



SERVICE MANUAL
STARTER 2100 Bench pH Meter
STARTER 3100 Bench pH Meter
STARTER 3100C Bench pH Meter

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Material in this manual is subject to change.

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1.1 INTRODUCTION

This service manual contains the information needed to perform routine maintenance and service on the Ohaus Starter 2100, Starter 3100 and Starter 3100C Series meters. Familiarity with the meter'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 meter.

Chapter 2 Maintenance Procedures – Contains preventive maintenance procedures and disassembly, repair and replacement procedures.

Chapter 3 Drawings and Parts Lists – Contains exploded views of Starter 2100/3100/3100C meters identifying all serviceable components.

Chapter 4 Reset to factory settings – Explains procedures for resetting the meter to factory default settings.

1.2 SERVICE FACILITIES

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

- Should be temperature controlled and meet meter 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.
- Meter must not be exposed to direct sunlight or radiating heat sources.
- Use an approved Electro-Static Device.

1.3 TOOLS AND TEST EQUIPMENT REQUIRED

The service shop should contain the following equipment:

1. Standard hand tools.
2. Digital Voltmeter (DVM).
3. Standard Electronics tool kit.
4. Grounding mat and clip.

CHAPTER 1 GETTING STARTED

1.4 SPECIFICATIONS

Complete specifications for the Ohaus Starter 2100 meters are listed in Table 1-1. When a meter has been serviced, it must meet the specifications listed in the table. Before servicing the meter, determine what specifications are not met.

TABLE 1-1. SPECIFICATIONS

Model	Starter 2100	Starter 3100	Starter 3100C
Measuring range	0.00...14.00 pH -1999...1999 mV 0 °C...100 °C	-2.00...16.00 pH -1999...1999 mV -5 °C...110 °C	0.0 µS/cm...199.9 mS/cm 0.1 mg/l...199.9 g/l (TDS) 0.00 ... 19.99 psu (Salinity) 0 °C...100 °C
Resolution	0.01 pH 1 mV 0.1 °C	0.01 pH 1 mV 0.1 °C	Automatic range 0.1 °C
Error limits	± 0.01 pH ± 1 mV ± 0.5 °C	± 0.01 pH ± 1 mV ± 0.5 °C	± 0.5 % of the measured value ± 0.3 °C
Calibration	1 or 2 points 1 predefined buffer group (4.01, 7.00, 10.01)	3 points 3 predefined buffer group	1 point 3 predefined standards
Memory	Recall last calibration data		
Power supply	110-240V/50Hz, DC 12V		
Size/weight	Approximately 220 W x 175 D x 78 H mm / 0.75 kg		
Display	Liquid crystal		
Input	BNC, impedance > 10e+12 Ω Cinch, NTC 30 kΩ		Mini-Din
Reference input	2mm banana socket		
Temperature-compensation	ATC & MTC		Linear: 0.00 %/°C...10.00 %/°C Reference temperature: 20 & 25 °C
Housing	ABS		

1.5 METER OPERATION – STARTER 2100

This section contains information on the basic operation of the Starter 2100 meter.

1.5.1 OVERVIEW OF THE CONTROLS

Displays

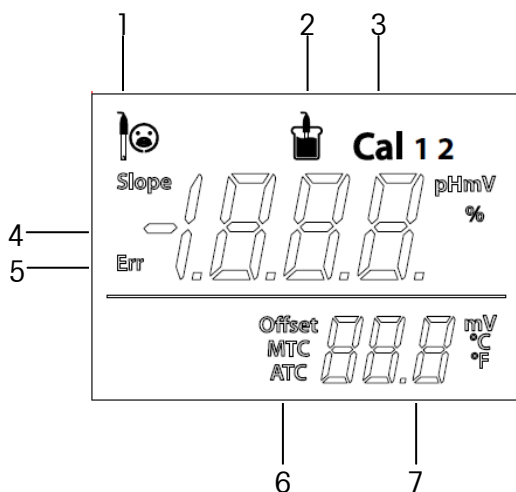





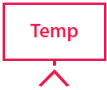

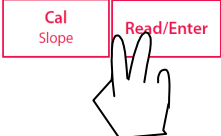


Figure 1-1. Starter 2100 display

1	Electrode condition		
	☺ Slope: more than 95% and offset: ± (0-15) mV Electrode condition is good	☺ Slope: 90-95% or offset: ± (15-35) mV Electrode condition is acceptable	☹ Slope: less than 90% or offset: ± (35-60) mV Electrode condition is not good or needs cleaning
2	Measurement icon - 🍷, measurement or calibration is running; disappear means the reading is locked, no matter measurement		
3	Calibration icon - Cal, 1 point or 2 point calibration in progress		
4	pH/mV reading or slope(%) in calibration		
5	Error message - Err		
6	Auto temperature compensation - ATC ; Manual temperature compensation - MTC		
7	Temperature during measurement or Offset (mV) in calibration		

CHAPTER 1 GETTING STARTED

TABLE 1-2. Control functions Starter 2100

Button	Press & release 	Press & hold for 3 seconds 
	<ul style="list-style-type: none"> - Start measurement or lock current reading - Confirm temp setting 	
	<ul style="list-style-type: none"> - Start calibration 	<ul style="list-style-type: none"> - Review the latest calibration data (slope, offset)
	<ul style="list-style-type: none"> - Meter turn on - Exit, return to measurement screen 	<ul style="list-style-type: none"> - Meter turn off
	<ul style="list-style-type: none"> - Entered temperature setup mode - Increase temp. value when in temp. setup mode 	
	<ul style="list-style-type: none"> - Switch between pH and mV measuring modes - Decrease temp. value when in temp. setup mode 	
	<ul style="list-style-type: none"> - Start self-diagnosis 	

Notes: ¹ Short Press: Press less than 1 seconds.

² Long Press: Press and hold for more than 2 seconds.

³ Press and hold the **Off** button until OFF is displayed, then release the button.

1.6 METER OPERATION – STARTER 3100

This section contains information on the basic operation of the Starter 3100 meter.

1.6.1 OVERVIEW OF THE CONTROLS

Displays

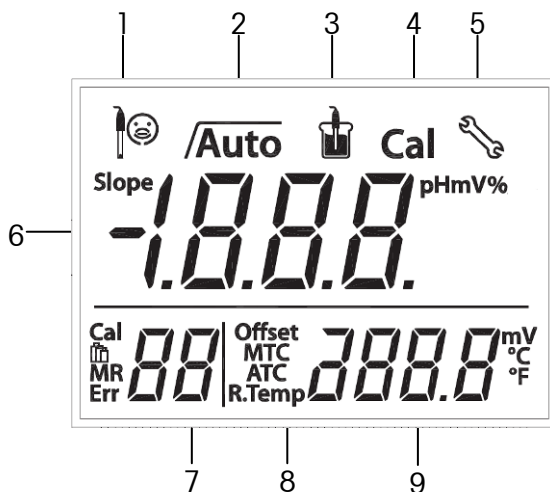













Figure 1-2. Starter 3100 display

1	Electrode condition	
	☺ Slope: more than 95% and offset: ± (0-15) mV Electrode condition is good	☺ Slope: more than 95% and offset: ± (0-15) mV Electrode condition is good
2	Endpoint stability icon $\sqrt{\quad}$; Auto endpoint icon $\sqrt{\text{Auto}}$	
3	Measurement icon - beaker ; measurement or calibration is running	
4	Calibration icon - Cal; calibration in progress	
5	Setup icon - wrench ; instrument is in the setup mode, can set temperature(MTC), buffer group etc.	
6	pH/mV reading or slope in calibration process	
7	Calibration point ca1 / Buffer group MR / Memory number MR/ Error index Err	
8	Auto temperature compensation - ATC ; Manual temperature compensation - MTC	
9	Temperature during measurement or offset (mV) in calibration process	

TABLE 1-3. Control functions Starter 3100

Button	Press & release 	Press & hold for 3 seconds 
	<ul style="list-style-type: none"> - Start or finish measurement - Confirm setting, store entered value 	<ul style="list-style-type: none"> - Turn auto endpoint on / off Auto, /
	<ul style="list-style-type: none"> - Start calibration 	<ul style="list-style-type: none"> - Recall the latest calibration data : slope and offset
	<ul style="list-style-type: none"> - Meter turn on - Exit and return to measurement screen 	<ul style="list-style-type: none"> - Meter turn off
	<ul style="list-style-type: none"> - Store current reading to memory - Increase value during setting - Scroll up through the memory 	<ul style="list-style-type: none"> - Recall stored data - Print current memory data
	<ul style="list-style-type: none"> - Switch between pH and mV - Decrease value during setting - Scroll down through the memory 	<ul style="list-style-type: none"> - Enter setup mode
 	<ul style="list-style-type: none"> - Start self-diagnosis 	
 		Turn on/turn off the backlight of the LCD

1.7 METER OPERATION – STARTER 3100C

This section contains information on the basic operation of the Starter 3100C meter.

1.7.1 OVERVIEW OF THE CONTROLS

Displays

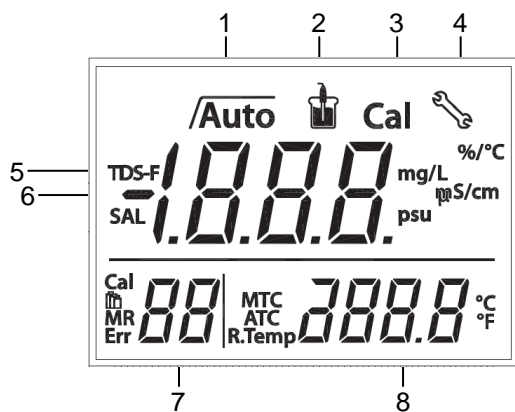







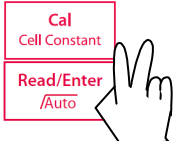
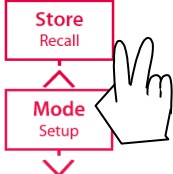


Figure 1-3. Starter 3100C display

1	Endpoint stability $\overline{\text{Auto}}$ / Auto endpoint $\overline{\text{Auto}}$
2	Measurement icon - measurement or calibration is running
3	Calibration icon Cal - calibration in progress
4	Setup icon - instrument is in the setup mode
5	TDS factor in the setup mode
6	Conductivity / TDS / Salinity / Cell Constant
7	Standard / Error index Err
8	Temperature during measurement or reference temperature in setup mode

TABLE 1-4. Control functions Starter 3100C

Button	Press & release 	Press & hold for 3 seconds 
	<ul style="list-style-type: none"> - Start or endpoint measurement - Confirm setting, store entered value 	<ul style="list-style-type: none"> - Turn auto endpoint on / off /Auto, /
	<ul style="list-style-type: none"> - Start calibration 	<ul style="list-style-type: none"> - Review the latest calibration data (cell constant)
	<ul style="list-style-type: none"> - Meter turn on - Return to measurement screen 	<ul style="list-style-type: none"> - Meter turn off
	<ul style="list-style-type: none"> - Store current reading to memory - Increase value during setting - Scroll up through the memory 	<ul style="list-style-type: none"> - Recall stored data - Print current memory data
	<ul style="list-style-type: none"> - Switch between pH and mV measuring modes - Decrease value during setting - Scroll down through the memory 	<ul style="list-style-type: none"> - Enter setup mode
	<ul style="list-style-type: none"> - Start self-diagnosis 	
		Turn on/off the backlight of the LCD

2.1 PREVENTIVE MAINTENANCE

Ohaus meters are precision instruments and should be carefully handled, stored in a clean, dry, dust-free area, and cleaned periodically.

2.2 SERVICE STRATEGY

All parts of the Starter 2100/3100/3100C are designed to be replaced rather than repaired. This includes the Main Printed Circuit Board (PCB) and the cables. For an illustrated list of replaceable parts, see Chapter 5.

2.3 OPENING THE METER

Use these procedures in order to replace the Printed Circuit Board.

2.3.1 Separating the Top and Bottom Housings

Common hand tools are sufficient to disassemble the Starter 2100/2100/3100/3100C meter. Turn the meter off and unplug the power cord before you begin.

1. Turn the meter over. Remove the four screws holding the Housing in place. (See Figure 2-1.)
2. Separate Top Housing from Bottom Housing. Avoid straining the cables that connect the Main PCB on the bottom housing to the parts in the top Housing. (Lay the two housings close to each other, so cable is not strained.)



Figure 2-1. Screws (marked with white circles) that secure the housing.

2.4 Removing/Replacing the PCB

If the PCB are suspected of being faulty, it should be replaced, as follows:

1. Disconnect the Cable connecting the PCB to the meter's control buttons.
(See Figure 3-2.)
2. Remove the four screws that secure the PCB to the bottom housing.
3. Lift out the PCB. (See Figure 3-2.)
4. Position the replacement PCB as in Figure 3-2.
5. Re-connect the Top housing Cable to the PCB, in the same position as originally installed.
6. Insert and tighten the screws that secure the PCB to the bottom housing.

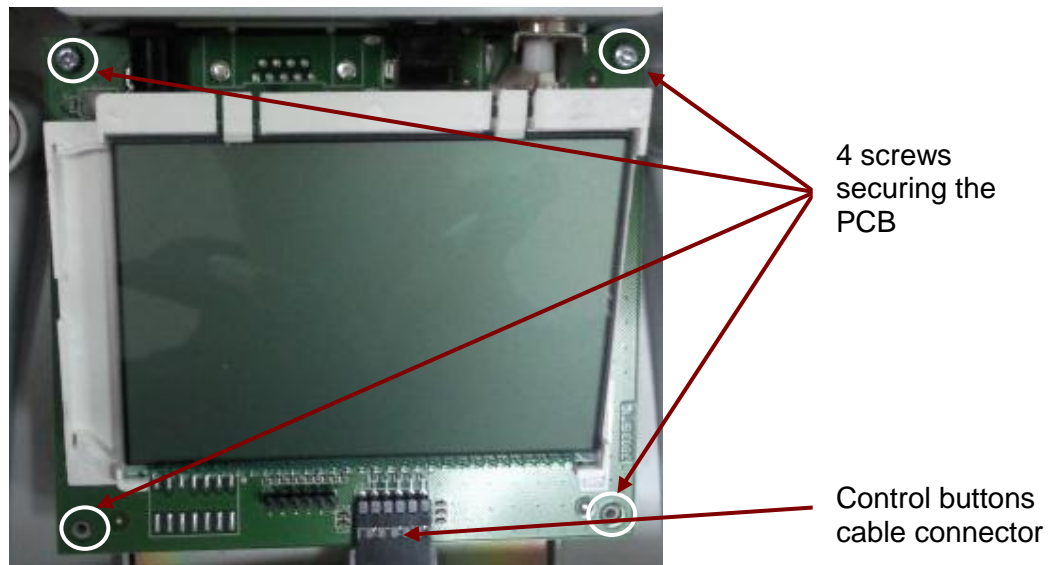


Figure 2-2. Main Printed Circuit Board with display.

3.1 Recover factory settings

- When the meter is off, press and hold button-**Read** & button-**Cal** & button-**Exit** together for 3 seconds, the screen displays *RSF* and blinks, means “Reset”. Then we have 2 choice:
 - ❖ Press button-**Read** to reset factory settings (MTC, slope and offset, etc.), display *YES* then restart the meter.

Or press button-**Exit** to quit the setting, display *NO* then turn off the meter.

This section of the manual contains exploded views of the Starter 2100/3100/3100C pH meter. The exploded view drawings are designed to identify the parts which can be serviced on the pH meter in the field.

NOTE:

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

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

www.ohaus.com

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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.

4.1 STARTER 2100 pH meter: PARTS

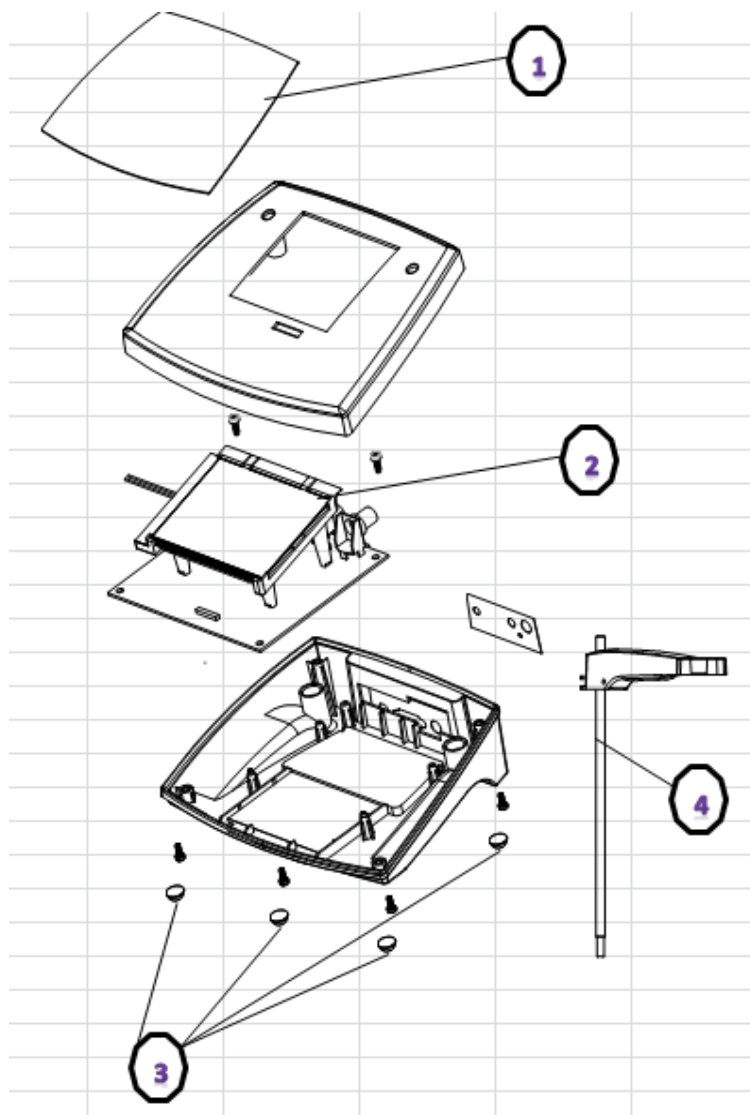


Figure 4-1. Starter 2100 pH meter: Parts.

TABLE 4-1 Starter 2100 pH meter: PARTS

Drawing Item	Part Number	Description
1	30063953	SP_Overlay Starter 2100 EN
2	30063907	SP_PCBA Starter 2100
3	30063906	SP_Screw and feet set for Starter Bench
4	30058732	Acc Electrode holder attached
NA	46001724	PWR,W,IN,6W,12VDC,S21x55x9x100,S
NA	46001780	PWR,ACCES,AC-PRONG,SET,EU-US-AU-UK
NA	30063957	ASM Package ST3100
NA	30031622	Manual,Instr.,EN,ST2100

Note: For parts numbers, see your local Ohaus distributor, or visit www.ohaus.com.

4.2 STARTER 3100 pH meter: PARTS

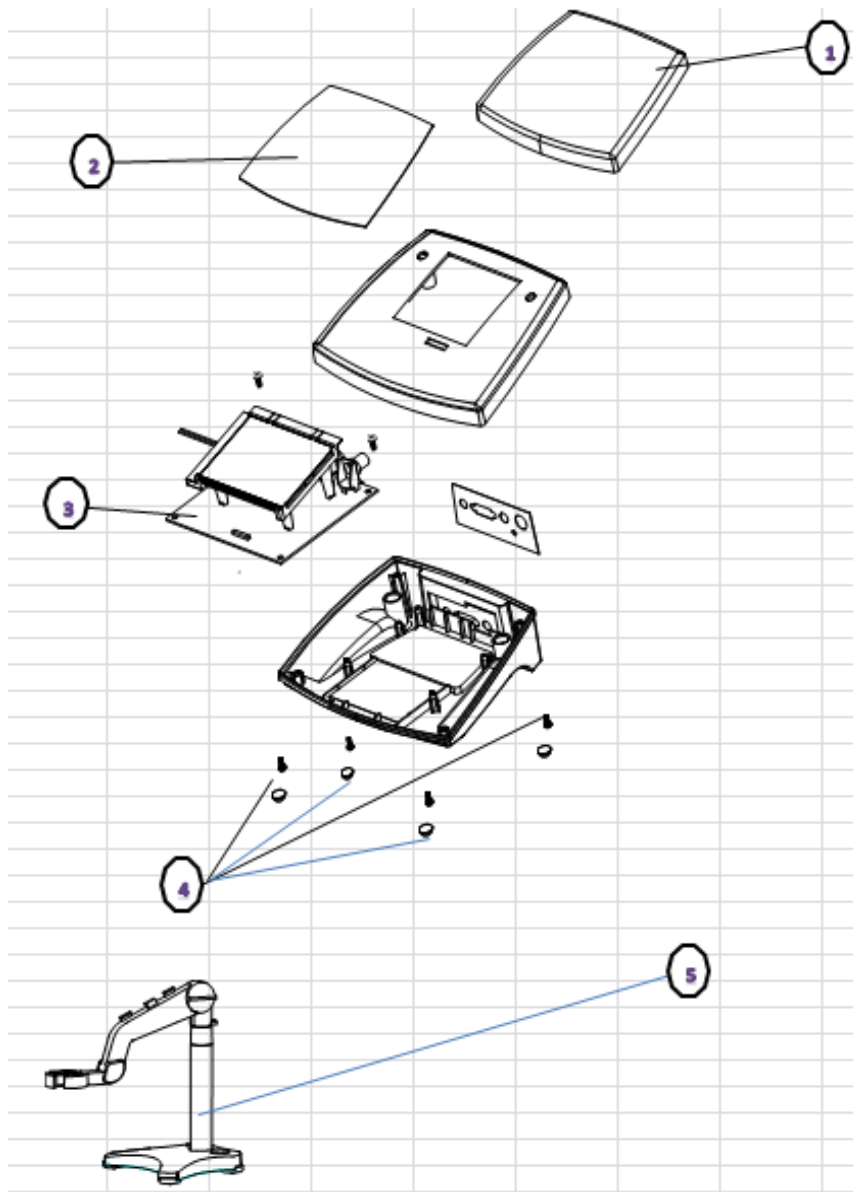


Figure 4-2. Starter 3100 pH meter: Parts.

TABLE 4-2 Starter 3100 pH meter: PARTS

Drawing Item	Part Number	Description
1	30058734	Acc In-use-cover STARTER
2	30063954	SP_Overlay Starter 3100 EN
3	30063908	SP_PCBA Starter 3100
4	30063906	SP_Screw and feet set for Starter Bench
5	30058733	Acc Electrode holder stand alone
NA	46001724	PWR,W,IN,6W,12VDC,S21x55x9x100,S
NA	46001780	PWR,ACCES,AC-PRONG,SET,EU-US-AU-UK
NA	30063957	ASM Package ST3100
NA	30031621	Manual,Instr.,EN,ST3100

4.3 STARTER 3100C pH meter: PARTS

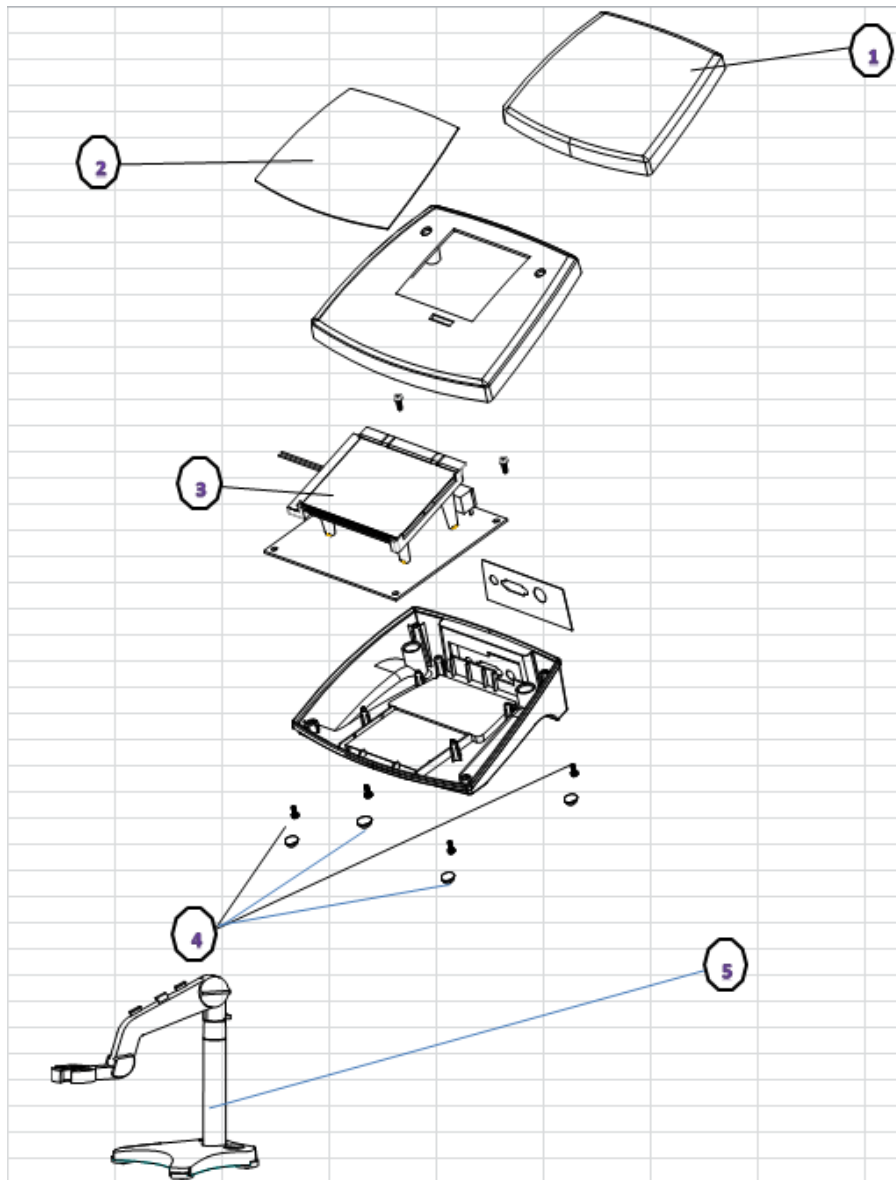


Figure 4-3. Starter 3100C pH meter: Parts.

TABLE 4-3 Starter 3100C pH meter: PARTS

Drawing Item	Part Number	Description
1	30058734	Acc In-use-cover STARTER
2	30063955	SP_Overlay Starter 3100C EN
3	30063909	SP_PCBA Starter 3100C
4	30063906	SP_Screw and feet set for Starter Bench
5	30058733	Acc Electrode holder stand alone
NA	46001724	PWR,W,IN,6W,12VDC,S21x55x9x100,S
NA	46001780	PWR,ACCES,AC-PRONG,SET,EU-US-AU-UK
NA	30063957	ASM Package ST3100
NA	30031623	Manual,Instr.,EN,ST3100C