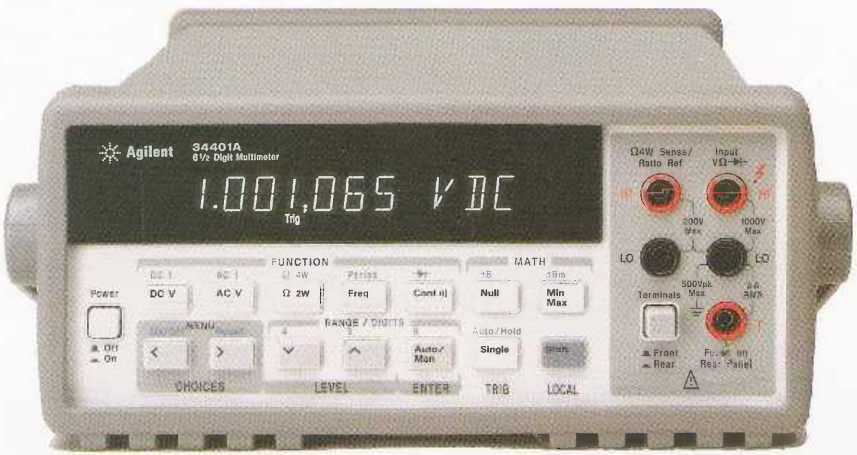
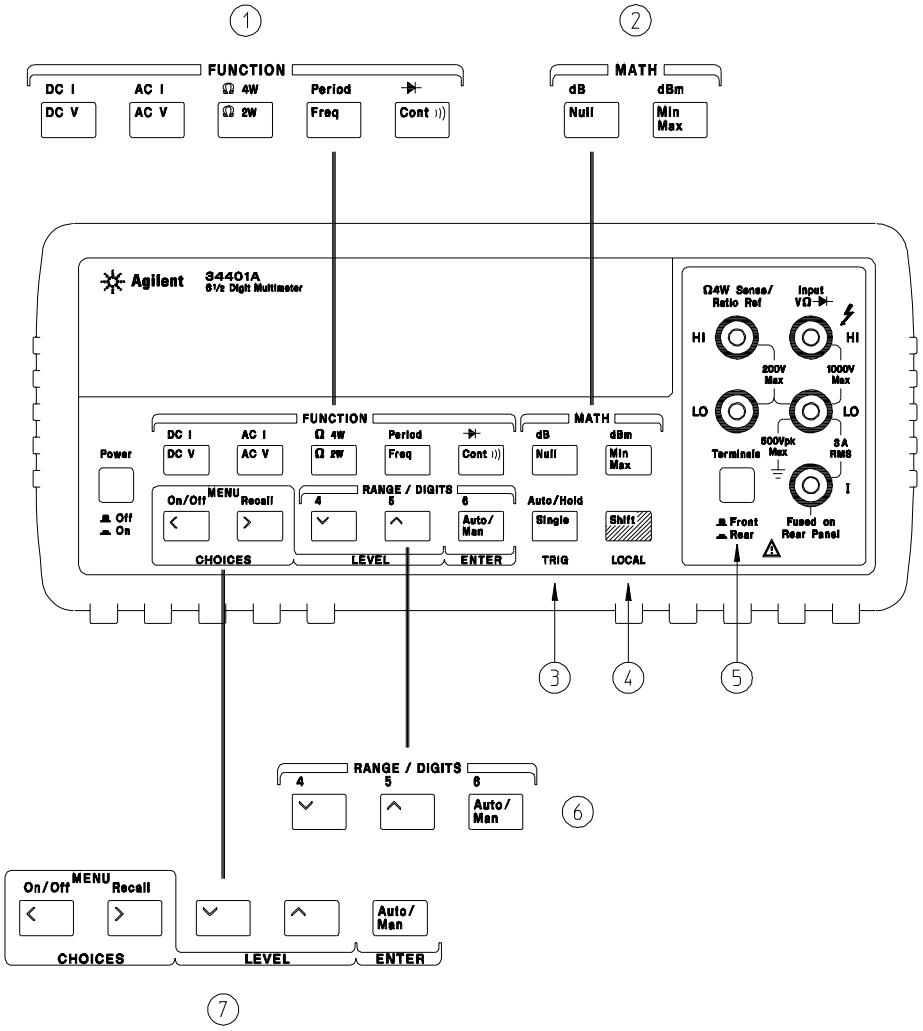
Agilent 34401A

Multimeter

Service Guide

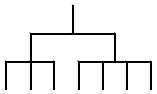


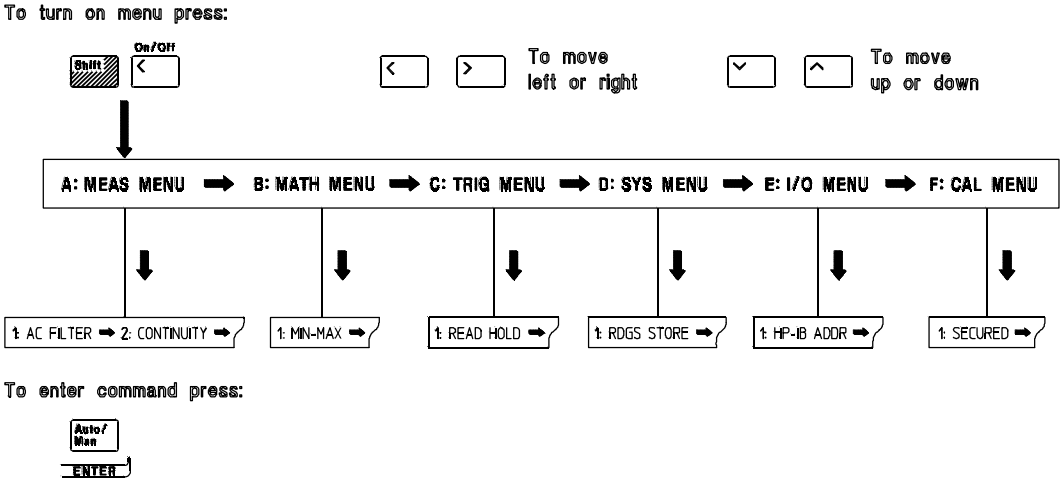
Agilent Technologies



1 Measurement Function keys
2 Math Operation keys
3 Single Trigger / Autotrigger / Reading Hold key
4 Shift / Local key
5 Front / Rear Input Terminal Switch
6 Range / Number of Digits Displayed keys
7 Menu Operation keys

The menu is organized in a top-down tree structure with three levels.





A: MEASurement MENU

1: AC FILTER > **2:** CONTINUITY > **3:** INPUT R > **4:** RATIO FUNC > **5:** RESOLUTION

B: MATH MENU

1: MIN-MAX > **2:** NULL VALUE > **3:** dB REL > **4:** dBm REF R > **5:** LIMIT TEST > **6:** HIGH LIMIT > **7:** LOW LIMIT

C: TRIGger MENU

1: READ HOLD > **2:** TRIG DELAY > **3:** N SAMPLES

D: SYStem MENU

1: RDGS STORE > **2:** SAVED RDGS > **3:** ERROR > 4: TEST > **5:** DISPLAY > **6 :** BEEP > **7:** COMMA > 8 : REVISION

E: Input / Output MENU

1: HP-IB ADDR > **2:** INTERFACE > **3:** BAUD RATE > **4:** PARITY > **5:** LANGUAGE

F: CALibration MENU*

1: SECURED > [**1:** UNSECURED] > [**2:** CALIBRATE] > **3:** CAL COUNT > **4:** MESSAGE

***** The commands enclosed in square brackets ([ ]) are “hidden” unless the multimeter is UNSECURED for calibration.

In This Book

Specifications Chapter 1 lists the multimeter's specifications and describes how to interpret these specifications.

Quick Start Chapter 2 prepares the multimeter for use and helps you get familiar with a few of its front-panel features.

Menu Tutorial Chapter 3 introduces you to the front-panel menu and steps you through several simple menu examples.

Calibration Procedures Chapter 4 provides a detailed description of the multimeter's calibrations and adjustments.

Theory of Operation Chapter 5 describes each functional block in the multimeter.

Service Chapter 6 provides guidelines for returning your multimeter to Agilent for servicing, or for servicing it yourself.

Replaceable Parts Chapter 7 contains a detailed parts list of the multimeter.

Backdating Chapter 8 describes the procedures involved with back issues of this manual.

Schematics Chapter 9 provides the multimeter's schematics.

*If you have questions relating to the operation of the Agilent 34401A, call **1-800-452-4844** in the United States, or contact your nearest Agilent Sales Office.*

*If your 34401A fails within three years of purchase, Agilent will repair or replace it free of charge. Call **1-877-444-7278** ("Agilent Express") in the United States, or contact your nearest Agilent Sales Office.*

Contents

Chapter 1 Specifications

DC Characteristics 12
AC Characteristics 14
Frequency and Period Characteristics 16
General Information 18
Product Dimensions 19
To Calculate Total Measurement Error 20
Interpreting Multimeter Specifications 22
Configuring for Highest Accuracy Measurements 25

Chapter 2 Quick Start

To Prepare the Multimeter for Use 29
If the Multimeter Does Not Turn On 30
To Adjust the Carrying Handle 32
To Measure Voltage 33
To Measure Resistance 33
To Measure Current 34
To Measure Frequency (or Period) 34
To Test Continuity 35
To Check Diodes 35
To Select a Range 36
To Set the Resolution 37
To Make Null (Relative) Measurements 38
To Store Minimum and Maximum Readings 39
To Make dB Measurements 40
To Make dBm Measurements 41
To Trigger the Multimeter 42
To Make dcv:dcv Ratio Measurements 43
Front-Panel Display Formats 44
To Rack Mount the Multimeter 45

Chapter 3 Menu Tutorial

Front-Panel Menu Reference 49
A Front-Panel Menu Tutorial 51
Menu Examples 53

Contents

Chapter 4 Calibration Procedures

Agilent Calibration Services 61
Calibration Interval 61
Time Required for Calibration 61
Automating Calibration Procedures 62
Recommended Test Equipment 63
Test Considerations 64
Performance Verification Tests 65
Zero Offset Verification 67
Gain Verification 69
Optional AC Performance Verification Tests 72
Calibration Security Code 73
Calibration Count 75
Calibration Message 75
Calibration Procedures 76
Aborting a Calibration in Progress 76
Zero Adjustment 77
Gain Adjustment 79
Optional Gain Calibration Procedures 82
Understanding the AC Signal Filter 85
Understanding Resolution 86
Error Messages 89

Chapter 5 Theory of Operation

Block Diagram 93
Front/Rear Selection 94
Function Switching 95
DC Amplifier 96
Ohms Current Source 98
AC Circuit 99
A-to-D Converter 101
Floating Logic 103
Earth-Referenced Logic 105
Power Supplies 106
Front Panel 107

Chapter 6 Service

Operating Checklist 111
Types of Service Available 112
Repackaging for Shipment 113
Electrostatic Discharge (ESD) Precautions 114
Surface Mount Repair 114
To Replace the Power-Line Fuse 114
To Replace The Current Input Fuses 115
To Connect Pass/Fail Output Signals 115
Troubleshooting Hints 117
Self-Test Procedures 120

Chapter 7 Replaceable Parts

To Order Replaceable Parts 126
Backdating and Part Changes 126
Replaceable Parts: 34401-66501 (Main Assembly) 127
Replaceable Parts: 34401-66512 (Display Assembly) 133
Replaceable Parts: Agilent 34401A Mainframe 134
Manufacturer's List 135

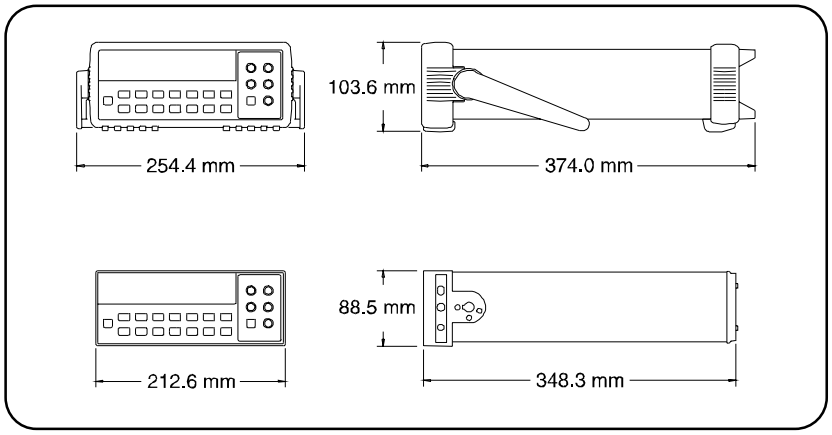
Chapter 8 Backdating 137

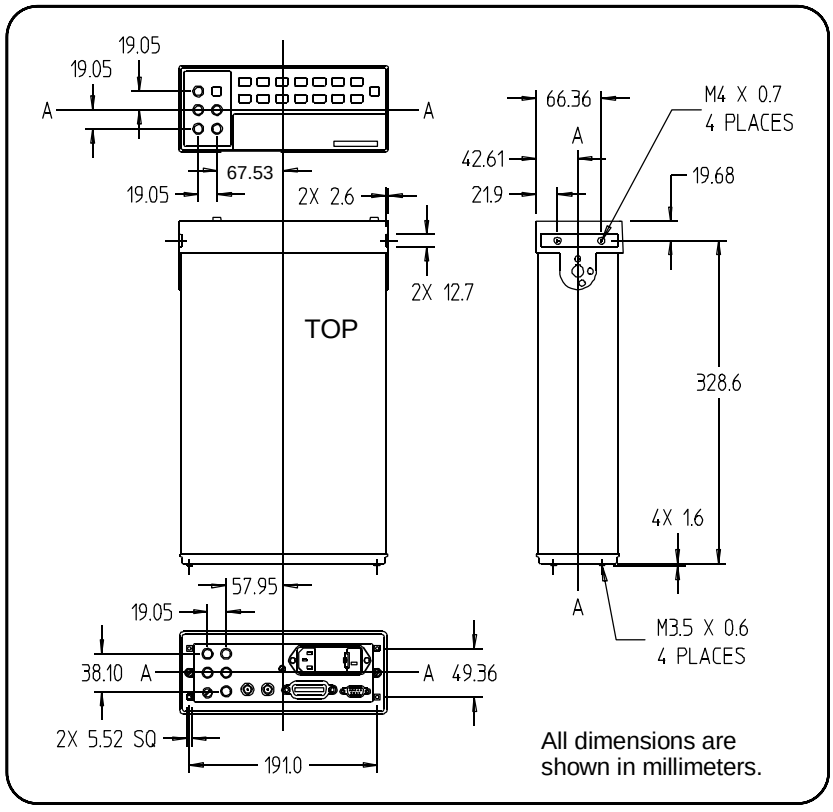
Chapter 9 Schematics

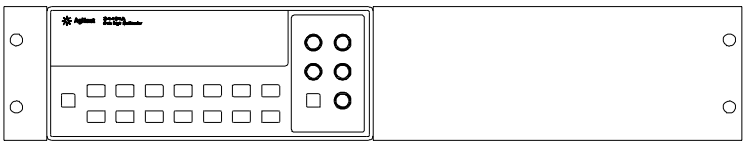
Mechanical Disassembly 9-3
Component Locator Diagram – Main Board (34401-66501) 9-5
Component Locator Diagram – Front Panel (34401-66512) 9-6
Agilent 34401A Block Diagram 9-7
Front/Rear Selection Schematic 9-8
Function Switching Schematic 9-9
DC Amplifier and Ohms Schematic 9-10
AC Circuit Schematic 9-11
A/D Converter Schematic 9-12
Floating Logic Schematic 9-13
Earth-Referenced Logic Schematic 9-14
Power Supplies Schematic 9-15
Front-Panel Display Schematic 9-16

Specifications

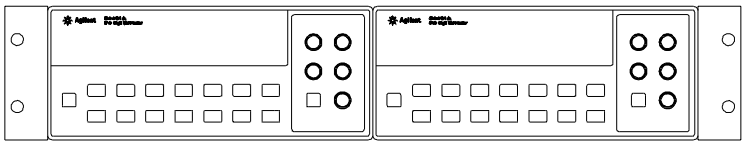
Product Dimensions



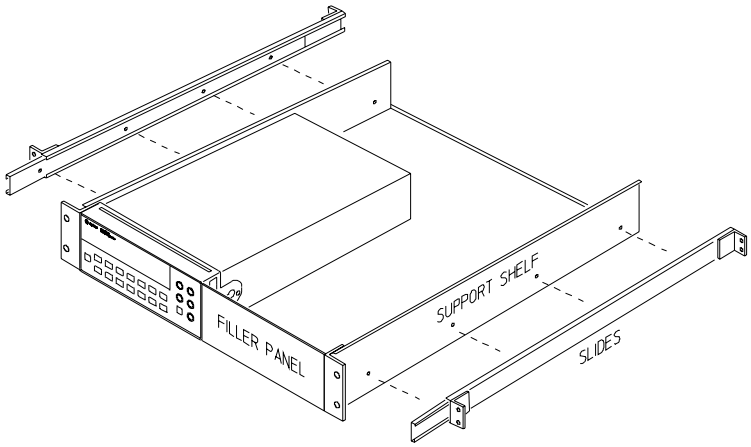




To rack mount a single instrument, order adapter kit 5063-9240.



To rack mount two instruments side-by-side, order lock-link kit 5061-9694 and flange kit 5063-9212.



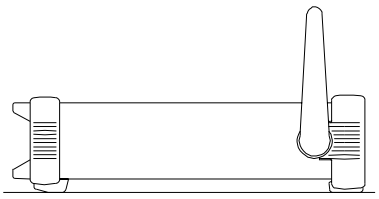
To install one or two instruments in a sliding support shelf, order shelf 5063-9255, and slide kit 1494-0015 (for a single instrument, also order filler panel 5002-3999).

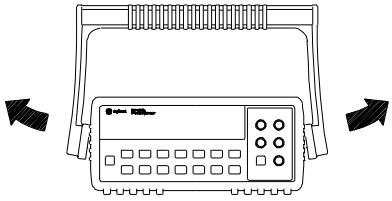
2

To Rack Mount the Multimeter

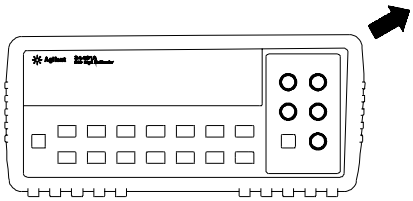
You can mount the multimeter in a standard 19-inch rack cabinet using one of three optional kits available. Instructions and mounting hardware are included with each rack-mounting kit. Any Agilent *System II* instrument of the same size can be rack-mounted beside the 34401A.

Remove the carrying handle, and the front and rear rubber bumpers, before rack-mounting the multimeter.

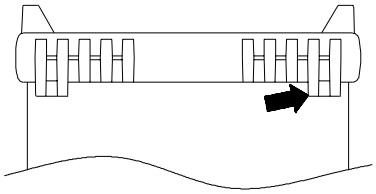




To remove the handle, rotate it to the vertical position and pull the ends outward.



Front



Rear (bottom view)

To remove the rubber bumper, stretch a corner and then slide it off.