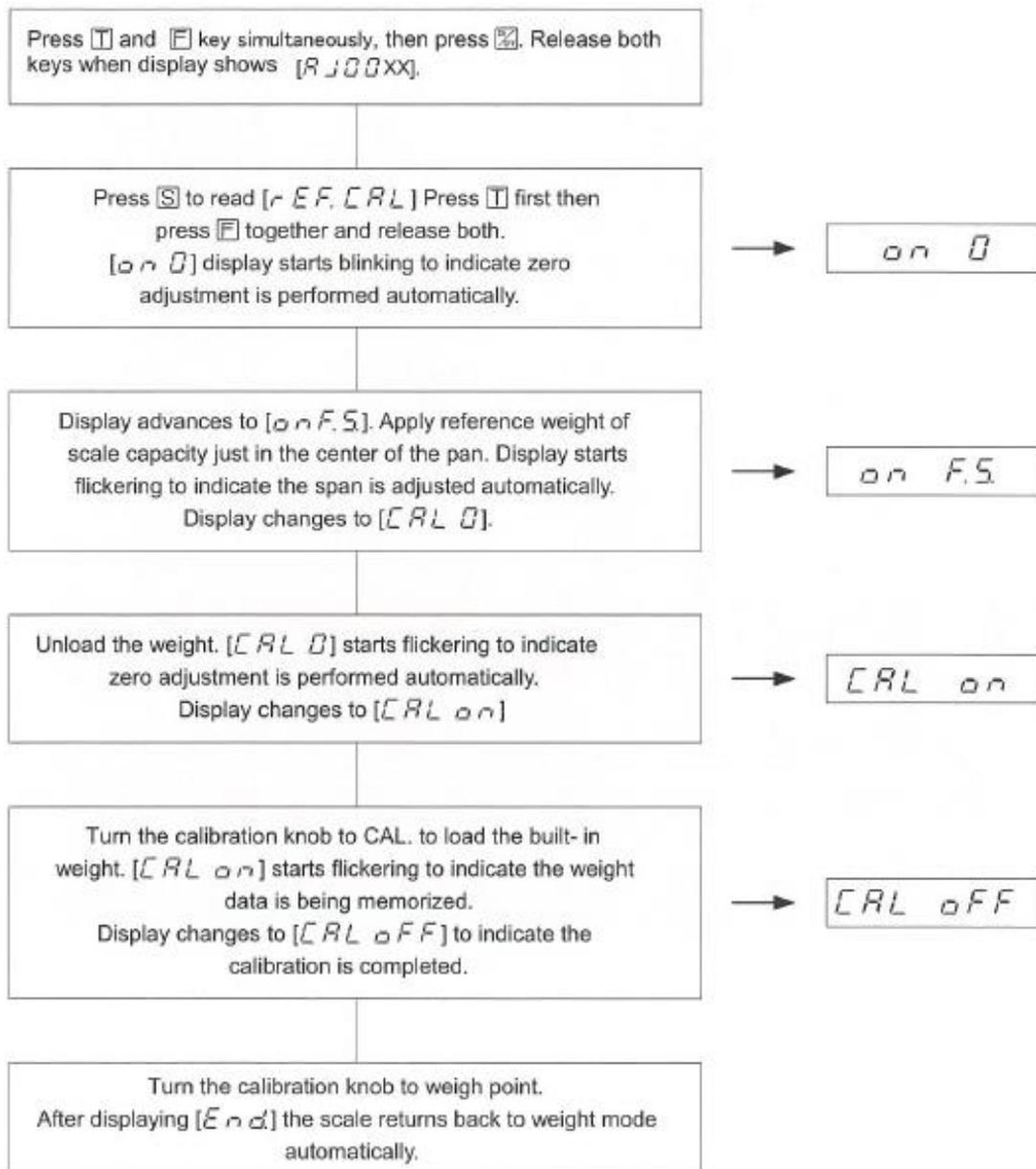
A-Err Internal adjustment automatics defective

Err 710 Instable environmental conditions

7.3 CALIBRATION OF BUILT-IN WEIGHT (REFCAL) - AJ(H)-CE TYPE -

- Following does not describe the procedure of ordinary span adjustment.
- This is the procedure of Calibration of the built-in weight of AJH-CE scales.
- It is necessary to adjust the linearity of the scale beforehand. Refer to 4-6.
- **The scale must be set to the non-verifiable mode.**

※  = 「Function」 key
 = 「Zero/Tare」 key
 = 「Set」
 = 「On/Off」 key

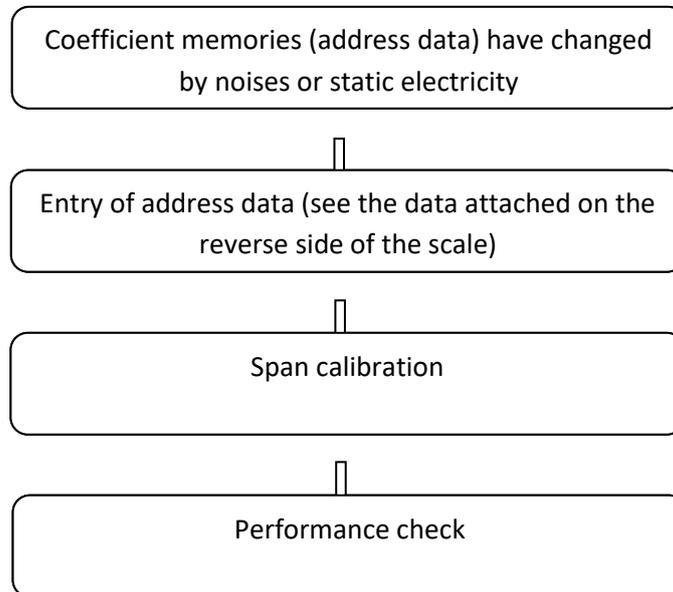


CAUTIONS

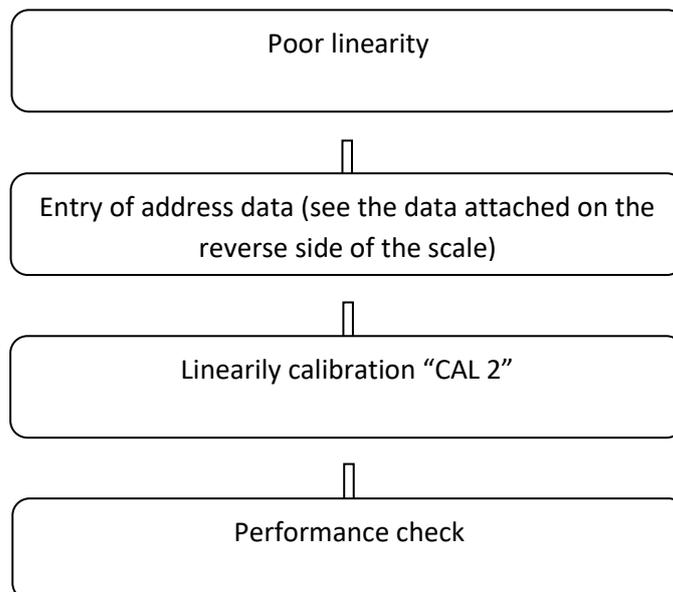
- (1) [r E F. C R L] must be carried out in following cases:
 - ① When built-in weight is added or replaced.
 - ② When linearity adjustment is done.
 - ③ When AJDP PCB is replaced.
- (2) The quality/tolerance of the reference weight determine the accuracy of the scale. Use weights of higher accuracy than the scale.
- (3) Adjust the level beforehand. The REF CAL must be done in a good environment, no wind, no oscillation, and no temperature changes.
- (4) $1 - E r r$: The reference weight is less than 1/2 of F.S.
 $2 - E r r$: The data error exceeds 1%. Adjust the linearity

7.4 Resetting address data and linearity calibration

Procedure for address data correction



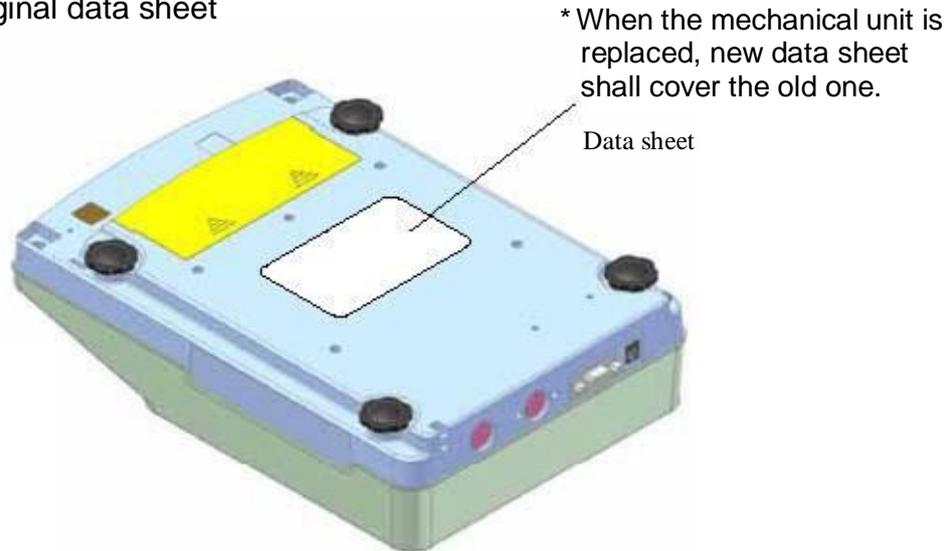
Procedure for linearity calibration



7.5 Resetting address data (coefficients)

If accurate address data is lost due to replacing the AJDP circuit board and phenomena such as static electricity, then follow the procedure below to re-set the address data.

7.5.1 Location for where to attach the original data sheet



7.5.2 How to read the data sheet

Tuning fork No.	Program No.	
S=K12N0016 P=AJ504 2294		
00-9A	23, 43, 98, 43, 75, 9B, 27, 63, 19	Address from the left: 00 to 09
0A-12	99, 27, 74, 18, 43, 20, 18, 32, 10	Address from the left: 0A to 13
14-85	22, 17, 11, 97, 88, 18, 8D, 59, 14	Address from the left: 14 to 1D
1E-22	80, 84, 75, 89, 22, 16, 20, 20, 00	Address from the left: 1E to 27
28-00	00, 20, 10, 00, 00, 00, 5F, 0C, 30	Address from the left: 28 to 31
32-09	01, 00, 00, 08, 02, FF, 1C, 0B, 14	Address from the left: 32 to 3B
3C-53	0A, 00, 00, 00, 00, 00, 00, 00, 00	Address from the left: 3C to 45
46-00	00, 00, 00, 00, 00, 00, 00, 00, 00	Address from the left: 46 to 4F
50-01	00, 00, 00, 00, 00, 00, 00, 00, 00	Address from the left: 50 to 59
5A-00	00, 00, 00, 00, 43	Address from the left: 5A to 5E

Changing the entered data only at KERN possible.

7.6 Linearity calibration

To enter the service mode (verified scale) you have to slide the switch on the PCB in the On position.

No.	Action	Result / display
1	While holding down  and  , press ON to turn on the display.	
2	Release the keys	Calibration mode
3	When the scale after a brief wait shifts to weighing mode, hold down  until the display shows.	FUNC
4	Hold F until	CAL2
5	With a empty weighing pan, press first  and  together and release both	On 0
6	on 0 starts blinking	Zero point calibration
7	Follow the steps at the display	On 1 to on 4
8	After busy appears, the scale shifts to the weighing mode	
9	Turn off the scale	
10	Turn on.	Weighing mode

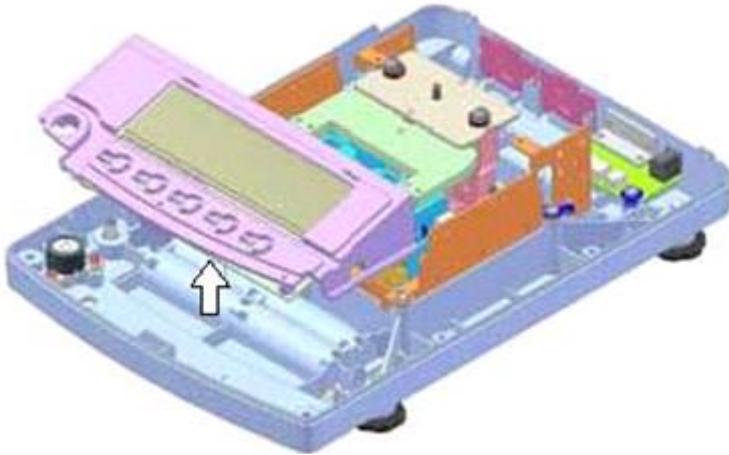
Setting the cumulative weight table for linearity adjustment

(): Cumulative total of weights on the scale

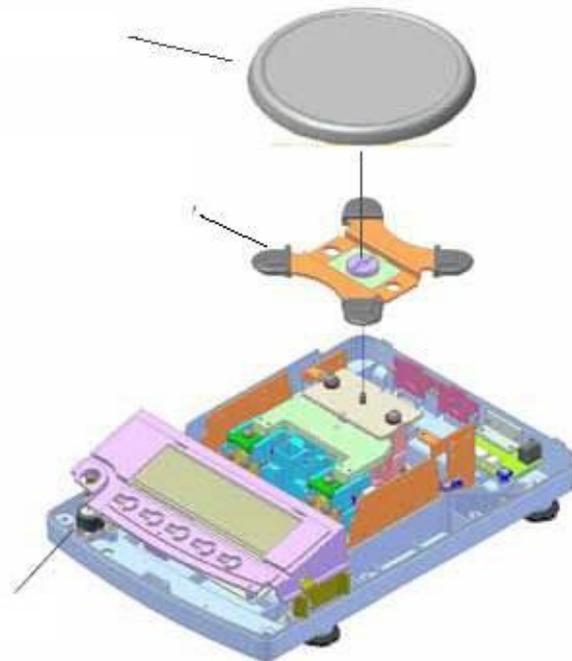
Capacity \ Display	620 g	3200 g	12000 g
on 0	0 g (0 g)	0 g (0 g)	0 g (0 g)
on 1	150 g (150 g)	500 g (500 g)	3 kg (3 kg)
on 2	150 g (300 g)	1000 g (1500 g)	3 kg (6 kg)
on 3	150 g (450 g)	1000 g (2500 g)	3 kg (9 kg)
on 4	170 g (620 g)	700 g (3200 g)	3 kg (12 kg)
Used Weights	100 g x 4 50 g x 4 20 g x 1	1000 g x 2 500 g x 2 200 g x 1	2 kg x 4 1 kg x 4

7.7 Corner Error Adjustment

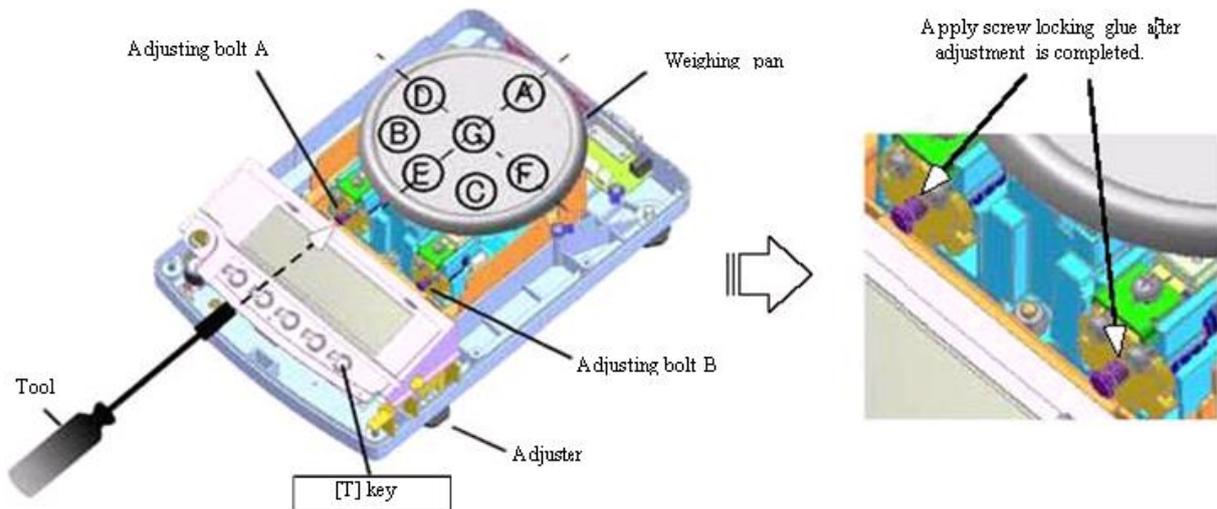
Remove the case and remove the boarder holder assy



Reattach the weighing pan and the pan base and then use the adjuster to make them level.



Turn the adjusting bolts to adjust the corner error referring to following illustrations.
 (After adjustment, apply screw locking glue to the adjusting bolts.)



Description

- ⊕ : Indicates a positive value
- ⊖ : Indicates a negative value
- ⌚ : Turn the adjusting bolt clockwise.
- ⌚ : Turn the adjusting bolt counterclockwise.

Corner placement error a adjustment table (1) Adjusting bolt A Adjusting bolt B

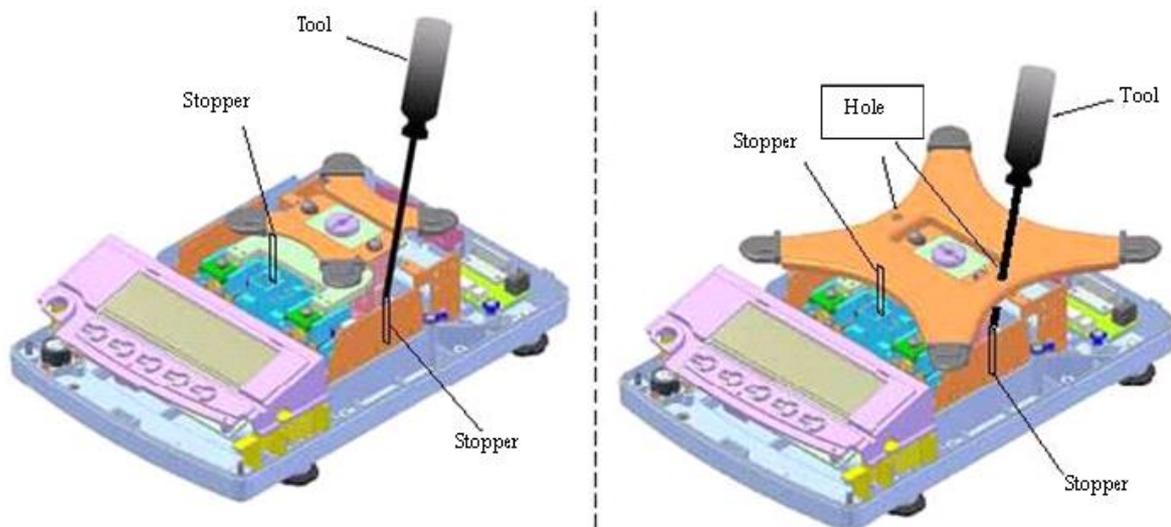
(1)	(2)	(3)	(4)

Corner placement error a adjustment table (2)

(1)	(2)	(3)	(4)
(5)	(6)	(7)	(8)

7.8 Overload adjustment

1. Remove the case and the board holder assy
Set the scale to factory adjustment mode.
2. Hold down the  until "CAL 2" is displayed.
3. While pressing the  key, press the  and then release both keys. The display changes from "on 0" (blinking) to "on 1." Then, place a weight equivalent to the capacity on the pan base assy.
4. After the display changes from "on 1" (blinking) to "on 2," press the  to set the scale to the weight display mode.
5. Place a weight equivalent to the stopper setting weight on each pan base assy and then bring the right and left stoppers into slight contact. In the stopper adjustment, use a tool to access the stoppers from the side of the pan base when a circle pan (for capacity of 620 grams or less) is used, or through holes in the pan base when a square pan (for capacity of 1200 grams or more) is used.
6. The weight may be moved slightly to adjust it so that it will not block the pan base holes.
7. Adjustment is acceptable when indication is 5 to 50 grams lower than the setting weight or when the stoppers come into contact before the upper weight is reached.

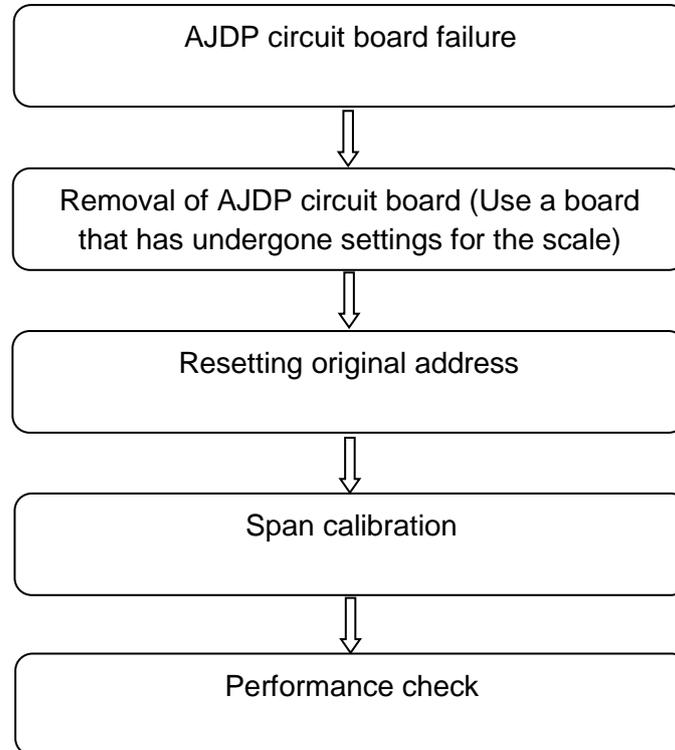


Stopper adjustment range

Capacity	Stopper setting weight	Upper weight (additional weight)
620 g	1000 g	1100 g (100 g)
1200 g	4200 g	4700 g (500 g)
12 kg	16 kg	17 kg (1 kg)

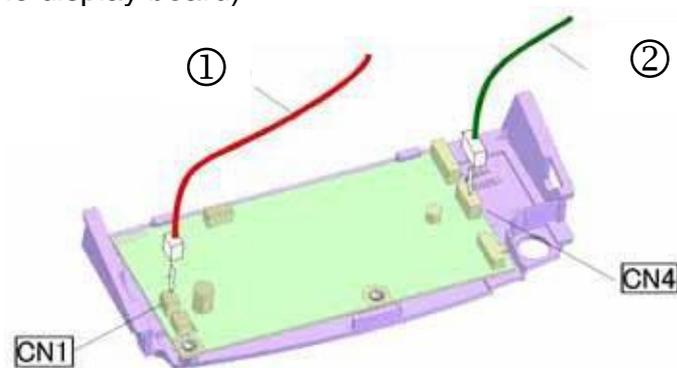
8 Replacing the AJDP circuit board

Only at KERN possible.



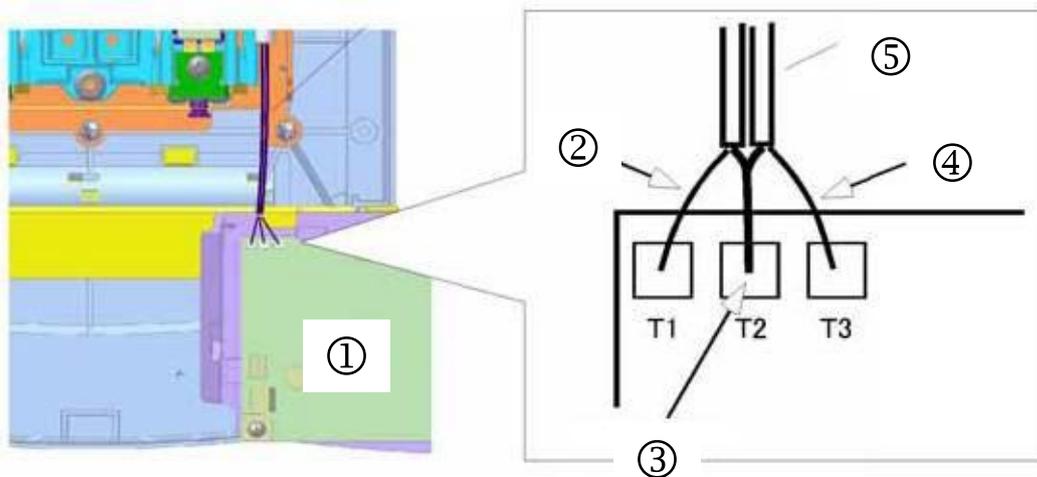
8.1 How to remove the AJDP circuit board

- Remove the case
- Flip the board holder assy over (be careful not to damage the liquid crystal surface of the display board)



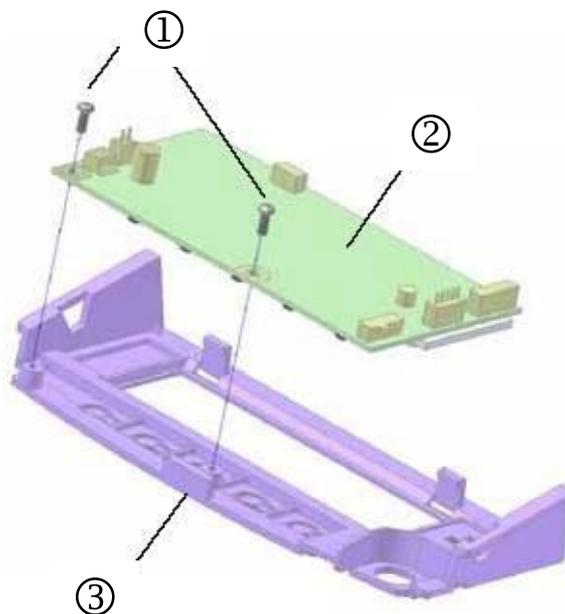
- ① LF board cable
- ② IF board cable

Remove the tuning fork cable soldered onto the AJDP circuit board



- ② AJDP circuit board
- ② White wire
- ③ Shield wire
- ④ Black wire
- ⑤ Tuning fork cable

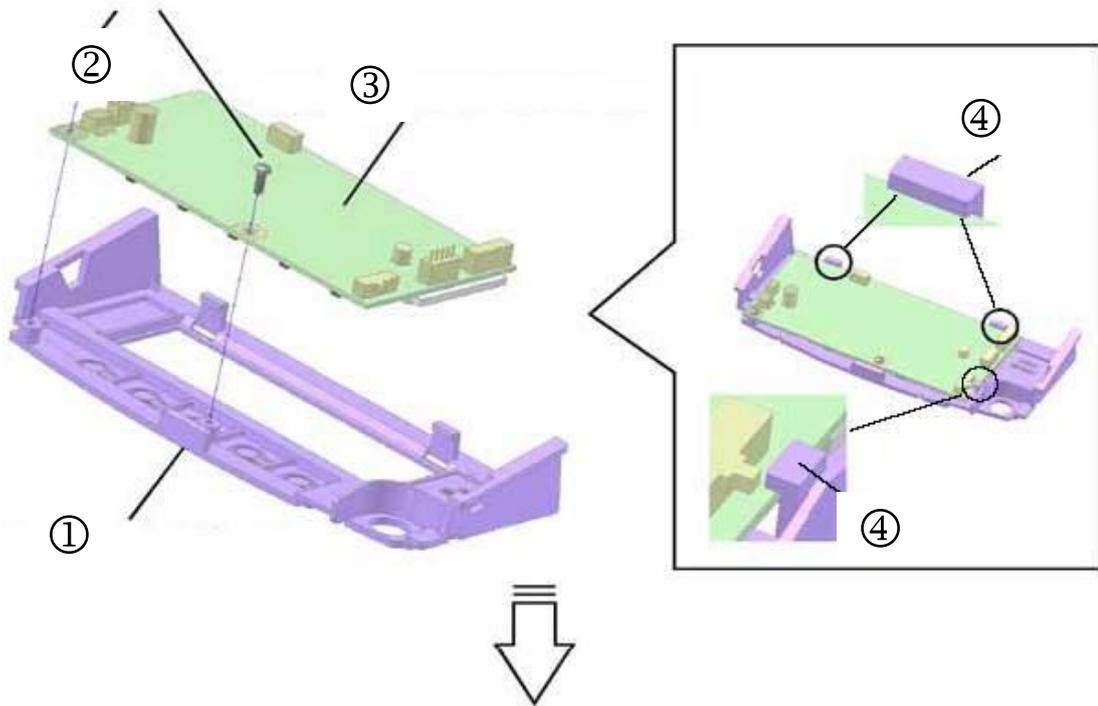
Remove the two tapping screws and then remove the AJDP circuit board from the board holder.



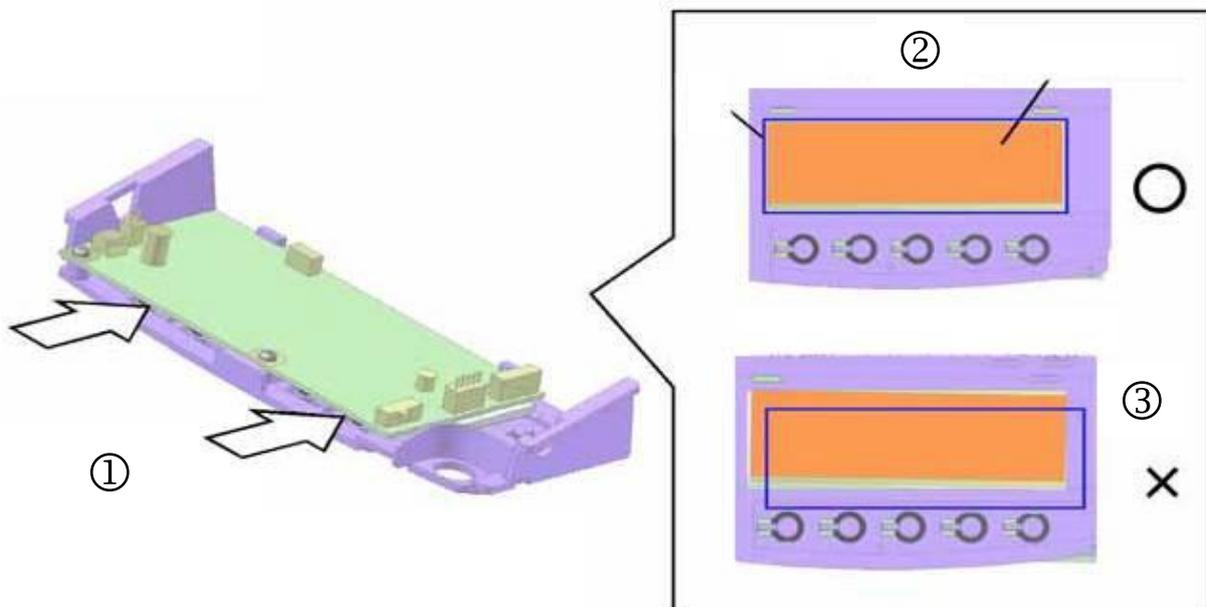
- ① Tapping screws (3mm x 8)
- ② AJDP circuit board
- ③ Board holder

8.2 Install the AJDP circuit board

Install the AJDP circuit board in the board holder.

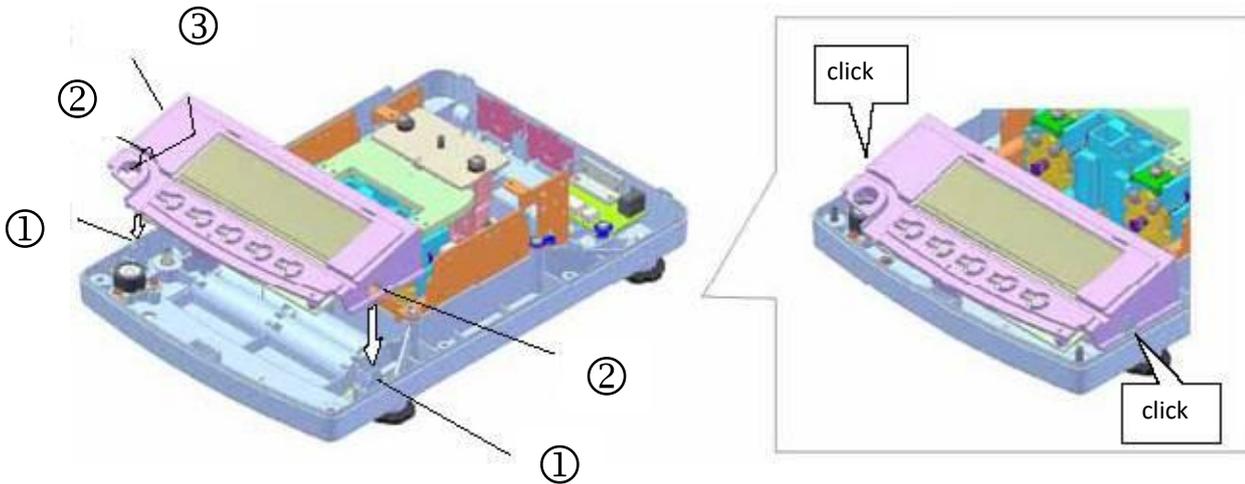


- ① Board holder assy
- ② Tapping screw 3 mm x 8
- ③ AJDO board assy
- ④ Projections



- ① Perform final tightening while holding down the board
- ② The LCD and the window are parallel
- ③ The LCD and the window are not parallel

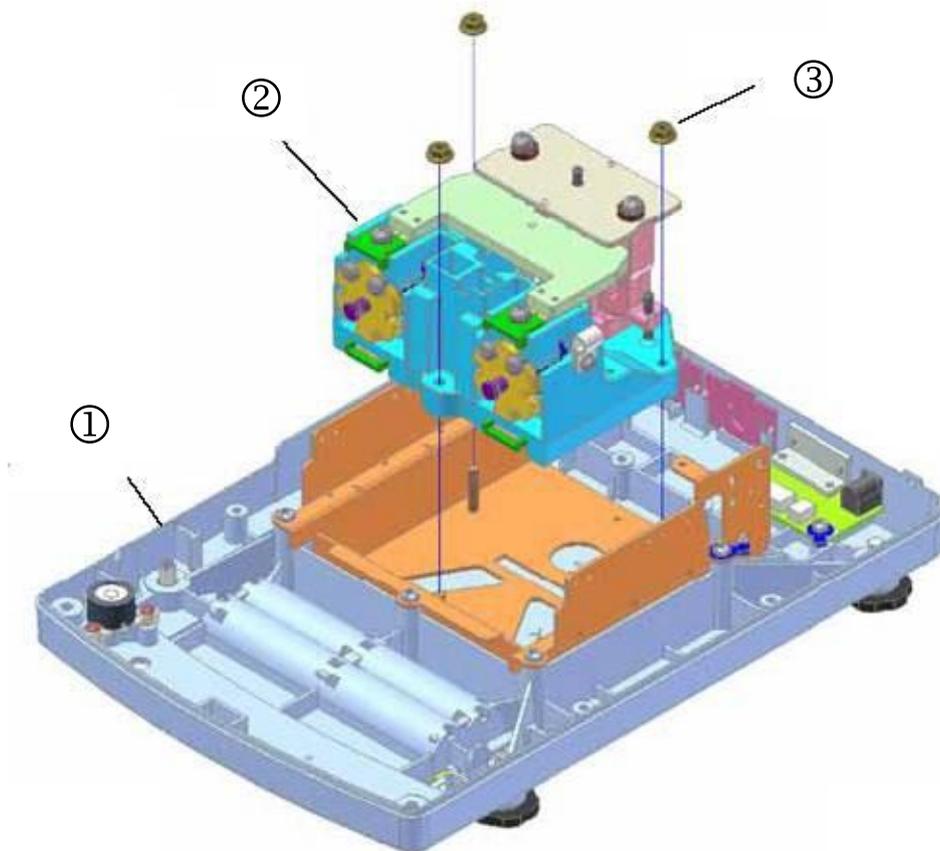
1. Flip the board holder assy over (During this task be careful not to damage the liquid crystal surface of the display board.)
2. Solder the tuning fork assy cable onto the AJDP circuit board.
3. Connect the cables to CN1 and CN4 on the AJDP circuit board.
4. Fix the board holder assy on the chassis in place (Insert the chassis tabs into the notches of the board holder assy). During this task be careful not to let the cables get caught between the notches and the tabs.



- ① Tab
- ② Notch
- ③ Board holder assy

9 Removing the mechanism unit

1. Remove the case and then remove the AJDP circuit board
2. Remove M4 conical nuts attached at four locations and then remove the mechanism unit assy from the mechanical unit base of the chassis assy.



- ① Chassis assy
- ② Mechanism unit assy
- ③ Conical nut

To install the mechanical nut perform the reverse of the procedure to removing it.