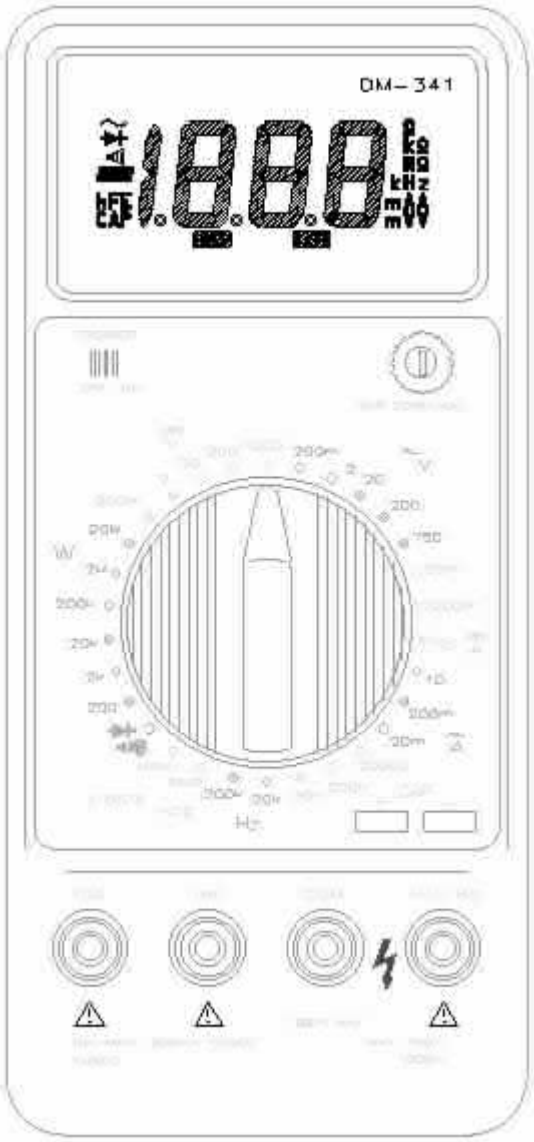
Adjustment and Test procedure Manual for digital multimeter Model: DM-341



LG Precision Co., Ltd.

1999/9/1 P/N:

Revision History

NO	Modification	ECN NO	Date	Name

General Specifications of DM-341

Display: 4½ Digit Multimeter

Battery Life: Typical 200 hours

Operating Temperature: 0ºC ~ 40ºC (≤ 80% RH)

Storage temperature: -10ºC ~ 60ºC (≤ 70% RH)

Accuracy guaranteed temperature: 23ºC ± 5ºC (≤ 80% RH)

Maximum Reading Rate: 2 readings / second

Explanation of each part of DM-341

æĥ= **LCD Display**

æĦ= **Capacitor Zero Adjustment**
Used for zero display adjustment in capacitor measure mode.

æĥ= **Power S/W**

æĨ= **Rotary S/W**
Used for selecting mode and range.

æĭ= **Capacitance Socket**
Used for inserting capacitor to measure

æĬ= **Transistor Socket**
Used for inserting transistor to measure

æĭ= **Terminal Ω-V-Hz**
Used for AC/DC voltage, Resistance and frequency measure terminal

æĬ= **Terminal COM**
Used for common terminal

æĭ= **Terminal mA**
Used for measuring DC/AC current below 200mA current

æĮ= **Terminal 10A**
Used for measuring DC/AC current below 10A

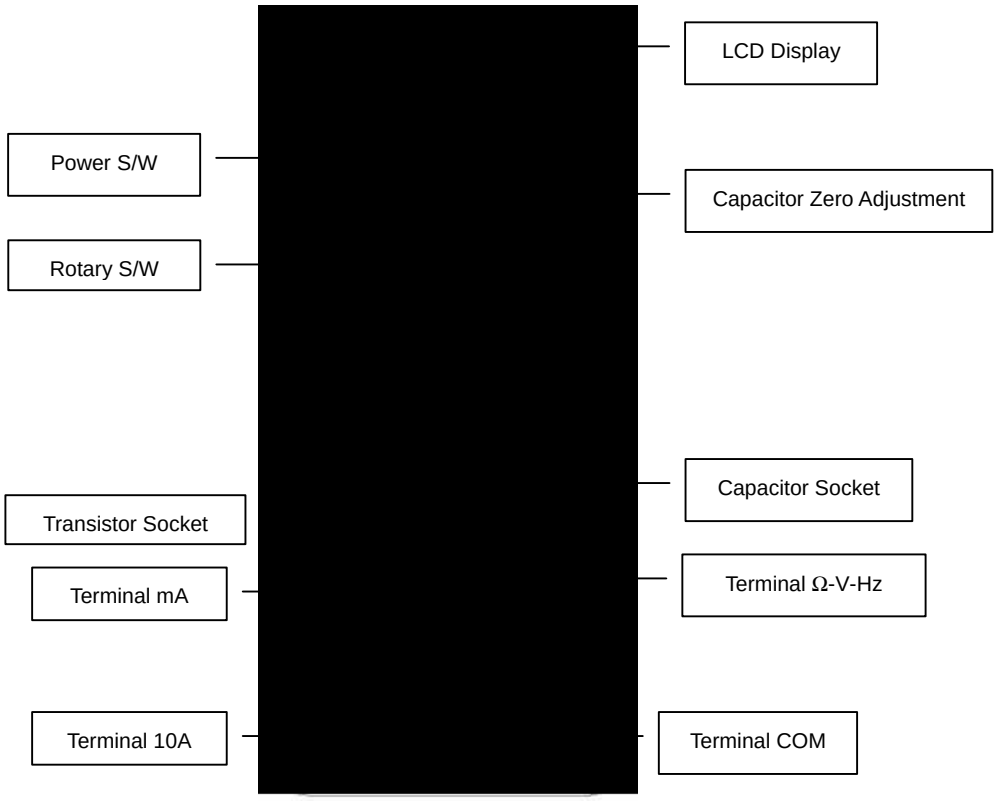


Fig 1 - Front View of DM-341

Note

Adjustment and Test of DM-341 should be conducted under proper test environment.

Check operating temperature and relative humidity before adjustment and test.

Accuracy guaranteed temperature: 23ºC ± 5ºC (Below 80% RH)

l Test Equipment List

DMM Calibrator: 1set Decade Resistor: 1 set

Decade Capacitor: 1set Signal Generator: 1set

DC Power Supply (0 ~ 12V) or 9V Battery

l Calibration Procedure

1. Power On Test

Turn DM-341 on by using power S/W. and check LCD display is turned on.

2. LCD Display Test

Check LCD Display to each range by selecting range with Rotary S/W. Below chart shows correct display

Function	LCD Display to each range
DC VOLTAGE	00.00 → .0000 → 0.000 → 00.00 → 000.0
AC VOLTAGE	00.00 → .0000 → 0.000 → 00.00 → 000.0
DC CURRENT	0.000 → 00.00 → 0.000
AC CURRENT	0.000 → 00.00 → 0.000
RESISTANCE	1 . → 1. →1 . →1 . →1. → 1 .
CAPACITANCE	000.0 → 00.00 → 0.000
hFE	000.0 → 000.0
FREQUENCY	0.000 → 00.00
DIODE & CONTINUITY	1 .

3. Low Battery Warning Display Test

Check a message, “BATT” on LCD display when Power supply or Battery Voltage goes below 6.4V.

4. Adjustment of DC voltage, AC voltage DC current, Capacitance ,Frequency and Diode.

Function	Adjustment Specification	Procedure
DC Voltage	189.98~190.02	1. Set Rotary S/W to DC Voltage 200mV range 2. Apply DC 190mV to Terminal COM and Terminal V of DM-341 with a calibrator 3. Adjust VR1 to be displayed 190.00mV on LCD display
AC Voltage	189.95~ 190.05	1. Set Rotary S/W to AC Voltage 200mV range 2. Apply AC 190mV/60Hz to Terminal COM and Terminal V with a calibrator 3. Adjust VR2 to be displayed 190.00mV on LCD display
DC Current	9.995 ~ 10.005	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(R30) to be displayed 10.000A on LCD display with a ripper
Capacitance	189.90 ~ 190.10	1. Set Rotary S/W to “CAP” 200nF Range 2. Set 00.00 display with ZERO ADJ. 3. Apply 190nF between CAP jack with a decade capacitor 4. Adjust VR4 to be displayed 190.00 on LCD display
	18.990 ~ 19.010	1. Set Rotary S/W to “CAP” 20μF Range 2. Set 0.000 display with ZERO ADJ. 3. Apply 19μF between CAP jack with a Decade capacitor 4. Adjust VR3 to be displayed 19.000 on LCD display
Frequency	18.995 ~ 190.05	1. Set Rotary S/W to “Hz” 20KHz Range 2. Apply 19KHz/RMS 100mV to Terminal V and Terminal COM. 3. Adjust VR7 to be displayed 19.000 kHz on LCD display
	189.95 ~ 190.05	1. Set Rotary S/W to “Hz” 20KHz Range 2. Apply 190KHz/RMS 100mV to Terminal V and Terminal COM. 3. Adjust VR6 to be displayed 190.00 kHz on LCD display
Diode & Continuity	99.95 ~ 100.05	1. Set Rotary S/W to Diode & Continuity mode 2. Apply 100 Ω to Terminal V and Terminal COM with decade resistor. 3. Adjust VR8 to be displayed 100.00Ω on LCD display

5.Test

5-1 No Input on DC Voltage Mode

- Specification : ±00.1mV
- Set Rotary S/W to DC Voltage 200mV range and check DM-341 to meet the above specification.

5-2 Short-circuit on DC Voltage Mode

- Specification : ±00.1 mV
- Set Rotary S/W to DC Voltage 200mV range and Short-circuit between terminal COM and terminal V
- Check DM-341 to meet the above specification.

5-3 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

Range	Customer Specification	Factory Specification	Test DC Voltage
DC 200mV	±(0.05% + 4dgt)	±(0.05% + 4dgt)	190mV
DC 2V			1.9V
DC 20V			19V
DC 200V			190V
DC 1000V	±(0.15% + 4dgt)	±(0.14% + 4dgt)	1000V

5-4 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.

Range	Customer Specification	Factory Specification	Test AC Voltage
AC 200mV	±(0.5%+10dgt)	±(0.45%+3dgt)	190mV/60Hz 190mV/400Hz
AC 2V			1.9V/60Hz 1.9V/400Hz
AC 20V			19V/60Hz 19V/400Hz
AC 200V			190V/60Hz 190V/400Hz
AC 750V			750V/60Hz 750V/400Hz

5-5 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 20mA	±(0.5%+1dgt)	±(0.4%+1dgt)	19mA
DC 200mA			190mA

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

Range	Customer Specification	Factory Specification	Test DC Current
DC 10A	±(0.75%+3dgt)	±(0.65%+3dgt)	9A

5-6 AC Current Measurement Test

Set Rotary S/W to AC Current 20mA 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 20mA	±(0.75%+10dgt)	±(0.65%+10dgt)	19mA/60Hz 19mA/400Hz
AC 200mA			190mA/60Hz 190mA/400Hz

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

Range	Customer Specification	Factory Specification	Test AC Current
AC 10A	±(1.5%+10dgt)	±(1.4%+10dgt)	9A/60Hz 9A/400Hz

5-7 Resistance Measurement Test

Set Rotary S/W to Resistance Measure 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

Range	Customer Specification	Factory Specification	Test Resistance value
200Ω	±(2.0%+5dgt)	±(1.9%+5dgt)	190Ω
2kΩ	±(0.2%+2dgt)	±(0.2%+2dgt)	1.9kΩ
20kΩ			19kΩ
200kΩ			190kΩ
2MΩ	±(0.5%+2dgt)	±(0.4%+2dgt)	1.9MΩ
20MΩ			10MΩ

5-8 Capacitor Measurement Test

Set Rotary S/W to “CAP” 200nF range and adjust ZERO ADJ to be displayed 00.0

And apply below capacitance value between CAP jack with a decade capacitor

Range	Customer Specification	Factory Specification	Test Capacitance Value
2000pF	±(2.0%+6dgt)	±(1.9%+6dgt)	1900pF
200nF			190nF
20μF	±(5.0%+4dgt)	±(4.9%+4dgt)	19μF

5-9 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
20KHz	±(2.0%+3dgt)	±(1.9%+3dgt)	19KHz/RMS 100mV
200KHz			190KHz/RMS 100mV

5-10 Transistor hFE Measurement Test

Set Rotary S/W to “hFE” mode and insert transistor below to transistor socket

Range	Customer Specification	Factory Specification	Test Transistor
NPN		120 ~ 240	3198Y
PNP			1266Y

5- 11Diode & Continuity Test

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

Range	Customer Specification	Factory Specification
Diode		Forward Direction : 450.0 ≤ Reverse Direction : 1

Set Rotary S/W to diode & continuity test mode and Short-circuit between terminal COM and terminal V. Buzzer will sound when measurement is lower than 200Ω.

Range	Customer Specification	Factory Specification
Continuity		Open Circuit : 1 Short Circuit : less than 000.4

5-12 Short-circuit ohm Test

Set Rotary S/W to Resistance measure mode and short-circuit to terminal COM and terminal V

Range	Customer Specification	Factory Specification
200Ω		Less than 0.4Ω

Appendix A) Bill of material

LGP P/N	Category	Specification	PCB F/N	Quantity
334-013-1	BUSHING	INPUT CORE BLACK DMM		1
334-013-2	BUSHING	INPUT CORE RED DMM		3
362-035	SPRING	SHIELD SPRING DMM	SP1	1
362-036	SPRING	CAP CHK SPRING DMM		2
384-017-1	HOLDER	BAT SNAP 9V UL		1
418-100	FILM VINYL	PPI255 W=65.0 DMM M		1
513-564R7	PCB BARE B/D	DM-341 PCB REV 7		1
521-108	SWITCH	SW SLIDE KSA-1206		1
531-400	CONNECTOR	HFE SOCKET ESQ-104-23-G-S		1
550-798-A	WIRE HARNESS ASSY	WH DMM341		1
563-063-2	FUSE	250V 0.25A 50F UL&EU	F1	1
563-065	FUSE	250V 10A H216010 ULE14080	F2	1
563-068	FUSE	125V 1A 22NM MICRO 101L	F3	1
564-015	FUSE HOLDER	FUSE HOLDER FC51A(DMM)		4
571-316	VARIABLE RESISTOR	VR TMC3K B20K (SMD)	VR06	1
571-320	VARIABLE RESISTOR	VR TMC3K 2K (SMD)	VR02,VR04,VR08	3
571-321	VARIABLE RESISTOR	VR TMC3K 5K (SMD)	VR07	1
571-322	VARIABLE RESISTOR	VR TM10K(PV) 8USB2K	VR05	1
571-323	VARIABLE RESISTOR	VR TMC3K 500 OHM(SMD)	VR01,VR03	2
573-098	RESISTOR	W.W 0.985 OHM 1W 0.25%	R29	1
574-052-2	PTC	PT05MP-L1K6001	R19	1
574-052-2	PTC	PT05MP-L1K6001	R20	1
574-052-2	PTC	PT05MP-L1K6001	R19A	1
574-055	SPARK GAP	AG15PC 152FS-K2M DAIYOYDEN	SG1	1
581-159	CAPACITOR	CAP 0.047UF 63V M.P MKS	C04	1
581-160	CAPACITOR	ELEC 47UF 16V SRE-TYP	C12 C13 C26	3
581-162	CAPACITOR	ELEC 1UF 50V SRE-TYPE	C16 C17 C18 C32 C33	5
581-176	CAPACITOR	ELEC 10UF 16V SRE-TYPE	C07 C10	2
581-195	CAPACITOR	MP 0.1UF 63V J MMY168	C03 C05 C15 C27	4
581-204	CAPACITOR	MP 0.01UF 63V J MMY168	C28	1
581-221	CAPACITOR	ELEC 0.47UF 50V SRE-TYPE	C19	1
585-154-1	DIODE	RL105	D01 D02 D06 D07	4
585-248	DIODE	KDS226 (SMD) KEC	D03 D08	2
585-261	DIODE	KDS187 (SMD)	D04 D05	2
586-003	VOLTAGE REFERENCE IC	LM385BLP-1-2	Z1	1
591-500	IC	CADDOCK 1776-C611	R16	1
591-647-2	IC	MC74HC00AD (SMD) MOTOROLA	U02	1
591-650	IC	NJM062M-T1 OP-AMP NJRC	U03	1
591-651-1	IC	TIMER TS555ID THOMSON	U4 U5 U6	3
591-653-1	IC	LM393D (SMD) MOTOROLA	U07	1
591-659	IC	TC7129CKW A-D CON TELEDYN	U01	1
611-665	TRANSISTOR	KRC110S (SMD)	Q01	1
611-671	TRANSISTOR	SS8050 SAMSUNG	Q02 Q3	2
637-013	BUZZER	BUZZ SBT-11P	B01	1
648-075	CRISTAL	F=120KHZ TF TYPE	Y1	1
873-028R	MN WIRE	MN WIRE CM2 10MOHM	R30	1
873-027	Mn WIRE CM2 DIA 1.6MM	Mn WIRE CM2 DIA1.6MM		1
CK1HI100D	CAPACITOR	CER 10PF 50V D (2012)	C02	1
CK1HI101J	CAPACITOR	CER 100PF 50V J (2012)	C22	1
CK1HI102K	CAPACITOR	CER 1000PF 50V K (2012)	C21	1

LGP P/N	Category	Specification	PCB F/N	Quantity
CK1HI104M	CAPACITOR	CER 0.1UF 50V M (2012)	C06 C09 C25	3
CK1HI150J	CAPACITOR	CER 15PF 50V J (2012)	C29	1
CK1HI220J	CAPACITOR	CER 22PF 50V J (2012)	C1	1
CK1HI221J	CAPACITOR	CER 220PF 50V J (2012)	C11	1
CK1HI224M	CAPACITOR	CER 0.22UF 50V M (3216)	C31	1
CK1HI272K	CAPACITOR	CER 2700PF 50V K (2012)X7R	C30	1
CK1HI680J	CAPACITOR	CER 68PF 50V J (2012)	C24	1
CK2HI102K	CAPACITOR	CER 1000PF 500V K (1808)	C20	1
RD0BP105J	RESISTOR	C.F 1 MOHM 1/4W 5%	R31	1
RG0CP226J	RESISTOR	M.G 22 MOHM 1/2W 5%	R32	1
RM2P1303J	RESISTER	M.F 130KOHM 2W 5%	R40	1
RMAH1000J	RESISTOR	M.F 100 -OHM 1/8W 5% (3216)	R13 R21	2
RMAH1002J	RESISTOR	M.F 10 KOHM 1/8W 5% (3216)	R33 R34	2
RMAH1003J	RESISTOR	M.F 100 KOHM 1/8W 5% (3216)	R23	1
RMAH1004F	RESISTOR	M.F 1 MOHM 1/8W 1% (3216)	R57	1
RMAH1004F	RESISTOR	M.F 1 MOHM 1/8W 1% (3216)	R11,R12	2
RMAH1004J	RESISTOR	M.F 1 MOHM 1/8W 5% (3216)	R03,R04	2
RMAH1004J	RESISTOR	M.F 1 MOHM 1/8W 5% (3216)	R24 R25 R27 R53	4
RMAH1004J	RESISTOR	M.F 1 MOHM 1/8W 5% (3216)	R54 R64 R65	3
RMAH10R0J	RESISTOR	M.F 10 -OHM 1/8W 5% (3216)	R47	1
RMAH1102F	RESISTOR	M.F 11 KOHM 1/8W 1% (3216)	R39	1
RMAH1103F	RESISTOR	M.F 110 KOHM 1/8W 1% (3216)	R48	1
RMAH1301F	RESISTOR	M.F 1.3 KOHM 1/8W 1% (3216)	R55	1
RMAH1403F	RESISTOR	M.F 140 KOHM 1/8W 1% (3216)	R49	1
RMAH1502F	RESISTOR	M.F 15 KOHM 1/8W 1% (3216)	R56	1
RMAH1503J	RESISTOR	M.F 150 KOHM 1/8W 5% (3216)	R02	1
RMAH1603F	RESISTOR	M.F 160 KOHM 1/8W 1% (3216)	R51	1
RMAH1802J	RESISTOR	M.F 18 KOHM 1/8W 5% (3216)	R41 R50	2
RMAH2203F	RESISTOR	M.F 220 KOHM 1/8W 1% (3216)	R46	1
RMAH2400J	RESISTOR	M.F 240 -OHM 1/8W 5% (3216)	R67	1
RMAH2401F	RESISTOR	M.F 2.4 KOHM 1/8W 1% (3216)	R38	1
RMAH2702F	RESISTOR	M.F 27 KOHM 1/8W 1% (3216)	R59	1
RMAH2702F	RESISTOR	M.F 27 KOHM 1/8W 1% (3216)	R45	1
RMAH2702J	RESISTOR	M.F 27 KOHM 1/8W 5% (3216)	R42,44	2
RMAH3301F	RESISTOR	M.F 3.3 KOHM 1/8W 1% (3216)	R36	1
RMAH3303F	RESISTOR	M.F 330 KOHM 1/8W 1% (3216)	R01,R52,R61,R62	4
RMAH4701F	RESISTOR	M.F 4.7 KOHM 1/8W 1% (3216)	R37 R60	2
RMAH4702J	RESISTOR	M.F 47 KOHM 1/8W 5% (3216)	R5,R10	2
RMAH4703F	RESISTOR	M.F 470 KOHM 1/8W 1% (3216)	R58	1
RMAH4703J	RESISTOR	M.F 470 KOHM 1/8W 5% (3216)	R35 R63	2
RMAH5100J	RESISTOR	M.F 510 -OHM 1/8W 5% (3216)	R15	1
RMAH51R0J	RESISTOR	M.F 51 -OHM 1/8W 5% (3216)	R66	1
RMAH7503J	RESISTOR	M.F 750 KOHM 1/8W 5% (3216)	R06 R07 R08 R09	4
RMAH8200J	RESISTOR	M.F 820 -OHM 1/8W 5% (3216)	R14	1
RMAH8201F	RESISTOR	M.F 8.2 KOHM 1/8W 1% (3216)	R26	1
RMAH9103J	RESISTOR	M.F 910 KOHM 1/8W 5% (3216)	R22	1
RMBP1000B	RESISTOR	M.F 100 -OHM 1/4W .1%	R17	1
RMBP1001B	RESISTOR	M.F 1 KOHM 1/4W .1%	R18	1
RMBP2701F	RESISTOR	M.F 2.7 KOHM 1/4W 1%	R68	1
RMBP9R00C	RESISTOR	M.F 9 -OHM 1/4W .25%	R28	1

Appendix B) Schematic Diagram of DM-341