



Valor™ 1000 Series Service Manual

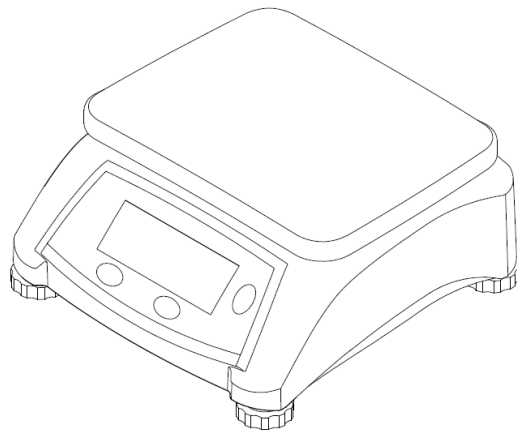


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1 GETTING STARTED

1.1 Introduction

This service manual contains the information needed to perform routine maintenance and service on the Ohaus Valor 1000 Series scales. Familiarity with the balance's Instruction Manual is assumed. The contents of this manual are contained in five chapters:

Chapter 1 Getting Started – Contains information on service facilities, tools and test equipment, specifications, and the mechanical and electronic functions of the scale.

Chapter 2 Troubleshooting – Contains a diagnostic guide and error code table.

Chapter 3 Maintenance Procedures – Contains preventive maintenance procedures and disassembly, repair and replacement procedures.

Chapter 4 Testing – Contains a list of required test masses, an operational test, segment display test, performance tests and adjustments.

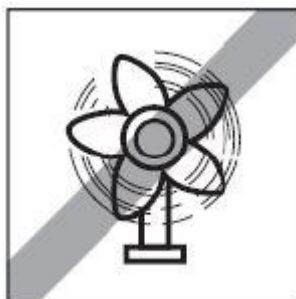
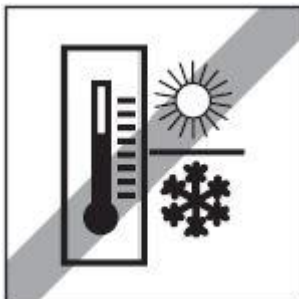
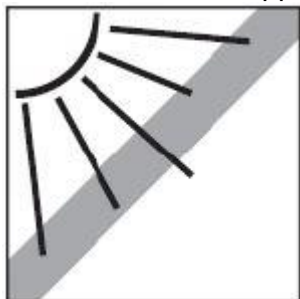
Chapter 5 Drawings and Parts Lists – Contains exploded views of Valor 1000 scales identifying all serviceable components.

Appendix A Standard Calibration – Explains procedures for Standard Calibration, performed prior to using a scale, and after service.

1.2 Service Facilities

To service a balance, the service area should meet the following requirements:

- Should be temperature controlled and meet scale specifications for temperature environmental requirements.
- Must be free of vibrations such as fork lift trucks close by, large motors, air currents or drafts from air conditioning/heating ducts, open windows, people walking by, fans, etc.
- Area must be clean and free of excessive dust.
- Work surface must be stable and level.
- Scale must not be exposed to direct sunlight or radiating heat sources.
- Use an approved Electro-Static Device



1.3 Technical Data

- Equipment Ratings: Indoor use only
- Altitude: 2000m
- Operating temperature: 0 to 40°C
- Humidity: Maximum relative humidity 80% for temperatures up to 31 °C decreasing linearly to 50% relative humidity at 40°C.
- Electrical supply: 12VDC, 0.5A. For use with certified or approved power supply, which must have a SELV and limited energy circuit output.
- Voltage fluctuations: Mains supply voltage fluctuations up to $\pm 10\%$ of the nominal voltage.
- Overvoltage category (Installation category): II
- Pollution degree: 2

1.4 Tools and Test Equipment Required

- Common hand tools
- Standard electronics tool kit

1.5 Specification

Specifications for the Ohaus Valor 1000 Series scales are listed in Table 1-1, Table 1-2 and Table 1-3. When a scale has been serviced, it must meet the specifications listed in the table. Before servicing the scale, determine what specifications are not met.

TABLE 1-1. SPECIFICATIONS – NON-APPROVED MODELS

Model*	V12P3	V12P6	V12P15	V12P30
Capacity x Readability (Max x d non-approved)	6 lb x 0.001 lb 3 kg x 0.0005 kg 3,000 g x 0.5 g 96 oz x 0.02 oz 6 lb x 0.02 oz	15 lb x 0.002 lb 6 kg x 0.001 kg 6,000 g x 1 g 240 oz x 0.5 oz 15 lb x 0.5 oz	30 lb x 0.005 lb 15 kg x 0.002 kg 15,000 g x 2 g 480 oz x 0.1 oz 30 lb x 0.1 oz	60 lb x 0.01 lb 30 kg x 0.005 kg 30,000 g x 5 g 960 oz x 0.2 oz 60 lb x 0.2 oz
Maximum Displayed Resolution	1:6,000	1:6,000	1:7,500	1:6,000
Repeatability	0.001 kg	0.002 kg	0.005 kg	0.01 kg
Linearity	± 0.001 kg	± 0.002 kg	± 0.005 kg	± 0.01 kg
Weighing Units	g, kg, lb, oz, lb:oz			
Application Mode	Weighing			
Tare Range	To capacity by subtraction			
Stabilization Time	≤ 2 seconds			
Power requirements**	4 x D cell Alkaline battery, AC adapter or rechargeable battery			
Calibration	Digital with external weight			
Typical Battery Life	1500 hours with backlight turned off			
Construction	ABS plastic housing, stainless steel pan			
Safe Overload	150% of capacity			
Specified Temperature Range	32 to 104° F / 0 to 40 °C			
Display Type	Single display, LCD with white backlight			
Display Size	1.0 in / 25.4 mm			

Pan Size	9.65 x 7.48 in / 245 x 190 mm
Scale Dimensions (W x D x H)	10.2 x 10.6 x 4.8 in / 260 x 270 x 122 mm
Shipping Dimensions (W x D x H)	12.6 x 12.6 x 6.9 in / 319 x319 x175 mm
Net Weight	5.5 lb / 2.5 kg
Shipping Weight	6.8 lb / 3.1 kg

TABLE 1-2. SPECIFICATIONS – APPROVED MODELS

Model	V12P2T	V12P5T	V12P10T	V12P20T
Capacity x Readability (Max x d non-approved)	5 lb x 0.0005 lb 2 kg x 0.0002 kg 2,000 g x 0.2 g 80 oz x 0.01 oz	10 lb x 0.001 lb 5 kg x 0.0005 kg 5,000 g x 0.5 g 160 oz x 0.02 oz	20 lb x 0.002 lb 10 kg x 0.001 kg 10,000 g x 1 g 320 oz x 0.05 oz	50 lb x 0.005 lb 20 kg x 0.002 kg 20,000 g x 2 g 800 oz x 0.1 oz
Maximum Displayed Resolution	1:10,000	1:10,000	1:10,000	1:10,000
Certified Capacity x Readability (Max x e approved)	5 lb x 0.002 lb 2 kg x 0.001 kg 2,000 g x 1 g 80 oz x 0.05 oz	10 lb x 0.005 lb 5 kg x 0.002 kg 5,000 g x 2 g 160 oz x 0.1 oz	20 lb x 0.01 lb 10 kg x 0.005 kg 10,000 g x 5 g 320 oz x 0.2 oz	50 lb x 0.02 lb 20 kg x 0.01 kg 20,000 g x 10 g 800 oz x 0.5 oz
Approved Resolution	1:2,000	1:2,500	1:2,000	1:2,000
Repeatability	0.001 kg	0.002 kg	0.005 kg	0.01 kg
Linearity	±0.001 kg	±0.002 kg	±0.005 kg	±0.01 kg
Class	Class III NTEP / Measurement Canada			
Weighing Units	g, kg, lb, oz			
Application Mode	Weighing			
Tare Range	To capacity by subtraction			
Stabilization Time	≤2 seconds			
Power requirements	4 x Alkaline battery (not included) or AC adapter (included)			
Calibration	Digital with external weight			
Typical Battery Life	750 hours			
Construction	ABS plastic housing, stainless steel pan, in-use cover			
Safe Overload	150% of capacity			
Communication	Optional RS232			
Specified Temperature Range	32 to 104° F / 0 to 40 °C			
Display Type	LCD (front and back of scale) with white backlight			
Display Size	1.0 in / 25.4mm			
Pan Size	9.65 x 7.48 in / 245 x 190 mm			
Scale Dimensions (W x D x H)	10.2 x 10.6 x 4.8 in / 260 x 270 x 122 mm			
Shipping Dimensions (W x D x H)	12.6 x 12.6 x 6.9 in / 319 x319 x175 mm			
Net Weight	5.5 lb / 2.5 kg			
Shipping Weight	6.8 lb / 3.1kg			

TABLE 1-3. SPECIFICATIONS – APPROVED MODELS

Model	V12P3T	V12P6T	V12P15T	V12P30T
Capacity x Readability (Max x d non-approved)	3 kg x 0.0002 kg 3000 g x 0.2 g	6 kg x 0.0005 kg 6000 g x 0.5 g	15 kg x 0.001 kg 15000 g x 1 g	30 kg x 0.002 kg 30000 g x 2 g
Maximum Displayed Resolution (d)	1:15,000	1:12,000	1:15,000	1:15,000
Model	V12P3T-M	V12P6T-M	V12P15T-M	V12P30T-M
Capacity x Readability (Max x e approved)	3 kg x 0.001kg 3000 g x 1 g	6 kg x 0.002 kg 6000 g x 2 g	15 kg x 0.005 kg 15000 g x 5 g	30 kg x 0.01 kg 30000 g x 10 g
Approved Resolution	1:3,000	1:3,000	1:3,000	1:3,000
Repeatability	0.001 kg	0.002 kg	0.005 kg	0.01 kg
Linearity	±0.001 kg	±0.002 kg	±0.005 kg	±0.01 kg
Weighing Units	g, kg			
Application Mode	Weighing			
Tare Range	To capacity by subtraction			
Stabilization Time	≤2 seconds			
Power requirements	4 x Alkaline battery (included), AC adapter (optional) or rechargeable battery (optional)			
Calibration	Digital with external weight			
Typical Battery Life	750 hours			
Construction	ABS plastic housing, stainless steel pan			
Safe Overload	150% of capacity			
Communication	Optional RS232			
Specified Temperature Range	0 to 40 °C			
Display Type	LCD (front and back of scale) with white backlight			
Display Size	25.4mm			
Pan Size	245 x 190 mm			
Scale Dimensions (W x D x H)	260 x 270 x 122 mm			
Shipping Dimensions (W x D x H)	319 x319 x175 mm			
Net Weight	2.5 kg			
Shipping Weight	3.1 kg			

Special Note regarding Approved models:

The specifications for the approved scales below are only for initial testing. These scales must be tested according to the requirements of the local Weights and Measures authority. Before returning the scale to service an approved representative of the local Weights and Measures authority must certify the scale.

1.6 Controls

1.6.1 Overview of the Controls

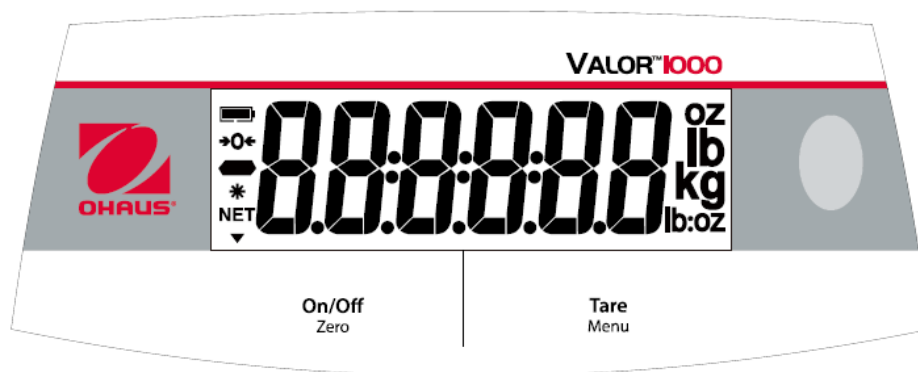


TABLE 1-4 CONTROL FUNCTIONS

Button	Functions
On/Off Zero	Press (when off): Turns the scale on Short Press (when on): Sets display to zero Long Press (when on): Turns the scale off Press (in Menu): Confirm (Enter)
Tare Menu	Short Press: Enters / clears a Tare value Long Press: Enters User Menu Press (in Menu): Changes menu selections (Forward)

1.6.2 Main Application Screen

- 1 _____
- 2 _____
- 3 _____
- 4 _____
- 5 _____



Item	Description
1	Battery charge symbol
2	Center of Zero symbol
3	Negative symbol
4	Stable weight symbol
5	NET symbol

1.6.3 Turning Scale On/Off

Press **On/Off** to turn the scale on. The scale will find and set the zero weight point automatically after it displays the software version.
In weighing mode, short press **On/Off** for more than 3 seconds to turn the scale off.

1.6.4 Weighing

Once the scale has a stable zero weight and the tare weight of any packaging or container has been captured, place the product being weighed on the platform -- the display will show the weight of the product in the selected unit of measure.

1.7 Legal for Trade (LFT)

When the scale is used in trade or a legally controlled application, it must be set up, verified and sealed in accordance with local weights and measures regulations. It is the responsibility of the purchaser to ensure that all pertinent legal requirements are met. As the requirements vary by jurisdiction, the purchaser is advised to contact their local weights and measures office for instructions about putting the scale into service.

1.7.1 Settings

Before verification and sealing, perform the following steps:

1. Confirm that the selected unit of measure is permitted by the local weights and measures regulations.
2. Perform a calibration refer to user manual in Section 4.1.
3. Set the position of the security switch as shown in Section 1.7.3.

1.7.2 Verification

A weights and measures official must perform the verification procedure. Contact the local weights and measures office for more information.

1.7.3 Sealing

A LFT switch under the sealing cover is used to secure the menu settings. When the switch is pressed, the menu settings may be viewed but not changed. This sealing cover is located at the bottom of the scale. Remove the sealing cover with a screwdriver and then press the switch when the scale is powered on. After that you will see "LFT .00" is displayed on the screen.



LFT switch cover



LFT switch

After the scale has been verified, it must be sealed by the weights and measures official to prevent undetected access to the legally controlled settings. Refer to the illustrations below for the sealing.



Wire Sealing

2 DIAGNOSTIC GUIDE

This section of the manual contains troubleshooting information. Information is contained to isolate specific problems using Table 2-2, Diagnostic Guide. Follow all directions step by step. Make certain that the work area is clean. Handle balance components with care. Use appropriate electro-static protection devices to prevent damage to the sensitive electronic components.

2.1 Trouble Shooting

General procedures for Troubleshooting:

1. Do the most obvious, user-level remedies.
2. Visual Check:
 - Check that the internal parts are clean and free from debris.
 - Examine the balance for damage or signs of abuse, replace any damaged items.
3. Use the error code table for solutions for specific codes.
4. Use the Diagnostic Guide; locate the symptom then follow the suggested remedies in order.



Note: Allow the scale to warm up for approximately five minutes after stabilizing to room temperature.

2.2 Diagnostic Guide

Diagnostic Guide designed to help locate the problem area quickly and easily. The probable causes are listed with the most common cause first. If the first remedy does not fix the problem, proceed to the next remedy. Before attempting to repair the balance, read all chapters of this manual to be familiar with the balance components and operation.

2.2.1 Diagnosis:

1. Isolate and identify the symptom.
2. Refer to Diagnostic Guide tables and locate the symptom.
3. Follow the suggested remedies in the order they appear.
4. Perform the indicated checks, or see the appropriate section of the manual.
5. Repair or replace the defective section of the scale.

NOTE:

If more than one symptom is observed, approach one area at a time, and remember that the symptoms may be interrelated. If a problem arises that is not covered in this manual, contact Ohaus Corporation for further information.

2.2.2 Checking Load Cells for Trouble

1. Visual Check:

- Clean the unit before evaluating any mechanical problems. In some cases, debris may have accumulated inside the Housing. Make sure there is no buildup of any foreign material.
- Examine the unit for bent Frame or signs of physical abuse that could cause it to malfunction. Replace all damaged parts. See Chapter 5 for parts identification.
- Check that the Down Stops are not touching the Frame. This would restrict movement, causing improper operation. If the Down Stops are improperly set, adjust them. (See Section 3.6.)
- Check the cables leading to the Load Cell for cuts, abrasions or other signs of excessive wear and tear.
- Check for a bent or twisted Load Cell: Place the top surface and then each of the sides of the Load Cell on a flat surface, to see if it rests flat and even. A gap indicates a bent or twisted Load Cell. A Load Cell that is even slightly bent or corroded should be replaced.
- Examine the Load Cell for corrosion due to high humidity or exposure to chemicals.

2. **Perform a Resistance Test**, to determine if the Load Cell is severely damaged or a short circuit to the frame has occurred.

Note: The Load Cell must be completely disconnected from the Printed Circuit Board and at no load when the resistance readings are taken.

Using an ohm meter, measure and record resistance between each pair of wires from the Load Cell, as specified in Table 2-1. Compare the measured readings with the specified values in Table 2-1.

If the resistance readings are in the range specified, skip to the next section. If they are outside the expected range, open circuit or short-circuit across any two wires, the Load Cell is defective: replace it. (See Chapter 3.)

TABLE 2-1. LOAD CELL RESISTANCE READINGS (in Ohms)

Ex+ to Ex–	S+ to S–
404 ± 10	350 ± 10

TABLE 2-2 DIAGNOSTIC GUIDE

Sympto	Possible Cause	Possible Solution
CALL E	Calibration error: unstable environment or incorrect calibration weight	Check environment and calibration weights, and then re-calibrate.
Err 8.1	The Power On weight on the platform exceeds the zero range.	Clear pan.
Err 8.2	The Power On weight on the platform is below the zero range.	Check if pan is missing.
Err 8.3	Over load (weight exceeds rated capacity)	Remove weight from pan.
Err 8.4	Under load (pan removed)	Re-install pan.
Err 8.5	Tare weight out of range	Tare value exceeds maximum.
Err 9.5	Internal data error or calibration data error	Contact OHAUS or your authorized dealer for help.
Err 13	Failure to write to EEPROM	Contact OHAUS or your authorized dealer for help.
Lo.BAt	Battery very low	Replace batteries; Charge rechargeable battery.
--nD--	Action not allowed	/
-----	Busy	/

3 MAINTENANCE / REPAIR PROCEDURES

3.1 Preventive Maintenance

Ohaus scales are precision instruments and should be carefully handled, stored in a clean, dry, dust-free area, and cleaned periodically. Follow these precautionary steps:

- When a scale has had chemicals or liquids spilled on it, all exterior surfaces should be cleaned as soon as possible with warm water on a damp cloth.
- Do not leave a mass on the scale when the scale is not in use.
- Allow time for the scale to stabilize after moving it from an area which is at a different temperature than the area where it is to be operated. Allow one hour for each 5°F (2.7°C) temperature change before using the scale. After temperature stabilization, allow another 20 minutes after turning the scale on, for the scale electronics to stabilize

Preventive Maintenance Checklist

The scale should be inspected and checked regularly, as follows:

1. Remove the Pan and Sub Pan to inspect and clean the area beneath the Pan.
2. Clean the outside of the scale using a damp cloth with warm water.



CAUTION

DO NOT USE CHEMICAL CLEANERS OR SOLVENTS OF ANY TYPE.
SOME CLEANERS ARE ABRASIVE AND MAY AFFECT THE SCALE'S FINISH.

3. Check the Power Cord for broken or damaged insulation.
4. If using the rechargeable battery and the scale malfunctions, first recharge the battery to see if this resolves the problem.
5. Make a visual inspection for faulty connectors, wiring, and loose hardware.

Service Strategy

All parts of the Valor 1000 are designed to be replaced rather than repaired. This includes the Main Printed Circuit Board (PCB), the Load Cell, and the Feet etc. For an illustrated list of replaceable parts, see Chapter 5.

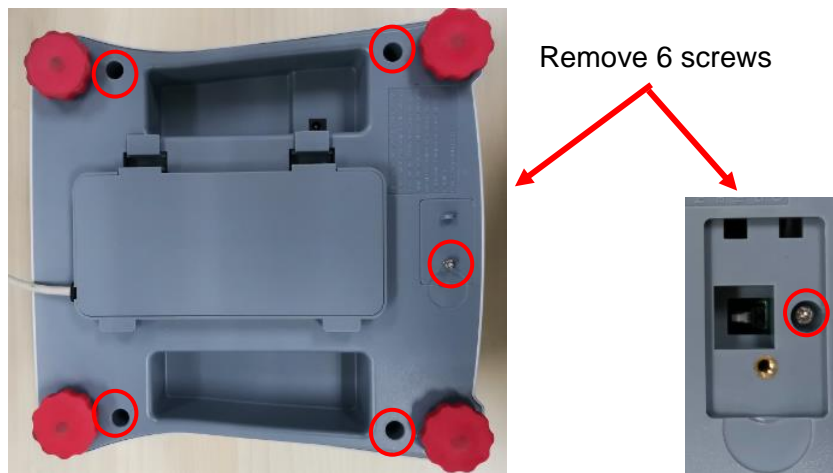
3.2 Opening the Scale

Use these procedures in order to replace the Load Cell, any of the Printed Circuit Boards and/or LCD Displays.

Separating the Top and Bottom Housings

Common hand tools are sufficient to disassemble the Valor 1000 scales. Turn the scale off and unplug the power cord or remove the battery before you begin.

1. Lift off the Weighing Pan from the Pan Support.
2. Remove the Pan Support.
3. Turn the scale over. Remove the five screws on the bottom and one screw under the LFT cover.



4. Separate Top Housing from Bottom Housing. Avoid straining the cables that connect the Main PCB to the parts in the Bottom Housing. (Lay the two housings close to each other, so cable is not strained.)

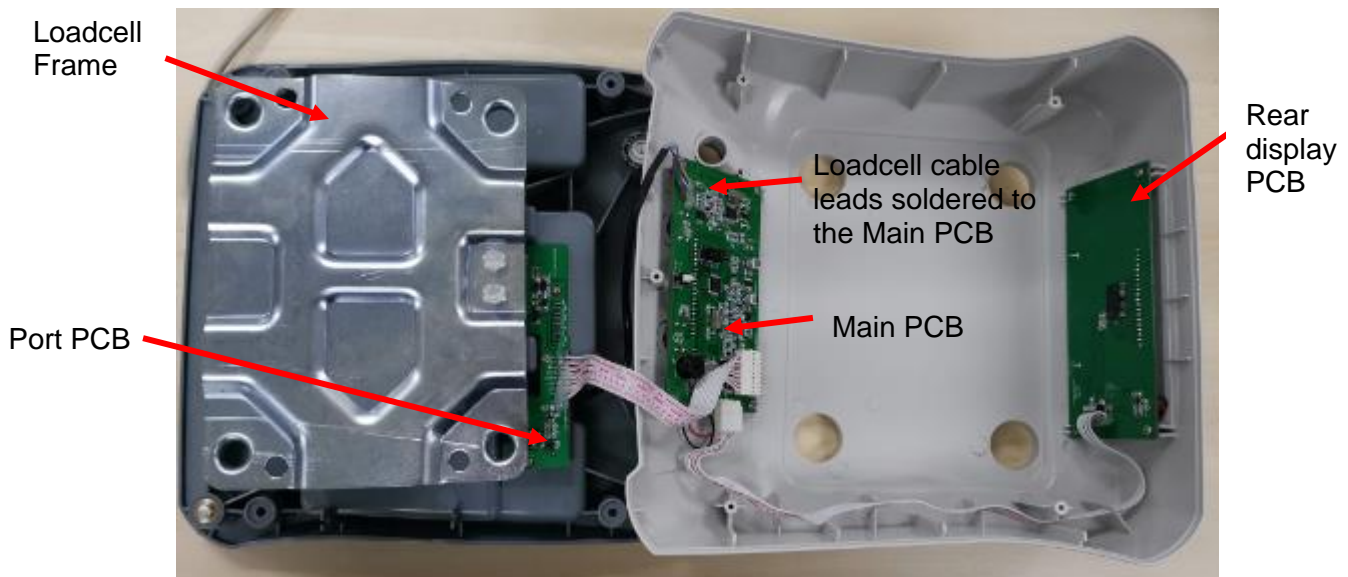


Figure 3-1 Top and Bottom Housings: Approved Model.

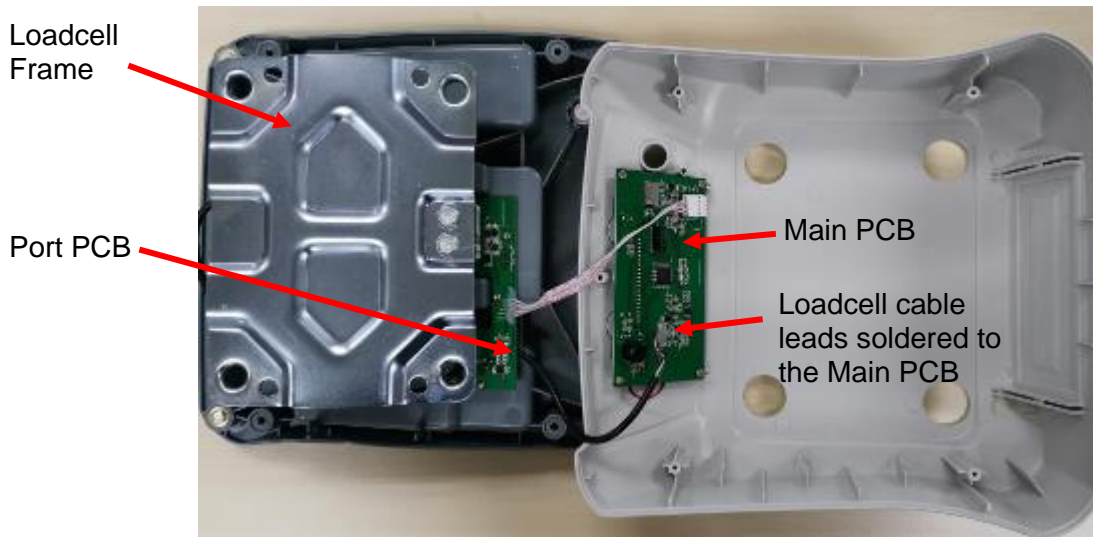


Figure 3-2 Top and Bottom Housings: Non-approved Model.

Note: Unsealing before this step for the approval models.

3.3 Removing/Replacing the Main PCB

If the PCBs are suspected of being faulty, they should be replaced, as follows:

1. Disconnect the Cable connecting the Main PCB to the scale's power system, for the approved model, please disconnect the cable of rear display PCB (See Figure 3-3 and Figure 3-4.)
2. Remove the four screws that secure each PCB to the Top Housing.
3. If either the Main PCB or the Load Cell is to be replaced, note the order of the wire colors, then carefully cut off the hot melt glue and unsolder the Load Cell Cable from the Main PCB at the four solder points on the PCB. (See Figure 3-3 and Figure 3-4.)

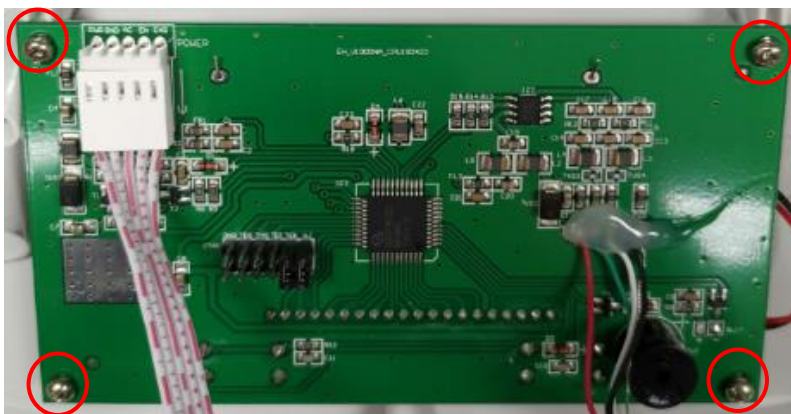


Figure 3-3 Main PCB: Non-approved Model.

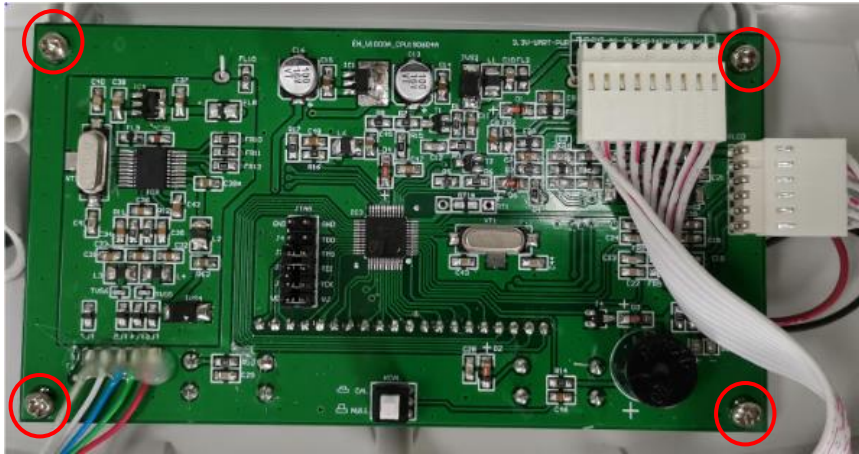


Figure 3-4 Main PCB: Approved Model.

4. Reverse the disassembly procedure to assemble the Load cell PCB.

3.4 Removing/Replacing the Rear Display PCB

1. Disconnect the Cable connecting the Main PCB to Rear Display PCB. (See Figure 3-1.)
2. Remove 2 screws indicated in Figure 3-5, take out the display PCB
3. Position the replacement PCB, insert and tighten the screws, screws should be fixed in the slot of the plastic ribs.
4. Connect the Rear Display PCB Cable to the Main PCB.



Figure 3-5 Rear Display PCB.

3.5 Removing/Replacing the Load Cell

A Load Cell that is even slightly bent or corroded should be replaced. The Load Cell may also need to be replaced because of instability, or because the scale does not calibrate or repeat. **Note:** The Load Cell is supplied as an assembled unit. (See Chapter 5.)

1. Carefully cut off the hot melt glue. Unsolder the cable leads connecting the Load Cell to the PCB. (See Figure 3-3 or Figure 3-4.)
2. Remove the bolts that hold the Load Cell Frame to the Load Cell. Use a high-leverage socket wrench (10mm). (The bolts are tightened to about 10 Nm torque.)



Figure 3-6. Removing bolts holding Frame to the Load Cell.

Note: There are one or several shim between the Load Cell Frame and the Load Cell. Be careful not to lose it.

3. Turn the scale over and remove the bolts and washers that hold the Load Cell to the Bottom Housing.



Figure 3-7. Removing bolts holding Frame to the bottom housing

Note: The shims are used between the Load Cell and its base. Be careful not to lose it.

4. Lift the Load Cell away from the housing.
5. When installing the replacement Load Cell, first position the shim, then insert and tighten the two bolts and their washers in the Bottom Housing.
6. Place the cover on the Bottom Housing's cavity where the two Load Cell bolts are inserted. Insert the small cover screws and tighten them.
7. Position the shim and Load Cell Frame on top of the Load Cell. Insert the bolts and their washers, and tighten the bolts. (The bolts are tightened to about 10 Nm torque.)
8. Solder the cable leads connecting the Load Cell to the PCB, See the color code of load cell in table 3-1.

TABLE 3-1. COLOR CODE FOR LOAD CELL WIRE

EXE+	SIG+	SIG-	EXE-	SCR
RED	GREEN	WHITE	BLACK	SHIELDED WIRE

9. Cover the solder points with the hot melt glue.
10. Set Overload Stops as shown in Section 3.6.

3.6 Setting the Overload Stops

The Overload Stop gaps must be checked and reset if the Load Cell or the LC plate are replaced for the Models with Capacity of 2kg and 3kg ONLY. Please use the 0.5mm plug-in metal sheet/ gauge to adjust the Overload Stop gaps, otherwise please measure the gap with 0.5mm after adjusting the screw. (See Figure 3-8.)

Note: Do not adjust the overload screw hard, stop when the screw touch with the metal sheet to prevent from the material rebounding.

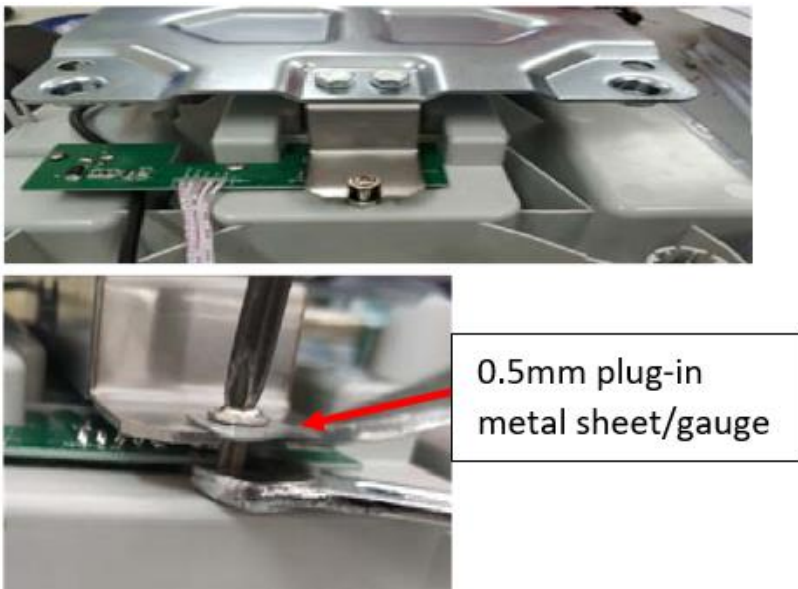


Figure 3-8. Adjust the overload stop screw

3.7 Replacing the Port PCB

1. Remove cable from main PCB
2. Remove 3 screws indicated in Figure 3-9



Figure 3-9. Port PCB

3. Unsolder the leads connecting the battery metal sheet. See Figure 3-10, and lift the Port PCB.

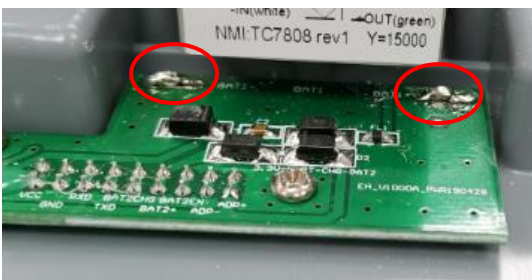


Figure 3-10. Unsolder the leads on the port PCB

4. Reverse the disassembly procedure to assemble the Port PCB.

3.8 Replacing the Function Label

The Function Label may need to be replaced. (See Chapter 5 for parts information.) Use a broad knife to remove the label. Clean the glue residue from the Housing surface. Then carefully place the new label where the old one was.

4 TESTING

Before and after servicing a Valor 1000 scale, an operational test and various performance tests should be made to confirm that the scale meets specifications. Turn the scale on and allow it to warm up for at least one hour before performing these tests.



NOTE:

Make sure the test area is free from drafts and that the scale rests on a level and vibration-free surface.

4.1 Test Masses Required

The masses required to test the Ohaus Valor 1000 scales must meet the requirements of ASTM Class 4 or OIML F2 Tolerance. The mass values are listed in Table 4-1.

TABLE 4-1. TEST MASS VALUES

Model	Weight (g)
V12P3X	500, 1000, 2000, 3000
V12P6X	1500, 3000, 4500, 6000
V12P15X	3000, 4000, 9000, 11000, 15000
V12P30X	6000, 8000, 15000, 22000, 30000
V12P2X	500, 1000, 2000
V12P5X	1000, 1500, 2500, 4000, 5000
V12P10X	2500, 5000, 7500, 10000
V12P20X	5000, 10000, 15000, 20000

4.2 Performance Tests

Accurate performance of the Valor 1000 scales is determined by a series of four performance tests. The displayed readings are compared with the tolerances listed for each test in Table 1-1, Table 1-2 and Table 1-3. Tolerance values are expressed in counts. A one-count difference is shown in the last digit on the scale display.

NOTE:

The following performance tests are used to evaluate scale operation before and after repairs. The scale must meet the requirements specified in each test as well as the other specifications listed in Table 1-1, Table 1-2 and Table 1-3. Before proceeding with the following tests, the scale should be calibrated. (See Appendix A.)

4.2.1 Precision Test

The Precision Test measures the Standard Deviation of a set of similar weight readings, which should match the specification for each model, listed in Table 1-1, Table 1-2 and Table 1-3.

Power on the balance. The reading on the display should be 0g.

Select a mass weighing near the maximum capacity of the balance, and place it on the center of the Pan. Observe and record the reading.

Remove the mass. The reading should return to 0g ± 1 count.

Repeat this test three times. The reading should be within ± 1 count of the reading recorded. If so, the balance passes the Precision Test.

If the deviation for any set of readings (using the same mass placed on the center of the Pan) is greater than ± 1 d, the balance does not meet the precision specification. Inspect and correct the following areas:

Check for mechanical obstructions. Any foreign object touching any part of the moving assemblies will cause a balance to fail the Precision Test. Inspect and correct as necessary.

If the scale does not meet specifications, move it to a suitable location, ensure that it is level, and try again. If it still does not meet specifications, perform a service calibration, and try again. (See Appendix A for Service Calibration.)

4.2.2 Repeatability Test

Repeatability is the Standard Deviation of a set of similar weight readings.

Requirements:

- To perform this test a single mass must be used for all readings.
- The test mass should be approximately $\frac{1}{2}$ of the capacity of the instrument.
- Wear gloves when handling the mass.

Before starting a repeatability test, set up the instrument as follows:

Set Up:

Follow the steps in Appendix A, Setup and Calibration.

Record Settings:

Zero Tracking Setting = _____

Displayed Units = _____

Mass Used = _____

TEST PROCEDURE:

Zero the instrument, if it does not read zero.

Using a test mass approximately half the capacity of the instrument, place the mass on the center of platform. Record the reading on the worksheet provided.

Remove the mass from the platform.

Repeat this test starting at Step 1 until you record a total of ten readings

Fill in the worksheet (Table 4-2) with the ten (10) readings.

TABLE 4-2. REPEATABILITY WORKSHEET

n	Reading	Delta = Reading – Mean	Delta x Delta
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
n = number of Reading Mean = Sum of readings / 10 Delta = Reading – Mean Standard Deviation = Square Root of (sum of (Delta x Delta) / 9)			

5. Add the ten readings and divide the total by 10 to find the Mean (average).

6. Mean = (Reading 1 + Reading 2 + Reading 3 + Reading 4 + Reading 5
+ Reading 6 + Reading 7 + Reading 8 + Reading 9 + Reading 10) / 10

Mean = _____

7. Calculate the Delta for each reading and record in the work sheet.

Delta = Reading – Mean

8. Calculate the Delta x Delta for each reading and record in worksheet.

9. Add the ten Delta x Delta values and divide by 9 Calculate the Standard Deviation by applying the square root of the result from step 8.

Standard Deviation = _____

Note: If the balance does not meet specifications, move it to a suitable location, ensure that it is level, and try again.

4.2.3 Linearity Test

This test is used to determine the linearity of the unit throughout its operating range. The masses used to perform this test can be utility masses



NOTE:

The scale must pass the Precision and Repeatability Tests, and be calibrated before the Linearity Test may be performed.

TABLE 4-3. LINEARITY TEST MASSES

Capacity (g)	3000 x .5g	6000 x 1g	15000 x 2g	30000 x 5g
Reference Wt.	1000	1500	4000	8000
Load 1	500	1500	3000	6000
Load 2	1500	3000	9000	15000
Load 3	2000	4500	11000	22000
Capacity (g)	2000 x .2g	5000 x .5g	10000 x 5g	20000 x 10g
Reference Wt.	500	1200	2500	5000
Load 1	500	1200	2500	5000
Load 2	1000	2500	5000	10000
Load 3	1500	3800	7500	15000

NOTE:

All masses are nominal values. Use the same reference mass throughout the procedure.

1. Place the test mass on the Scale, record the weight and remove.
2. Place Load 1 on the Scale and press **Tare**
3. Place the test mass on the Scale, record the weight and remove.
4. Place Load 2 on the Scale and press **Tare**
5. Place the test mass on the Scale, record the weight and remove.
6. Place Load 3 on the Scale and press **Tare**

7. Place the test mass on the Scale and record the weight.
8. The difference in the weights of the test mass should be within ± 2 d, as specified in the Table 1-1, Table 1-2 and Table 1-3. If not, calibrate (see Appendix A) and repeat the test.
9. If the Scale remains out of tolerance, the Load Cell may need to be replaced.

4.2.4 Off-Center Load Test

The Off-Center Load Test is used to determine whether displayed weight values are affected by moving the sample to different areas of the Pan.

1. Place 1/3 of the scale's capacity in the center of the Pan.
2. Note the reading.
3. Move the mass halfway (between the center and the edge) to the front of the Pan. Note any differences in the displayed weight reading.
4. Repeat the test for the back, left, and right position of the Pan.

Maximum allowable change in displayed weight readings for each of the four positions can be in ± 2 d.

5. If this maximum is exceeded, follow procedures in Section 4.2.5, Adjusting Off Center Load.

4.2.5 Adjusting Off Center Load

If the Off Center Load (OCL) is excessive, perform adjustment as follows:

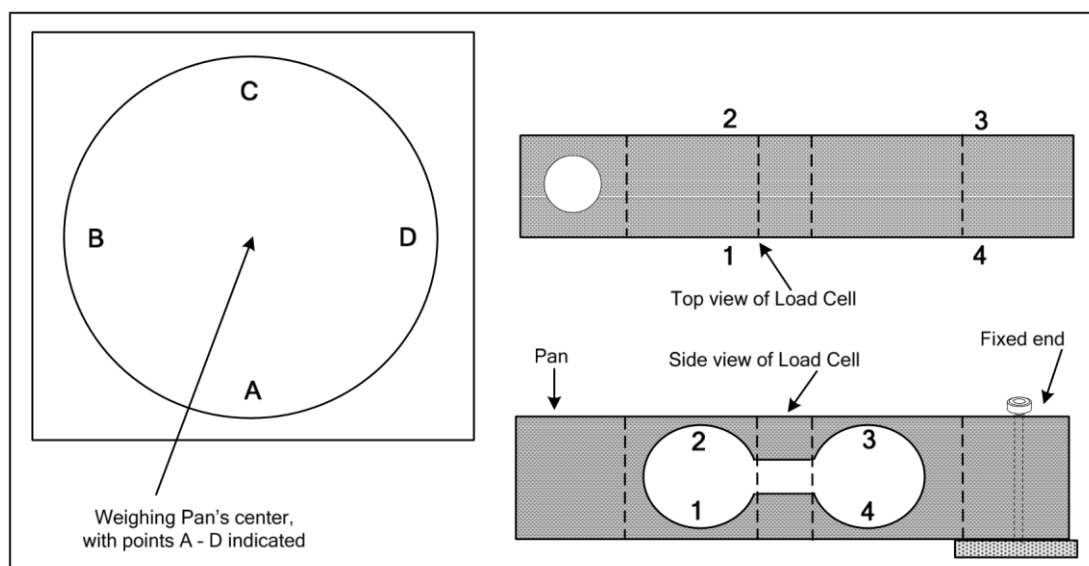


Figure 4-2. Scale drawing of Valor 1000 Load Cell and Weighing Pan.

1. Place the test weight in the center of the Weighing Pan.
2. Tare the balance.
3. Move the weight to point A and record the reading.
4. Move the weight to point B and record the reading.
5. Move the weight to point C and record the reading.
6. Move the weight to point D and record the reading.
7. If the reading at point A is negative, file at points 1 and 4 AT AN ANGLE.
8. If the reading at point B is negative, file at points 1 and 2 STRAIGHT ACROSS.
9. If the reading at point C is negative, file at points 2 and 3 AT AN ANGLE.
10. If the reading at point D is negative, file at points 3 and 4 STRAIGHT ACROSS.



Note: It is not recommended that you try to adjust more than –5 counts if the beam has been filed already. If the beam has not been filed previously, you can adjust –10 counts.

Remember, when filing you are weakening the beam. File a little at a time.

This section of the manual contains exploded views of the Valor 1000 scales. The exploded view drawings are designed to identify the parts which can be serviced on the scale in the field.



NOTE:

In all cases where a part is replaced, the scale must be thoroughly checked after the replacement is made. The scale **MUST** meet the parameters of all applicable specifications in this manual.

If further technical information is needed, please contact your local Ohaus distributor, or:

Ohaus Corporation, www.ohaus.com
7 Campus Drive
Suite 310
Parsippany, NJ 07054 USA

Tel: 973-377-9000
Fax: 973-593-0359

In the United States call toll free, 800-526-0659 between 8:00 a.m. and 6:00 p.m. EST.

5 PARTS LISTS & DIAGRAMS

5.1 Non-Approved Models Spare Parts

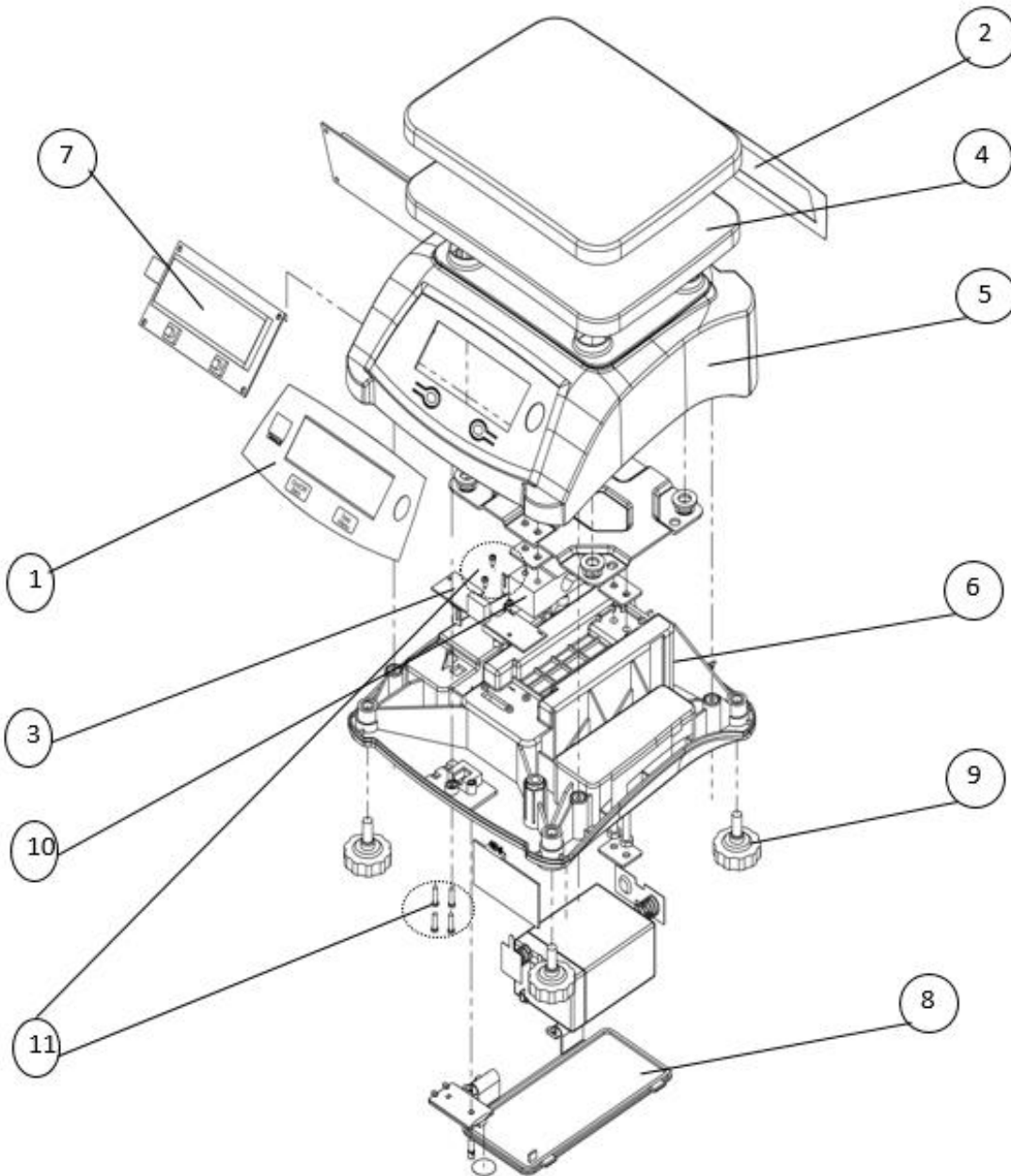


TABLE 5-1 NON-APPROVED MODELS SPARE PARTS

Drawing Item	Part Number	Description	Comments
1	30554451	Overlay Front EN V12P	
	30554452	Overlay Front KR V12P	
	30554453	Overlay Front JP V12P	
	30554454	Overlay Front RU V12P	
2	30556411	Overlay Back w/o window V12P	
3	30556413	PCB Port V12P	
4	30551941	Pan Support V12P	
5	30551942	Housing Top V12P	
6	30551943	Housing Bottom V12P	
7	30551944	Display Front V12P	
8	30556415	Battery Cover Dry Battery V12P	For model of V12P
	30556416	Battery Cover Rechargeable battery V12P	For model of V12PR
9	30556417	Feet V12P	
10	30556418	Loadcell 6kg V12P	For model of V12P3
	30556428	Loadcell 10kg V12P	For model of V12P6
	30556429	Loadcell 20kg V12P	For model of V12P15
	30556430	Loadcell 40kg V12P	For model of V12P30
11	30556412	Hardware Kit V12P	
NA	30556414	Foam Kits V12P	
NA	30539411	Box V12P	
NA	30467987	Adapter with plugs (EU-US-UK-AU-KR)	

NOTE: PELASE FIND THE SPARE PART VIA MODEL IN THE SPARE PART LIST DOCUMENT.

5.2 Approved Models Spare Parts

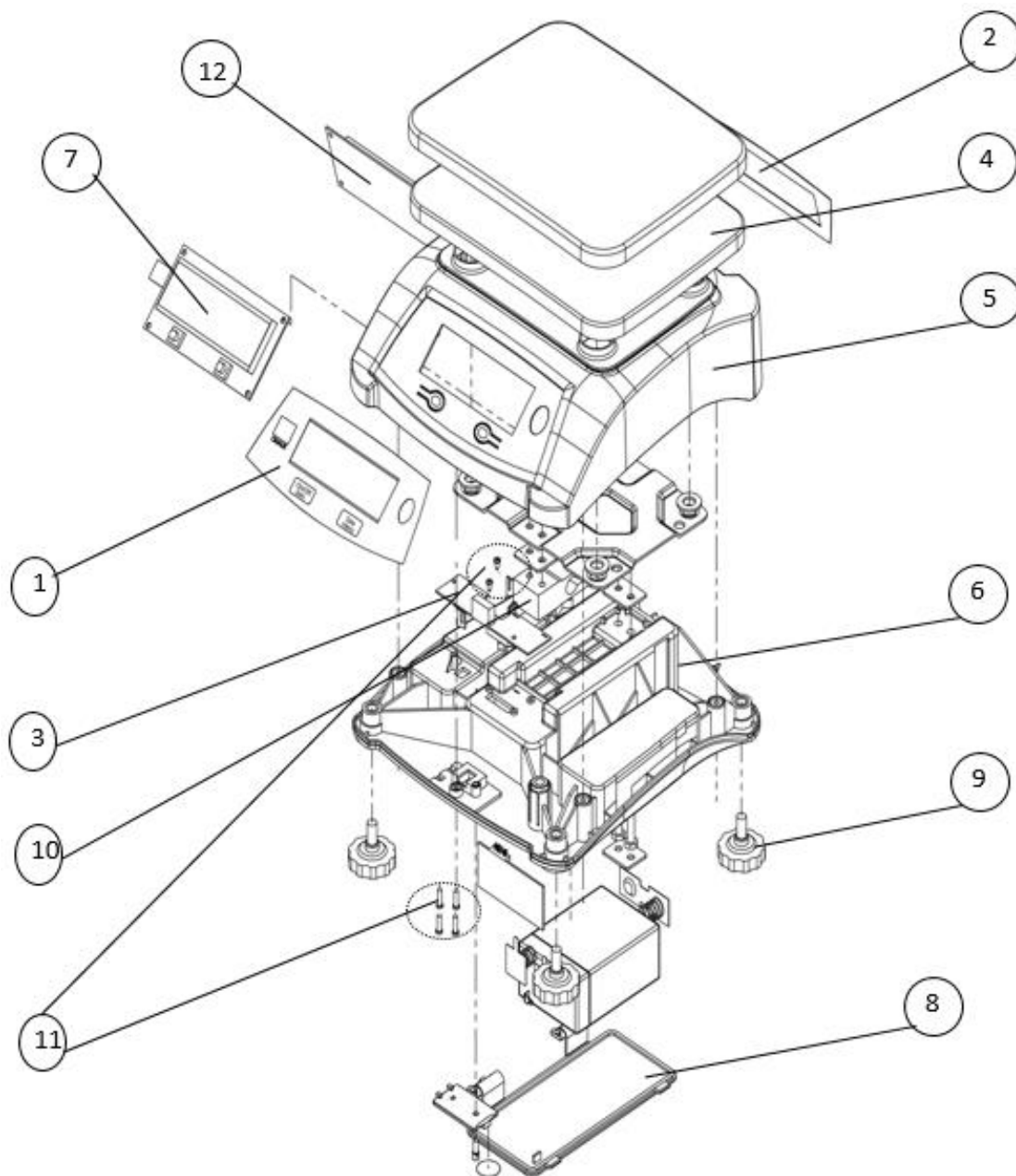


TABLE 5-2 BASE SPARE PARTS (APPROVED MODELS)

Drawing Item	Part Number	Description	Comments
1	30554451	Overlay Front EN V12P	
	30554452	Overlay Front KR V12P	
	30554453	Overlay Front JP V12P	
	30554454	Overlay Front RU V12P	
2	30556410	Overlay Back V12P	
3	30556413	PCB Port V12P	
4	30551941	Pan Support V12P	
5	30551942	Housing Top V12P	
6	30551943	Housing Bottom V12P	
7	30567939	Display Front V12P Approved	
8	30556415	Battery Cover Dry Battery V12P	
9	30556417	Feet V12P	
10	30556418	Loadcell 6kg V12P	For model of V12P3T
	30556428	Loadcell 10kg V12P	For model of V12P6T
	30556429	Loadcell 20kg V12P	For model of V12P15T
	30556430	Loadcell 40kg V12P	For model of V12P30T
	30567942	Loadcell 3kg V12P AM Approved	For model of V12P2T AM
	30567943	Loadcell 6kg V12P AM Approved	For model of V12P5T AM
	30567944	Loadcell 15kg V12P AM Approved	For model of V12P10T AM
	30567945	Loadcell 30kg V12P AM Approved	For model of V12P20T AM
11	30556412	Hardware Kit V12P	
12	30554456	Display Back V12P	
NA	30556414	Foam Kits V12P	
NA	30539411	Box V12P	
NA	30467987	Adapter with plugs (EU-US-UK-AU-KR)	

NOTE: PLEASE FIND THE SPARE PART VIA MODEL IN THE SPARE PART LIST DOCUMENT.

APPENDIX A – SERVICE MENU

This appendix describes Service Menu, and entry by following step:

1. Turn the balance off
2. Press and Hold the **On/Off** button and the **Tare** Button for 10 seconds. As the balance powers up, appears followed by **Ramp**
3. Select the function by pressing **On/Off** button, and change the function by pressing **Tare** Button.
4. Exit service menu with **End**

A.1 Service Menu Structure

Function	Display	Remark
Ramp	rAMP	Show Ramp value
Lin	L IN	Perform the Service linearity calibration
Span	SPAN	Perform the Service Span calibration
GEO	GEO	Hide/Unhide certain regions
Cap	CAP	Capacity
Grad	GRAD	Gradacity
S.Unit	S.UNIT	Setup Unit
Filter	FILTER	Setup Filter
Expand	EXPAND	Expand reading
Lock	LOCK	Hide Calibration in the user menu Lock the unit setting in user menu
Reset	RESET	Reset
End	End	Exit servcie menu

A.2 Service Calibration

Valor 1000 offer a choice of two calibration methods: Span calibration and Linearity Calibration.

Attention: Do not disturb the balance during any calibration.

SPAN [SPRN]

Initiates a span calibration procedure using a span calibration weight equal to the full capacity of the scale. Press **On/Off** to enter the SPAN calibration routine, or press **Tare** to proceed to a Lin calibration.

When 0.000kg is shown, short press **On/Off** to capture the zero weight if the platform is empty.

When the full capacity of the scale is shown, place a weight equal to the capacity of the scale and short press **On/Off**.

If the scale displays "ERR -E", one of the weights used to calibrate is wrong and the scale did not complete calibration.

To exit calibration at any point, short press **Tare/Menu**.

LIN [LIN]

Initiates a linearity calibration procedure (zero, mid-point and span).

When performing a linearity calibration, the scale will prompt you for a zero weight -- the platform without anything on it and weight display at zero -- a Midpoint weight equal or close to 50% of the Span weight, and a Span weight equal to the full capacity of the scale.

When 0.000kg is shown, short press **On/Off** to capture the zero weight if the platform is empty.

When the half capacity of the scale is shown, place a weight on the pan according to the value shown on the display and short press **On/Off**.

When the full capacity of the scale is shown, place a weight equal to the capacity of the scale and short press **On/Off**.

If the scale displays "ERR -E", one of the weights used to calibrate is wrong and the scale did not complete calibration.

To exit calibration at any point, short press **Tare/Menu**.



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