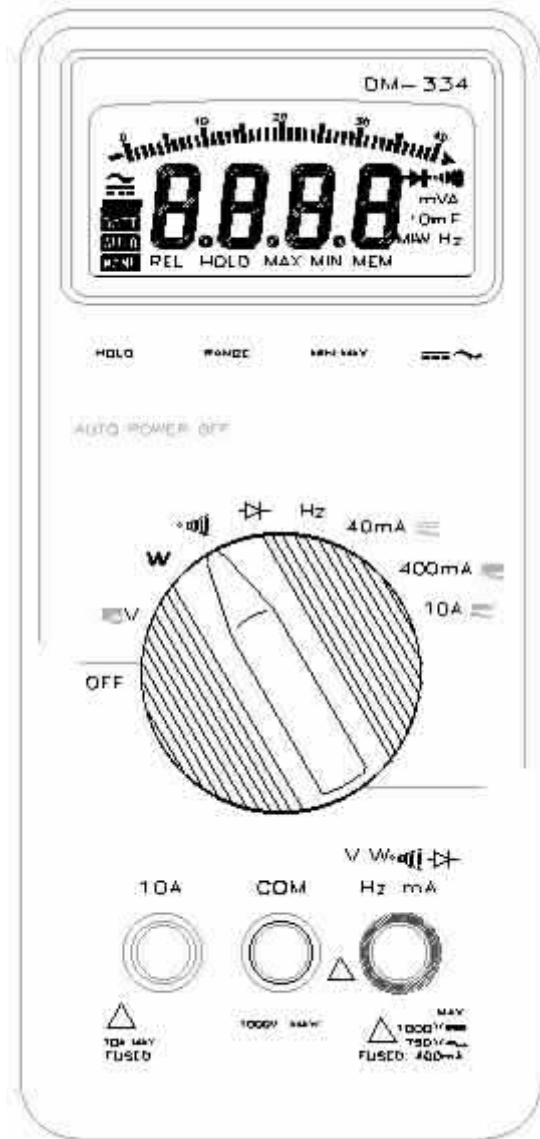


Adjustment and Test procedure Manual
for digital multimeter
Model: DM-334



LG Precision Co., Ltd.

Last Modified : 1999/10/09

P/N:

General Specifications of DM-334

Display: 3 3/4 Digit Multimeter

Battery Life: Typical 200 hours

Operating Temperature: 0°C ~ 40°C ($\leq 80\%$ RH)

Auto Power Off : 30 minutes

Storage temperature: -10°C ~ 60°C ($\leq 70\%$ RH)

Accuracy guaranteed temperature: 23°C \pm 5°C ($\leq 80\%$ RH)

Maximum Reading Rate: 2 readings / second

Explanation of each part of DM-334

∧ 1 **LCD Display**

current measure terminal

∧ 1 **Rotary S/W**

∧ 1 **Terminal COM**

Used for selecting mode and range.

Used for common terminal

∧ 1 **Terminal Ω -V-mA-Hz**

∧ 1 **Terminal 10A**

Used for AC/DC voltage, Resistance, frequency and

Used for measuring DC/AC current below 10A

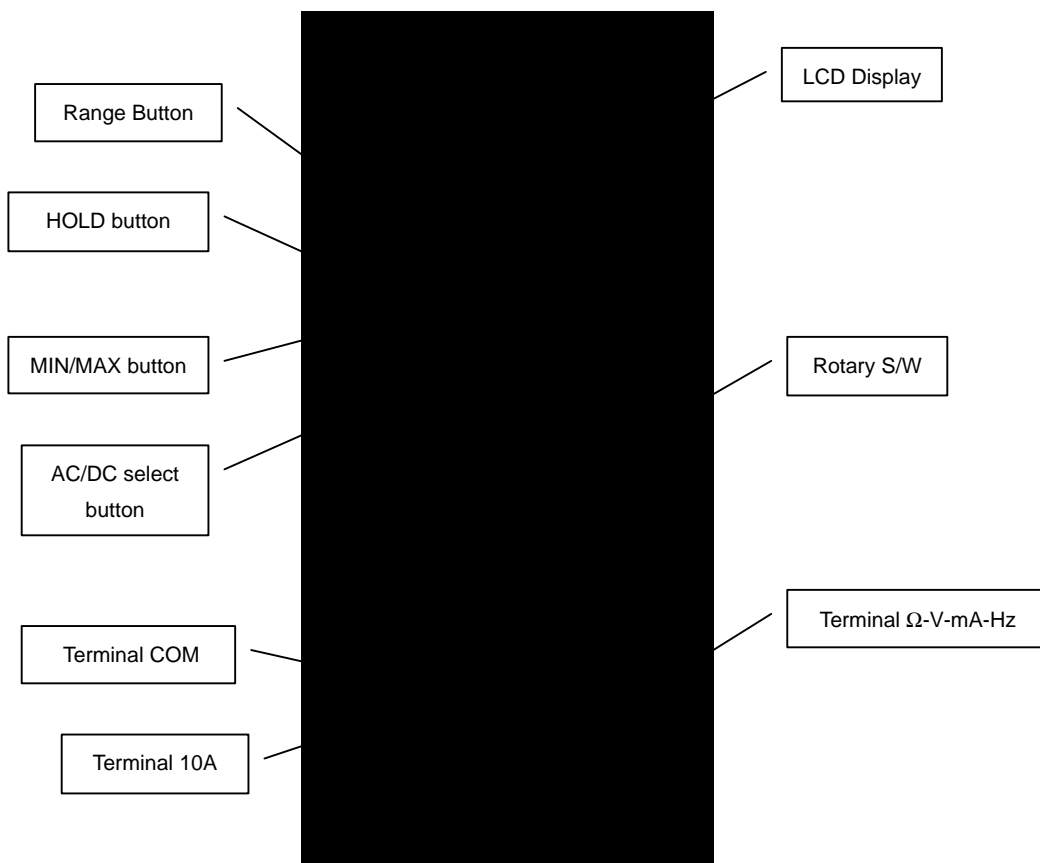


Fig 1 - Front View of DM-334



Note

Adjustment and Test of DM-334 should be conducted under proper test environment.

Check operating temperature and relative humidity before adjustment and test.

Accuracy guaranteed temperature: 23°C \pm 5°C (Below 80% RH)

I Test Equipment List

DMM Calibrator: 1set.

Decade Resistor, Decad Capacitor : Each 1 set

Decade Capacitor: 1set.

Signal Generator: 1set

DC Power Supply (0 ~ 12V) or 1.5V Battery X 2

DMM (3 3/4 Digit) : 1set

I Calibration Procedure

1. Power On Test

Turn DM-334 on by using rotary S/W and check LCD display is turned on.

2. Function Check

2-1. LCD Display Test

Set each mode of DM-334 and Check LCD Display. Below chart shows correct display

Function	LCD Display
DC VOLTAGE(AUTO)	000.0mV
AC VOLTAGE(AUTO)	0.000V
DC CURRENT(MANUAL)	00.00mA → 000.0mA → 00.00A
AC CURRENT(MANUAL)	00.00mA → 000.0mA → 00.00A
Hz(AUTO)	00.00Hz
Diode	More than 2.400V
Continuity	400.0Ω
Resistor(AUTO)	40.00MΩ

2-2. MIN/MAX Function Test

Check min/max display is set each time MIN/MAX button is pushed.

2-3. HOLD Function Test

Check display is hold state each time HOLD button is pushed.

2-4 Range Test

Check range is changed each time Range button is pushed. Check Auto Range of DM-334 is set when Range button is pushed more than 1 sec in manual mode.

2-5 Warning System Test

Check Specification	Procedure
Buzzer Sound	Set other range with inserting a probe to 10A terminal on DC 10A range or AC 10A range.
Insertion is not allowable	Insert a probe to 10A terminal on other range except DC 10A range or AC 10A range.

2-6 Auto Power Off Test

If DM-334 is no-operation state during 30 minutes after power-on, DM-334 will be shut down

2-7. Low Battery Warning Display Test

Check a message, "BATT" on LCD display when Power supply or Battery Voltage goes below 2.4V.

3. Adjustment of DC voltage, AC voltage and DC current.

Function	Adjustment Specification	Adjustment Procedure
Reference Voltage	0.999 ~ 1.000	1. Set Rotary S/W to DC Voltage mode 2. Adjust VR2 to be 1.000V of TP1 voltage.
DC Voltage	389.8~390.2	1. Set Rotary S/W to DC Voltage mode. 2. Apply DC 390mV to Terminal COM and Terminal V of DM-334 with a calibrator 3. Adjust VR3 to be displayed 390.00mV on LCD display
AC Voltage	3.895~ 3.905	1. Set Rotary S/W to AC Voltage mode 2. Apply AC 3.9V/60Hz to Terminal COM and Terminal V with a calibrator 3. Adjust VR1 to be displayed 3.900V on LCD display
DC Current	9.95 ~ 10.05	1. Set Rotary S/W to DC Current 10A Mode 2. Apply DC 10A current to Terminal COM and Terminal 10A with a calibrator 3. Adjust MN Wire(R18) to be displayed 10.00A on LCD display with a ripper

4. Test

4-1 No Input on DC Voltage Mode

- n Specification : $\pm 001.0\text{mV}$
- n Set Rotary S/W to DC Voltage 400mV range and check DM-334 to meet the above specification.

4-2 Short-circuit on DC Voltage Mode

- n Specification : $\pm 000.1\text{ mV}$
- n Set Rotary S/W to DC Voltage 400mV range and Short-circuit between terminal COM and terminal V
- n Check DM-334 to meet the above specification.

4-3 Bar Graph Test

Check bar graph is proportional to measurement value and is displayed correctly.

4-4 DC Voltage Measurement Test

Set Rotary S/W to DC Voltage Mode and Apply below voltage to terminal COM and terminal V to each range with a calibrator. Use a range button for changing range of DC Voltage.

Range	Customer Specification	Factory Specification	Test DC Voltage
DC 400mV	$\pm(0.5\% + 1\text{dgt})$	$\pm(0.4\% + 1\text{dgt})$	390mV
DC 4V			3.9V
DC 40V	$\pm(0.5\% + 3\text{dgt})$	$\pm(0.4\% + 3\text{dgt})$	39V
DC 400V			390V
DC 1000V	$\pm(0.7\% + 2\text{dgt})$	$\pm(0.6\% + 2\text{dgt})$	1000V

4-5 AC Voltage Measurement Test

Set Rotary S/W to AC Voltage Mode and Apply below voltage to terminal COM and terminal V to each range with a calibrator. Check the measurement value to each frequency, 60Hz and 400Hz.
Use a range button for changing range of AC Voltage.

Range	Customer Specification	Factory Specification	Test AC Voltage
AC 400mV	$\pm(1.0\%+3\text{dgt})$	$\pm(0.9\%+3\text{dgt})$	390mV/60Hz 390mV/400Hz
AC 4V			3.9V/60Hz 3.9V/400Hz
AC 40V			39V/60Hz 39V/400Hz
AC 400V			390V/60Hz 390V/400Hz
AC 750V			750V/60Hz 750V/400Hz

4-6 DC Current Measurement Test

Set Rotary S/W to DC Current mode and Apply below DC current to terminal COM and terminal mA to each range with a calibrator. Check the measurement value to each range

Range	Customer Specification	Factory Specification	Test DC Current
DC 40mA	$\pm(1.5\%+2\text{dgt})$	$\pm(1.4\%+2\text{dgt})$	39mA
DC 400mA			390mA



Apply below DC current to **terminal COM and terminal 10A** with a calibrator.

Range	Customer Specification	Factory Specification	Test DC Current
DC 10A	$\pm(2.0\%+5\text{dgt})$	$\pm(1.9\%+5\text{dgt})$	9A

4-8 AC Current Measurement Test

Set Rotary S/W to AC Current Mode and Apply below AC current to terminal COM and terminal mA to each range with a calibrator. Check the measurement value to each range

Range	Customer Specification	Factory Specification	Test AC Current
AC 40mA	$\pm(1.5\%+3\text{dgt})$	$\pm(1.4\%+3\text{dgt})$	39mA/60Hz 39mA/400Hz
AC 400mA			390mA/60Hz 390mA/400Hz



Apply below AC current to **terminal COM and terminal 10A** with a calibrator.

Range	Customer Specification	Factory Specification	Test AC Current
AC 10A	$\pm(2.0\%+6\text{dgt})$	$\pm(1.9\%+6\text{dgt})$	9A/60Hz 9A/400Hz

4-9 Resistor Measurement Test

Set Rotary S/W to Resistance Measurement Mode and Apply below resistance value to terminal COM and terminal V to each range with decade resistor. Check the measurement value to each range
Use a Range button to select a range

Range	Customer Specification	Factory Specification	Test Resistance value
400Ω	±(0.7%+2dgt)	±(0.6%+2dgt)	390Ω
4kΩ			3.9kΩ
40kΩ			39kΩ
400kΩ			390kΩ
4MΩ	±(1.0%+2dgt)	±(0.9%+2dgt)	3.9MΩ
40MΩ	±(2.5%+2dgt)	±(2.4%+2dgt)	10MΩ

4-10 Frequency Measurement Test

Set Rotary S/W to "HZ" mode and apply below frequency value to terminal COM and terminal V with a signal generator

Range	Customer Specification	Factory Specification	Test Frequency Value
Frequency	±(0.3%+3dgt)	±(0.3%+3dgt)	100Hz/RMS Sine Wave 100mV
			1KHz/RMS Sine Wave 100mV
			10KHz / RMS Sine Wave 100mV
			100KHz / RMS Sine Wave 2V
			900KHz / RMS Sine Wave 4V

4- 11Diode & Continuity Test

Set Rotary S/W to diode test mode and apply a diode to terminal COM and terminal V with forward direction.

Range	Customer Specification	Factory Specification
Diode		Forward Direction : $0.500 \leq$ Reverse Direction : $2.600 \leq$

Set Rotary S/W to continuity test mode and Short-circuit between terminal COM and terminal V.
Buzzer will sound when measurement value is lower than 40Ω.

Range	Customer Specification	Factory Specification
Continuity		Short Circuit : less than 000.3

4-15 Short-circuit ohm Test

Set Rotary S/W to Resistance 400Ω range and short-circuit to terminal COM and terminal V

Range	Customer Specification	Factory Specification
400Ω		Less than 0.4Ω

Appendix A) Bill of material

] <u>Xala@_</u>	Trfvx, .E	dfvtwtriz, €	aTSIWz€u_l,	b^r€tZ€
DDE>ABD>B	Sf dYZ_X	Z_af eIT` cVIS|RT\IU^ ^		B
DDE>ABD>C	Sf dYZ_X	Z_af eIT` cVlcVUIU^ ^		C
DGC>ADF	dacZ_X	dYZV|UldacZ_XIU^ ^	daB	B
DI E>ABG>B	Y`]UVc	SReIY`]UVcIRR9f ^ >D:i Cif]		B
EBI >BAB	WZ] ^lgZ_j]	aaZCFIhNGA?AIU^ ^ IR11 ^ Rd\Z_X		B
FBD>FFBcF	aTSISRCVIS@U	U^ >DDEIaTSIcVgIF		B
FCB>BDB	dhZeTY	af dYId?hIad>CCBGR>]1_d		B
FGD>AGE>C	Wf dV	CFAgIA?FRIFAWf] 7Vf	WB	B
FGD>AGG	Wf dV	CFAgIBARIYDBEABAI f] VBEAIA	WC	B
FGD>AGI	Wf dV	BCFgIBRICC_ ^ 1^ Zc` 1BAB]	WD	B
FGE>ABF	Wf dVIY`]UVc	Wf dVIY`]UVcIWTfBR9U^ ^ :		C
FGE>ABJ	Wf dVIY`]UVc	Wf dVIY`]UVcIWTGBSIBAR		C
FHB>DBF	gRcZRS] VlcVdZde` c	gcle^ TD\ISBA`19d^ U:	gcB	B
FHB>DBG	gRcZRS] VlcVdZde` c	gcle^ TD\ISCA`19d^ U:	gcC=gcD	C
FHD>BBJ	cVdZde` c	^?X111FI^ ^ Y^ IB@Ch1A?CFG	cC	B
FHD>BCB	cVdZde` c	h?h1A?JJ1` Y^ IBh1A?CFG	cBH	B
FHD>BDH	cVdZde` c	^?XIBAI^ ^ Y^ IB@Ch1>A?C@A?AFG	cG	B
FHD>BDI	cVdZde` c	^?XIB?BB^ ^ Y^ IB@Ch1>A?C@A?AFG	cBD	B
FHD>BDJ	cVdZde` c	^?WIBABI` Y^ IB@Eh1>A?C@A?AFG	cBC	B
FHD>BEA	cVdZde` c	^?W11BAI` Y^ IB@Eh1>A?C@A?AFG	cBB	B
FHD>BEB	cVdZde` c	^?WIBI` Y^ IB@Eh1>A?C@A?AFG	cBA	B
FHD>BEC	cVdZde` c	^?WIBAAI>` Y^ IB@Eh1>A?C@A?AFG	cJ	B
FHE>AFC>C	aeT	aeAF^ a>]B\GAAB	cF	B
FHE>AFC>C	aeT	aeAF^ a>]B\GAAB	cFR	B
FHE>AFF	daRc\IXRa	RXBFA TIBFCWd> \C^ IURZ` j UV_	dXB	B
FI B>BHG	TRaRTZe` c	V]VTIBAf WBGgldcV>ej aV	TH	B
FI B>BJF	TRaRTZe` c	^ aIA?Bf WIGDgl[1^ ^ j BGI	TBC=TBD=TBF=TBH	E
FI B>CAE	TRaRTZe` c	^ aIA?ABf WIGDgl[1^ ^ j BGI	TBE	B
FI B>CCA	TRaRTZe` c	^ aIA?ADDf WIGDgl\1^ ^ j BGI	TBA=TBB	C
FI B>CCB	TRaRTZe` c	V]VTIA?EHf WfAgldcV>ej aV	TE=TF	C
FI B>CCC	TRaRTZe` c	V]VTIC?Cf WDFgldcV>ej aV	TI=TJ	C
FIF>BFE>B	UZ` UV	c]BAF	UD=UE	C
FIF>CEI	UZ` UV	\UdCCG19d^ U:i\VT	UB	B
FIF>CFD	UZ` UV	\UdBI B19d^ U:i\VT	UC	B
FIF>CGC	UZ` UV	\UdBI E19d^ U:	UF=UG	C
FJB>GEF	ZT	_ [f JCBAWUIR>UIT` _1_]cT	f B	B
GBB>GGE	ecR_dZde` c	\dTDCIR	bC=bd	C
GBB>GGF	ecR_dZde` c	\cTBBAd19d^ U:	bB	B
GDH>ABD	Sf kkVc	Sf kkIdSe>BBa	SB	B
GEI >AHE	Tcj deR]	i >eR]IE^ Yk1YT>EJ@f lej aV	j B	B
IHD>ACI c	^ _1hZcV	^ _1hZcVIT^ CIBA^ ^ Y^	cBI	B
IHD>ACH	^ €1hZcVIT^ CIUZRB?G^ ^	^ €1hZcVIT^ CIUZRB?G^ ^		B
T\BYZBAAU	TRaRTZe` c	TVcIBAaWfAg1U19CABC:	TB	B
T\BYZBAE^	TRaRTZe` c	TVcIA?Bf WfAg1^ 19CABC:	TD=TG	C
T\BYZBFA]	TRaRTZe` c	TVcIBFaWfAg1[19CABC:	tBI	B
T\BYZCA]	TRaRTZe` c	TVcICCaWfAg1[19CABC:	TC	B
cXATaBAH[	cVdZde` c	^?XIBAAI^ ^ Y^ IB@ChIFG	cD	B
cXATaBAH[	cVdZde` c	^?XIBAAI^ ^ Y^ IB@ChIFG	cBJ	B
c^ RYBAAA[	cVdZde` c	^?WIBAAI>` Y^ IB@h1fG19DCBG:	cB=cDG	C
c^ RYBAABW	cVdZde` c	^?W11B1` Y^ IB@h1BfG19DCBG:	cCF	B
c^ RYBAADW	cVdZde` c	^?WIBAAI` Y^ IB@h1BfG19DCBG:	cBE=cBF	C
c^ RYBAAEW	cVdZde` c	^?WIB1^ ^ Y^ IB@h1BfG19DCBG:	cCG	B
c^ RYBAAE[	cVdZde` c	^?W11B1^ ^ Y^ IB@h1fG19DCBG:	cDH	B
c^ RYBFAC[	cVdZde` c	^?W11BF1` Y^ IB@h1fG19DCBG:	cCD	B

]Xala@_	Trıvx, .£	dfvtzwtıřz, €	aTSIWz€ul,	b`r€ıřz
c^ RYCCAC[	cVdZde` c	^?W11CCI\` Y^1B@h1F619DCBG:	cCB=cCC	C
c^ RYDDAD[	cVdZde` c	^?W1DDA1\` Y^1B@h1F619DCBG:	cCA	B
c^ RYDDAD[	cVdZde` c	^?W1DDA1\` Y^1B@h1F619DCBG:	cCE	B
c^ RYDGAC[	cVdZde` c	^?W11DGI\` Y^1B@h1F619DCBG:	cCH	B
c^ RYFBAAW	cVdZde` c	^?W1FBA1>\` Y^1B@h1F619DCBG:	cDC	B
c^ RYGIAC[	cVdZde` c	^?W11GI1\` Y^1B@h1F619DCBG:	cCI	B
c^ RYGIAD[	cVdZde` c	^?W1GIA1\` Y^1B@h1F619DCBG:	cCJ	B
c^ SaBAAAW	cVdZde` c	^?W1BAA1>\` Y^1B@Eh1B6	cI	B
c^ SaGIADT	cVdZde` c	^?W1GIA1\` Y^1B@Eh1?CF6	cDA=cDB	C
c^ SaJcAAT	cVdZde` c	^?W111J1>\` Y^1B@Eh1?CF6	cBG	B
c^ TaBAAEW	cVdZde` c	^?W111B1^` Y^1B@Ch1B6	cH	B

Appendix B) Schematic Diagram

