■ MEGOHMMETER

1050
1060

ENGLISH

User Manual

AEMC® INSTRUMENTS

Statement of Compliance

Chauvin Arnoux®, Inc. d.b.a. AEMC® Instruments certifies that this instrument has been calibrated using standards and instruments traceable to international standards.

We guarantee that at the time of shipping your instrument has met its published specifications.

An NIST traceable certificate may be requested at the time of purchase, or obtained by returning the instrument to our repair and calibration facility, for a nominal charge.

The recommended calibration interval for this instrument is 12 months and begins on the date of receipt by the customer. For recalibration, please use our calibration services. Refer to our repair and calibration section at **www.aemc.com**.

Serial #: _____

Catalog #: 2130.01 / 2130.03

Model #: 1050 / 1060

Please fill in the appropriate date as indicated:

Date Received: _____

Date Calibration Due: _____

AEMC® INSTRUMENTS

Chauvin Arnoux®, Inc.
d.b.a AEMC® Instruments
www.aemc.com

Table of Contents

1. INTRODUCTION 5

1.1 International Electrical Symbols 5

1.2 Definition of Measurement Categories 6

1.3 Receiving Your Shipment 6

1.4 Ordering Information 6

1.4.1 Accessories and Replacement Parts 7

1.4.2 Accessory Information 7

2. PRODUCT FEATURES 8

2.1 Control Features 10

2.2 Digital Display Features 11

2.3 Bargraph 11

2.4 Symbols 12

2.5 Button Functions 13

2.5.1 2nd Button 13

2.5.2 V-TIME Button 13

2.5.3 R-DAR-PI R(t) Button 14

2.5.4 ALARM Button 16

2.5.5 SMOOTH Button 17

2.5.6 UP/DOWN Button 18

2.5.7 SET-UP Button (Configuring the Instrument) 18

2.5.8 Clearing the Memory 20

2.5.9 Communication Rate (RS-232) 20

2.5.10 Lead Resistance Compensation 20

2.5.11 Default Device Configuration 21

2.5.12 Blocking (Disabling) Test Voltages 21

2.6 Measurement Functions 21

2.6.1 AC/DC Voltage 21

2.6.2 Insulation Measurement 22

2.6.3 Continuity (40Ω)/Resistance (400kΩ) 23

3. SPECIFICATIONS 24

3.1 Reference Conditions 24
3.2 Voltage 24
3.3 Insulation Resistance 24
3.4 Continuity 28
3.5 Resistance 28
3.6 Power Supply 29
3.7 Mechanical Specifications 30
3.8 Environmental Specifications 30
3.9 Safety Specifications 30

4. OPERATION 31

4.1 Measurement Procedure 31
4.2 Insulation Measurement 31
4.3 Continuity Measurement 32
4.4 Resistance Measurement 32
4.5 Capacitance Measurement 32

5. MEMORY / RS-232 (Model 1060) 33

5.1 RS-232 Specifications 33
5.2 Saving / Recalling Values (MEM/MR Button) 33
5.3 Printing Measured Values 35
5.4 Instantaneous Printing of Measurements (PRINT button) 36
5.5 Printing Data in Memory (PRINT MEM button) 37

6. APPLICATION EXAMPLES 39

6.1 Insulation Measurements on Electrical Installations 39
6.2 Measurements on Electrical or Telecom Cable 39
6.3 Insulation Measurements on Motors 40

7. USING DATAVIEW® 41

7.1 Installing DataView® 41

7.2 Connecting the Model 1060 to your Computer 44

7.3 Using DataView® 45

7.3.1 Configuring the Instrument 46

7.3.2 Running the Test 48

8. MAINTENANCE 51

8.1 Battery Replacement (Model 1050) 51

8.2 Recharging the Battery (Model 1060) 51

8.3 Fuse Replacement 52

8.4 Cleaning 52

8.5 Storage 52

Repair and Calibration 53

Technical and Sales Assistance 53

Limited Warranty 54

Warranty Repairs 54

CHAPTER 1

INTRODUCTION

⚠ WARNING ⚠

These safety warnings are provided to ensure the safety of personnel and proper operation of the instrument.

- Do not attempt to perform any tests with these instruments until you have read the instruction manual.
- Safety is the responsibility of the operator!
- Tests are to be carried out only on non-energized circuits! Check for live circuits before making resistance measurements (safety check).
- High voltage is present, as is the sample connected to it. Anyone performing or assisting in testing must follow all safety precautions to prevent electrical shock to themselves and to others.
- AEMC® considers the use of rubber gloves to be an excellent safety practice, even if the equipment is properly operated and correctly grounded.
- When testing samples with a capacitive component, make sure they have been properly discharged and are safe to touch. Dielectric insulation samples should be short-circuited for at least five times the amount of time they were energized.
- Megohmmeters should never be used in an explosive environment.
- Use the leads supplied with the megohmmeters. If they are defective or worn, replace before testing.
- The Model 1060 does not allow measurements to be carried out during battery charging.
- This instrument can be used on installations rated for 600V, Category III.

1.1 International Electrical Symbols

	This symbol signifies that the instrument is protected by double or reinforced insulation.
	This symbol on the instrument indicates a WARNING and that the operator must refer to the user manual for instructions before operating the instrument. In this manual, the symbol preceding instructions indicates that if the instructions are not followed, bodily injury, installation/sample and product damage may result.
	Risk of electric shock. The voltage at the parts marked with this symbol may be dangerous.
	In conformity with WEEE 2002/96/EC

1.2 Definition of Measurement Categories

CAT II: For measurements performed on circuits directly connected to the electrical distribution system. Examples are measurements on household appliances or portable tools.

CAT III: For measurements performed in the building installation at the distribution level such as on hardwired equipment in fixed installation and circuit breakers.

CAT IV: For measurements performed at the primary electrical supply (<1000V) such as on primary overcurrent protection devices, ripple control units, or meters.

1.3 Receiving Your Shipment

Upon receiving your shipment, make sure that the contents are consistent with the packing list. Notify your distributor of any missing items. If the equipment appears to be damaged, file a claim immediately with the carrier and notify your distributor at once, giving a detailed description of any damage. Save the damaged packing container to substantiate your claim.

NOTE: Charge the instrument fully before use (Model 1060).

1.4 Ordering Information

Megohmmeter Model 1050.....**Cat. #2130.01**

Includes detachable accessory pouch (one red, one blue test lead, one black shielded lead, three color-coded (black, red and blue) alligator clips, one black test probe), batteries, spare fuses and a user manual.

Megohmmeter Model 1060.....**Cat. #2130.03**

Includes detachable accessory pouch (one red, one blue test lead, one black shielded lead, three color-coded (black, red and blue) alligator clips, one black test probe; one RS-232 DB9 F/F 6 ft null modem cable, RS-232 to USB adapter, US 115V power cord, spare fuses, rechargeable battery, and a USB stick with DataView® software and a user manual.

NOTE: Spare fuse and clip are located inside the instrument's case.

1.4.1 Accessories and Replacement Parts

Remote Test Probe ..... **Cat. #2118.97**

Cable, PC RS-232, DB9 F/F 6 ft Null Modem Cable (1060)..... **Cat. #2119.45**

Fuse, Set of 5, 0.1A, 660V ..... **Cat. #2119.56**

Fuse, Set of 1, 2.5A, 1200V ..... **Cat. #2119.57**

Lead, Replacement Set (1 red, 1 blue test lead, 1 black shielded lead, 3 color-coded alligator clips, 1 black test probe, no RS cable) ..... **Cat. #2119.58**

Inverter – 12VDC to 120VAC 200 Watt for Vehicle use..... **Cat. #2135.43**

Lead, Set of 3 Color-coded 10 ft Safety Leads..... **Cat. #2951.70**

Replacement 9.6V Rechargeable Battery Pack (1060)..... **Cat. #2960.21**

US 115V Power Cord ..... **Cat. #5000.14**

Adapter – RS-232 to USB 2.0 (1060)..... **Cat. #5000.60**

Order Accessories and Replacement Parts Directly Online
*Check our Storefront at **www.aemc.com/store** for availability*

1.4.2 Accessory Information

Remote Test Probe

- The yellow test button generates the test voltage when pressed.
- The push-button on the back of the probe allows you to light the test point (approx 500 lux of light). This function is very useful, since insulation testing is performed on de-energized installations, which can be in a dark area.

DataView® Software (Model 1060)

- Retrieve data from memory and plot graphs of the changes in insulation as a function of the time over which the test voltage is applied, R(t).
- Print out protocols of personalized tests (depending on the user's needs).
- Create text files for use on spreadsheets.

CHAPTER 2

PRODUCT FEATURES

The Megohmmeters Models 1050 and 1060 are portable instruments housed in rugged casing.

The Model 1050 uses 1.5V (C cell) alkaline batteries.

The Model 1060 uses a rechargeable battery and AC power.

Model 1060: Measurements cannot be performed during battery charging.

These megohmmeters are designed to check the safety of electrical installations and equipment.

Units Measure:

- Voltage
- Insulation Resistance
- Continuity
- Resistance
- Capacitance

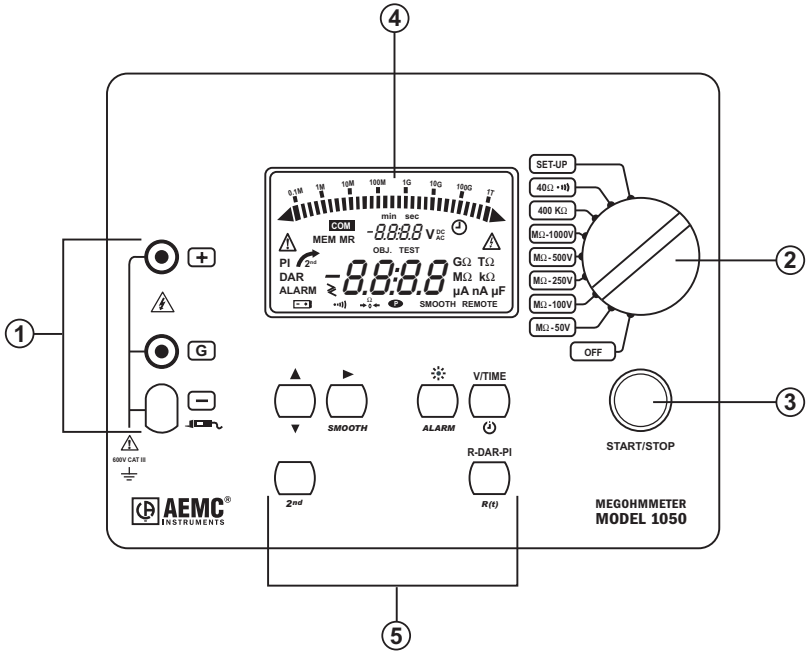
Advantages:

- Digital filtering of insulation measurements
- Measuring with the remote control probe
- Automatic voltage measurement in all functions
- Automatic detection of external AC or DC voltages on the terminals
- Threshold programming in each function, triggering audible alarms
- Timed control of measurement duration
- Fuse protection, with defective fuse detection and indication
- Automatic discharge of residual high voltage on the tested device
- Automatic shut-off to save the batteries
- Battery level indicator (1050) or battery charge status indicator (1060)
- Large easy-to-read back-lit LCD

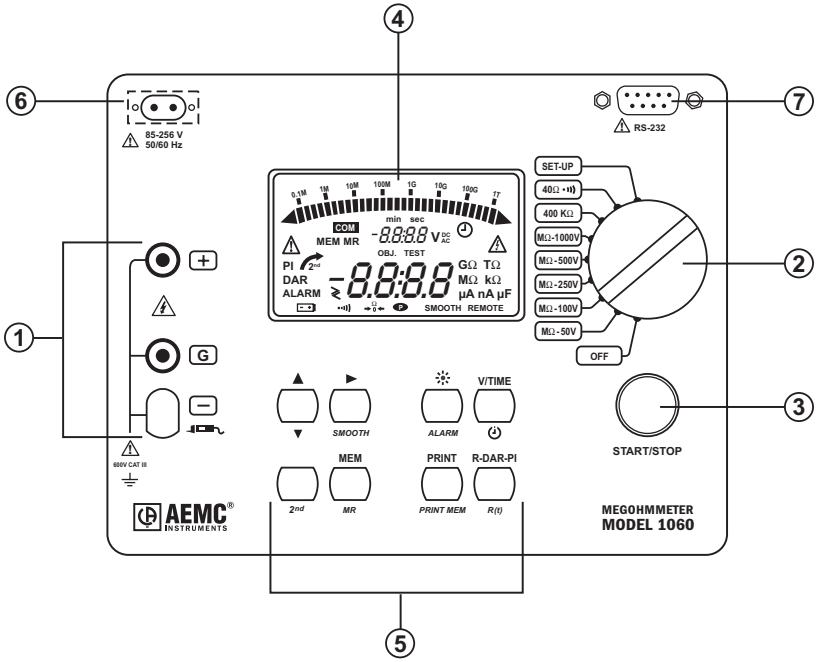
Additional Features (Model 1060 only):

- Integral rechargeable battery
- 128kB memory, real-time clock and serial interface
- Control and programming of the instrument from a PC (with DataView® software)

MODEL 1050



MODEL 1060



2.1 Control Features

1. Safety terminals: “+”, “G” and “-”.
   Next to the “-” terminal, there are 2 additional terminal contacts for the remote control probe connection (3 contact connector).
2. Rotary selector switch with 9 positions:
   - **OFF** - Instrument is off
   - **MΩ - 50V** - Insulation measurement (2kΩ to 200GΩ)
   - **MΩ - 100V** - Insulation measurement (4kΩ to 400GΩ)
   - **MΩ - 250V** - Insulation measurement (10kΩ to 1TΩ)
   - **MΩ - 500V** - Insulation measurement (20kΩ to 2TΩ)
   - **MΩ - 1000V** -Insulation measurement (40kΩ to 4TΩ)
   - **400KΩ** - Resistance measurement
   - **40Ω** - Continuity measurement
   - **SET-UP** - Set-up of the megohmmeter
3. START/STOP button
4. Back-lit liquid crystal display
5. 6 buttons (1050) or 8 buttons (1060), each with a first and second function. The second functions are highlighted in yellow below each button:
   - **2nd** - Selects the second function on each button
   - **R-DAR-PI** - Lets you choose the type of measurement to be performed. Instantaneous Resistance (R), Dielectric Absorption (DAR), or Polarization Index (PI).
   - **R(t)** - Show/hide the interval values of insulation resistance, test voltage and time-stamping, following a time-controlled test.
   - **V/TIME** - When measuring insulation, pressing this button displays the time elapsed since the beginning of the measurement, then the exact voltage generated. When performing resistance or capacitance measurement, this button has no effect. In MR (memory recall), it displays the date and time at which the measurement was stored, the exact test voltage and the OBJ : TEST number.
   - - Activates or deactivates the “time-controlled” test mode
   - - Turns the display backlight ON or OFF
   - **ALARM** - Activates or deactivates the alarms programmed in SET-UP
   - ▶ - Selects a parameter to be modified
   - **SMOOTH** - Stops/Starts smoothing of displayed values during insulation testing
   - ▲ - Increases the flashing parameter being displayed. To move about the list of interval insulation measurements, in the R(t) function.

- ▼ - Decreases the flashing parameter being displayed. To move about the list of interval insulation measurements in the R(t) function. If the ▲ and ▼ buttons are held down, the movement between parameters is increased to a faster rate.

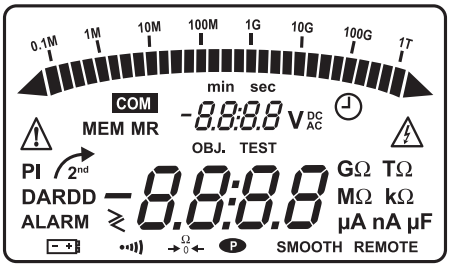
Model 1060 only:

- **MEM** - Saves measured values
- **MR** - Recalls saved data
- **PRINT** - Prints measurement results
- **PRINT MEM** - Prints memory contents

6. AC power plug (direct operation on AC and battery recharge).

7. RS-232 serial interface male plug (9-pin) for connection to a PC.

2.2 Digital Display Features



Main Display Indicates:

- Insulation measurement (resistance, DAR and PI, capacitance)
- Continuity measurement
- Resistance measurement

Small Display Indicates:

- Voltage measured or applied by the instrument
- Elapsed time or the output voltage, during insulation measurement

After recording data (1060), the small display also indicates the time and date in MR (memory recall) mode, and the memory address with the OBJ : TEST number.

2.3 Bargraph

- Active during insulation measurement (0.1MΩ to 1TΩ).
- Indicates the battery charge at start-up.
- Indicates free memory space - one segment representing approximately 100 groups of saved values, with each group holding approximately 50 recordings (1 OBJ and 1 TEST).

2.4 Symbols

MEM/MR: Memory address (1060) - the number is displayed on the small digital display.

OBJ:TEST: Memory address (1060) - the number is displayed on the small digital display.

COM: Flashes on the screen when data is transmitted to the serial interface (1060) or remains permanently displayed if there is a problem during transfer.

DAR/PI: Indicates the mode chosen before insulation measurement or the results of these measurements.

 Dangerous voltage generated; V > 120V.

 External voltage present, symbol is activated after pressing START, if V > 25VAC ± 3V or > 35VDC.

 Activation of “time-controlled test” mode or clock adjustment when in SET-UP (1060).

 Indicates that the second function of a button is to be used.

 Flashes if the battery voltage is low, indicating that the batteries should be replaced or recharged (See § 8). The voltage is displayed on the small display for 2 seconds when the instrument is turned on. The main display indicates “bat” when the test is carried on.

 Signal that lead compensation is in effect.

 Warning buzzer is activated.

 Indicates that the Auto Power OFF function has been deactivated.

SMOOTH: Smooths the insulation measurements displayed.

REMOTE: Remote control via an interface (1060). In this mode, all the buttons and the rotary switch on the instrument are non-functional, except for the OFF position.

FUSE HI: Flashes if the “+” input fuse is defective.

FUSE -G-: Flashes if the “G” input fuse is defective.

2.5 Button Functions

2.5.1 2nd Button

- Selects the second function (highlighted in yellow) on the buttons.
- The 2nd symbol appears. This symbol disappears upon pressing the function button chosen, except if the ▼ button is activated. In this case, it only disappears when the 2nd button is pressed again, or if other function buttons are pressed. This allows you to rapidly decrease parameters with the ▼ button, without having to press the 2nd button every time.

2.5.2 V-TIME / ⏲ Button

First Function - V/TIME

Displays all the secondary information available on the small display.

For Insulation Measurement:

- The time elapsed since the start of the measurement
- The voltage between the instrument's "+" and "–" terminals
- Date, time, test voltage and OBJ:TEST number in memory recall mode (MR)

For Resistance or Continuity Measurement:

- Voltage between the instrument's "+" and "–" terminals
- Date, time, test voltage and OBJ:TEST number in memory recall mode (MR)

Second Function - ⏲ Time-controlled Test

Displays the measurement duration programmed in **SET-UP** on the small display.

- The ⏲ symbol lights up.
- Pressing the **START** button begins the measurement process. The measurement duration is set to 15 minutes by default.
- As soon as the measurement starts, the small display counts down the remaining duration of the measurement. Once it reaches zero, the measurement stops.
- As the time-controlled test is carried out, interval samples (resistance/voltage values as a function of time) are automatically saved. The time between each sample is set to 30s by default, but it can be changed in the **SET-UP** menu.
- The samples are displayed with the **R(t)** function (see § 2.5.3) as long as a new measurement has not been started. With each new measurement, the previous sample value is erased from the memory. These sample values are saved with the last value of the resistance if used with the **MEM** (memory storage) function.

⚠ **NOTE:** If the selector switch's position is altered, or if the STOP button is pressed during measurement, the measurement is interrupted.
This function is only active for insulation measurement.

2.5.3 R-DAR-PI / R(t) Button

First Function - R-DAR-PI

The **R-DAR-PI** button allows automatic measurement of:

- Polarization Index (PI)
- Dielectric Absorption Ratio (DAR)

These two parameters are useful on long cables, or when monitoring the aging of insulation on electrical machines.

On this material, measurement is adversely affected at the beginning, due to interfering currents (from capacitive charges, dielectric absorption) which eventually cancel each other out. Therefore, in order to get an accurate measurement of the leakage current, it is necessary to carry out the measurement over a long period of time, to reduce the influence of any interfering currents at the beginning of the measurement.

Next we calculate the **PI** or the **DAR** ratios:

PI = $R_{10\ min}$ / $R_{1\ min}$ (2 values to record during a 10 min measurement)

DAR = $R_{1\ min}$ / $R_{30\ s}$ (2 values to record during a 1 min measurement)

The quality of insulation depends on the results found.

DAR	PI	State of the insulation
< 1.25	< 1	Inadequate, even dangerous
	< 2	
< 1.6	> 2 to < 4	Good
> 1.6	> 4	Excellent

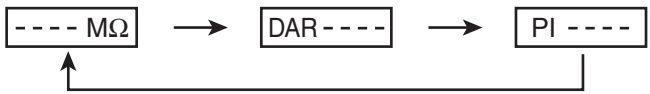
Using the R-DAR-PI Function:

During or after measurement, the **R-DAR-PI** button allows you to scroll through the following values:

- DAR (for measurements lasting >1 min).
- PI (for measurements lasting >10 min).
- Capacitance in µF (only after the measurement has stopped and the circuit has been discharged).
- Insulation resistance in MΩ, GΩ or TΩ.

Automatic Measurement of DAR or PI:

- If the button is pressed when in voltage measurement mode before proceeding with a measurement, the following is displayed:



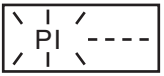
Depending on the choices (DAR or PI), the measurement goes as follows:

a) DAR: Press **START** - the **DAR** symbol flashes and the display indicates "- - - -" as long as the calculation of the coefficient is not possible (t < 1 mn).

e.g.: 

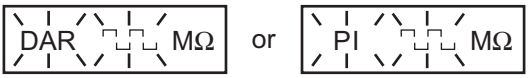
After 1 min, the measurement stops and the main display automatically shows the DAR value. During or after measurement, the **R-DAR-PI** button can be used to see the insulation measurement carried out, but it does not give the PI value since the measurement has not lasted long enough.

b) PI: Press **START** - the **PI** symbol flashes and the display indicates "- - - -" as long as the calculation of the coefficient is not possible (t < 10 mn).

e.g.: 

After 10 minutes, the measurement stops and the main display automatically shows the PI value. During and after measurement, the **R-DAR-PI** button makes it possible to display the DAR (after 1 min), the PI (after 10 min) and the insulation measurement.

Note: If during DAR or PI measurement (automatic or not), a high external interference voltage becomes present, or the insulation resistance goes beyond the device's measurement range, then the DAR or PI measurements are interrupted and the screen indicates:



Note: The 10 min / 1 min measurement durations for PI calculation can be modified in the **SET-UP** menu (see § 2.5.7), allowing changes to standards or to suit a particular application.

Second Function - R(t)

Used to access the interval insulation resistance values as a function of time after a measurement in "time-controlled test" mode (see § 2.5.2).

The time between each saved sample is programmed in the **SET-UP** menu.

This function is also available on the Model 1050, which has neither a read-write memory for saving measured data, nor an interface for data retrieval from the instrument by a PC.

Model 1050:
Up to 20 samples can be recorded during measurement at the sample rate chosen in **SET-UP** (the default value is 30 seconds). It is possible to save more than 20 samples depending on available memory.

Model 1060:

The number of samples that can be saved is only limited by the memory space available.

To enter the display mode, press the **R(t)** button:

- The small display indicates the time 00:30 (e.g. the sampling frequency is every 30s).
- The main display shows the corresponding R value.

Use the **V/TIME** button to alternate between the voltage and time (on the small display), associated with the R value on the main display.

The ▲▼ button is used to scroll down through the all the samples saved during measurement, allowing you to read the information in order to draw R(t) and V(t) graphs.

This makes it possible to carry out R(t) analysis on-site, without a printer or a PC.

To exit this function, press the **R(t)** or **R-DAR-PI** button again.

2.5.4 ☀ / ALARM Button

First Function - ☀

Turns the display back-light **ON** or **OFF**.

Second Function - ALARM

Activates/deactivates the ALARM function. The **"ALARM"** symbol is displayed when activated.

If activated, and the high or low threshold values are programmed, the **"ALARM"** symbol flashes and the buzzer (if activated) sounds continuously when the threshold is crossed.

It is possible to program a different limit in each function. These limits will be stored in memory even after the device is turned off.

Activating the Alarm Indication before a Test

To activate the Alarm Indication before performing a test you must go through the following steps:

- Program the Alarm Set Point Resistance Value for the Test Voltage you will be using.
- Turn the Rotary switch to the Setup position.
- Press the Yellow 2nd button and then the Alarm button to set Alarms. The first time you press 2nd & Alarm you will see the alarm setting for 50 volt tests.
- Press 2nd & Alarm buttons repeatedly until you see the test you wish to set alarms for in the top line of the display. The sequencing will be 50, 100, 250, 500, 1000, Res and Cont.

- Use the cursor keys to adjust the Blinking value. First select KΩ, MΩ, GΩ or TΩ using the Up Arrow Key (▲).
- Next, press the Right Arrow Key (▶) to move to the next selection which is the greater than (>) / less than (<) choice. Use the ▲ to make your selection.
- Press the ▶ again to move to the Resistance Value Set Point Selection. You can change this value digit by digit using the ▲ / ◀ combination working from the highest to lowest digit.
- When finished programming the alarm settings, place the rotary switch to the desired test function.
- Before initiating a test, press the Yellow 2nd button and the Alarm button to activate the Alarm Notification. The word “ALARM” will appear in the lower left side of the display.
- Next, press the round yellow Start/Stop button to begin the test. The Alarm symbol will flash and the buzzer will sound continuously if the Alarm set point is tripped.

NOTE: If the rotary switch is turned off prior to the next test, the alarm notification will be deactivated. You will need to press the Yellow 2nd button and the Alarm button to activate the Alarm Notification when you turn the unit back on before starting the next test, if alarm notification is desired.

2.5.5 ▶ / SMOOTH Button

First Function - ▶

Selects the desired parameter to be modified - the selected parameter flashes.

It is modified using the ▲▼ button (see § 2.5.6).

Second Function - SMOOTH

Activates a digital filter for insulation measurement. It only has an effect on the displayed values (which are smoothed) and not the actual measurements.

For example, this function is useful when the displayed insulation values are highly unstable, brought about due to a capacitive component in the tested element.

2.5.6 ▲ ▼ Button

Changes the flashing parameters displayed, or views R(t) values (see § 2.5.3).

As a general rule, two figures (day, month, hour, min., sec., and OBJ:TEST) flash.

The ▲ and ▼ functions have a “follow-on” mode. (e.g. as soon as the high or low program limit is reached, the parameter to be modified switches automatically to the following low or high limit.)

First Function ▲

- Press button briefly to increase the displayed number slowly
- Press button for a longer time to increase at a faster rate

Second Function ▼

- Press button briefly to decrease the displayed number slowly
- Press button for a longer time to decrease at a faster rate

Unlike all the second functions of other buttons, it is not necessary to press the 2nd button each time to get to the ▼ function. The 2nd symbol remains displayed and is valid for the ▼ function (only), as long as the user does not deactivate it by pressing 2nd or another button.

2.5.7 SET-UP Button (Configuring the Instrument)

After selecting **SET-UP** with the rotary selector switch:

- All the display segments are lit up for 1 second
- The software version number is displayed
- The instrument serial number is displayed
- “**PUSH”** comes up on the small display and “**btn”** on the main display, inviting the operator to press a button

The SET-UP function is used to directly access the parameters to be programmed, by pressing the corresponding button:

- After having pressed a button, the corresponding figures or symbols appear on the screen
- The figures or the symbols that can be modified flash on the screen
- Use the ▶ and ▲ ▼ buttons
- All the parameters are immediately and permanently saved

The table below defines the buttons that are functional when in SET-UP, and the corresponding display with the possible range of adjustment.

Parameter program	Command Button	Display			
		main	small	symbol	value
Duration of "time-controlled test"	◷		15 : 00	min. sec	1-59 min
1st and 2nd times for PI calculation	R-DAR-PI	second time (10 min)	first time (1 min)	min : sec	00 : 59
Time between interval samples in "time-controlled test"	R(t)		00 : 30	min : sec	5s - 10 min
Limit for MΩ - 50V	ALARM	50kΩ	50V	ALARM <	2k-200G and < / >
Limit for MΩ - 100V	ALARM (2nd press)	100kΩ	100V	ALARM <	4k-400G and < / >
Limit for MΩ - 250V	ALARM (3rd press)	250kΩ	250V	ALARM <	10k - 1T and < / >
Limit for MΩ- 500V	ALARM (4th press)	500kΩ	500V	ALARM <	20k - 2T and < / >
Limit for MΩ - 1000V	ALARM (5th press)	1000kΩ	1000V	ALARM <	40k - 4T and < / >
Limit for 400kΩ (resistance measurement)	ALARM (6th press)	100kΩ	rES	ALARM <	0.01-400kΩ and < / >
Limit for 40Ω (continuity measurement)	ALARM (7th press)	2Ω	Cont	ALARM <	0.01-40Ω and < / >
Time	V/TIME		12 :55	◷	hh (0-23) mn (0-59)
Date (European version)	V/TIME (2nd press)	17.03	1999		jj.mm.aaaa
Version : USA, European	V/TIME (3rd press)	USA/Euro			USA/Euro
Clear Memory	MEM then MEM (2s)	cLr	ALL	MEM	
Selective clearing of memory	MEM then ▶ and ▲▼ and MEM (2s)	cLr	OBJ : TEST number	MEM + OBJ : TEST	00...99
Baud	PRINT	9600	bAUd		300...9600
Buzzer	☀	On		•ıl)	ON / OFF
Auto Power OFF	☀ (2nd press)	On		Ⓟ	ON / OFF
Compensation	☀ (3rd press) then ▲ and START	- - - - (value if START)	On	Ω →0←	ON / OFF and 0.01-5Ω
Default configuration	☀ (4th press) then START	DFLt	SEt		
Disabling test voltages	☀ (5th press)	On	50V		ON / OFF
Disabling test voltages	☀ (6th press)	On	100V		ON / OFF
Disabling test voltages	☀ (7th press)	On	250V		ON / OFF
Disabling test voltages	☀ (8th press)	On	500V		ON / OFF
Disabling test voltages	☀ (9th press)	On	1000V		ON / OFF

The values shown on this table, in the "Display/main" and "Display/small" columns, are the factory default values. In case they are accidentally changed, it is possible to get them back (see § 2.5.11).

2.5.8 Clearing the Memory

In **SET-UP**, press the **MEM** button:

- The **MEM** symbol flashes
- The small display indicates **"ALL"**
- The main display indicates **"cLR**"

To clear the entire memory, press the **MEM** button again for 2 seconds:

- The **MEM** symbol is displayed without flashing
- The main display indicates **"FrEE"**

To clear the contents of a specific OBJ : TEST number:

- Select the number using the ▶ and ▲▼ buttons
- **"cLr"** remains displayed on the main display

Press the **MEM** button again for 2 seconds to clear the contents:

- The small display indicates the **OBJ : TEST** number
- The main display indicates **"FrEE"**

2.5.9 Communication Rate (RS-232)

- In **SET-UP**, press the **PRINT** button.
- The main display indicates the Communication Rate (300, 600, 1200, 2400, 4800, 9600 or Parallel).
- "**baud"** appears on the small display. The value can be changed using the ▲ and ▼ buttons.
- **"Parallel"** appearing in the display means that the parallel mode has been selected. This is for printing on a parallel printer.

2.5.10 Lead Resistance Compensation

In **SET-UP**, press the ☼ button three times. The $\rightarrow\overset{\Omega}{0}\leftarrow$ symbol and **ON** appears in the small display. **OFF** can be selected with the ▲▼ button. In this instance, the lead resistance will not be subtracted during continuity measurement.

To store the lead resistance:

- Connect them together and press **START** (in SET-UP position $\rightarrow\overset{\Omega}{0}\leftarrow$)
- The resistance of the leads will be stored and indicated on the main display

NOTE:

- This value is stored in memory, even when the instrument is switched **OFF.**
- The lead compensation only comes into effect when performing continuity measurements.

- To activate/deactivate this function, simply select **ON** or **OFF** on the small display with the ▲▼ button.
- The value will be stored and displayed on the main display, but can be activated or deactivated, depending on what the small display indicates.
- Values between 0 and 5Ω can be saved for lead compensation. Beyond this value, nothing is saved.

2.5.11 Default Device Configuration

In **SET-UP**, press the ☀ button four times:

- "**SEt"** appears in the small display
- "**DFLt"** appears in the main display

Press **START** to select the default configuration settings (see the previous table).

2.5.12 Blocking (Disabling) Test Voltages

This function prevents insulation measurements from being carried out at selected test voltages. This makes it possible to use the instrument for specific applications and avoid improper voltages.

In **SET-UP**, press the ☀ button 5 times or more (depending on the voltage to be disabled):

- The test voltages appear in order on the small display with the ☀ symbol and **ON/OFF** on the main display.
- Choose **ON** or **OFF** using the ▲▼ button for each test voltage you wish to disable (OFF) or to reinstate (ON) for use during insulation tests at these voltages.

2.6 Measurement Functions

2.6.1 AC/DC Voltage

- Select any measurement position with the rotary selector switch.
- The instrument is automatically in AC/DC voltage measurement mode.
- The voltage is continuously measured and is shown on the small display.

⚠ **Measurement is prohibited if an external voltage is present at the terminals before pressing START/STOP**. Similarly, if an interference voltage is detected during measurement, the measurement is stopped and that voltage is indicated.

2.6.2 Insulation Measurement

As soon as one of the MΩ positions has been selected, the main display shows "- - - - MΩ", and the small display indicates the voltage present at the device's "+" and "–" terminals.

If the external voltage present at the device's terminals exceeds 25V$_{AC/DC}$, pressing the yellow **START/STOP** button does not bring about insulation measurement, but instead triggers an audible signal. The ⚠ symbol flashes for 2 seconds, then the device goes back to automatic voltage measurement.

If the external voltage present at the device terminals is below 25V$_{AC/DC}$, then insulation measurement can proceed.

Pressing **START** immediately begins the measurement. The measurement value is displayed on the main digital display and on the bargraph. An audible beep is given out every 10 seconds to indicate that measurement is in progress.

If the test voltage is considered to be dangerous (>120V), the ⚠ symbol is displayed. If, during insulation measurement, an external voltage >25V$_{AC}$ ±3V or 35V$_{DC}$ is detected, the measurement is stopped as long as the voltage is applied to the instrument. The ⚠ symbol flashes and the voltage value is indicated on the small digital display.

If the measurements fluctuate greatly, the **SMOOTH** function can be enabled (see § 2.5.5).

By pressing the **V/TIME** button during measurement, you can alternate between displaying the duration of the voltage measurement and the exact voltage generated on the small display (see § 2.5.2).

Pressing the **STOP** button stops the measurement. After the measurement has been stopped the result remains displayed.

It is possible to scroll through all the other results available on the main display using the **R-DAR-PI** button. This button can also be used before the measurement is begun (see § 2.5.3).

If the "time-controlled test" mode has been selected, the **R(t)** button makes it possible to access all the saved interval measurements automatically (see § 2.5.2 and 2.5.3).

If the **ALARM** function is activated, a buzzer is triggered as soon as the measurement crosses the threshold programmed in the **SET-UP** configuration menu (see § 2.5.4).

Display of values after measurement

The following information may be displayed:

R-DAR-PI Button	V-TIME Button	
Main Display	Small display	Small display if the MR button is pressed (Model 1060)
Resistance	duration (min. sec)	date, time, test voltage, OBJ : TEST
DAR	duration (min. sec)	date, time, test voltage, OBJ : TEST
PI	duration (min. sec)	date, time, test voltage, OBJ : TEST
Capacitance* R(t)	duration (min. sec)	last voltage

**Capacitance (µF) measurement is only displayed after the measurement is finished and the circuit has been discharged.*

2.6.3 Continuity (40Ω •••)) / Resistance (400kΩ)

- Continuity measurement is carried out on the 40Ω switch position (with a test current >200mA up to 20Ω)
- Resistance measurement is carried out on the 400kΩ position (with a test current <6mA).

Once the selector switch has been turned to one of these 2 function positions, the main display indicates - - - - Ω (for continuity) or - - - - kΩ (for resistance) and the small display indicates the voltage present on the "+" and "–" terminals.

⚠ **If the voltage is >3VAC/DC and the START/STOP button is pressed**, the •••)) symbol flashes and the audible alarm beeps (for 2 seconds) signaling that the measurement was denied. The instrument then goes back to its normal voltage measurement.

If the voltage is <3VAC and the START/STOP button is pressed, the measurement proceeds.

The main display indicates the continuity or resistance value in progress, while the small display indicates the voltage present on the "+" and "–" terminals.

The **R-DAR-PI, V/TIME** and **SMOOTH** buttons are not active for these functions.

⚠ **WARNING:** If, during continuity or resistance measurement, an external voltage >25VAC ±3V or 35VDC is detected, the measurement is stopped as long as the voltage is applied to the instrument.

The ⚠ symbol flashes and the voltage value is indicated on the small digital display.

If the **ALARM** function is activated, a buzzer is triggered as soon as the measurement crosses the threshold programmed in the **SET-UP** configuration menu.

SPECIFICATIONS

3.1 Reference Conditions

Influence Quantity	Reference Values
Temperature	23°C ± 3°K
Relative Humidity	45 to 55%
Supply Voltage	9 to 12V
Frequency Range	DC and 15.3 to 65Hz
Capacitance in parallel with the input resistance	0µF
Electric Field	nil
Magnetic Field	< 40A/m

3.2 Voltage

Measuring Range: 1 to 99.9V; 100 to 1000V

Resolution: 0.1V; 1V

Frequency Range: DC/16 to 65Hz (65 to 420Hz not specified)

Accuracy: ±1% of Reading ± 3V, AC sinusoidal or DC voltage (DC and 15.3 to 65Hz)

Input Resistance: 750kΩ approx

WARNING: This instrument is rated 600V, CAT III, according to EN 61010-1 + A2 (ed. 95). NEVER use the megohmmeter on electrical conductors rated above 600V.

3.3 Insulation Resistance

Method: Voltage-current method according to EN 61557-2 (ed. 02/97)

Nominal Output Voltage: 50, 100, 250, 500, 1000VDC

Open-circuit Voltage: ≤1.1 x Vn ± 5V (50, 100, 250, 500, 1000V)

Nominal Current: >1mADC at the nominal voltage

Short-circuit Current: <6mADC

Max. Overvoltage: Vrms max = 1200VAC/DC for 10 seconds between the "+" and "-" terminals. 660VAC/DC between the "G" and "-" or "G" and "+" terminals.

Measurement Ranges: 50V: 2kΩ to 200GΩ
100V: 4kΩ to 400GΩ
250V: 10kΩ to 1TΩ
500V: 20kΩ to 2TΩ
1000V: 40kΩ to 4TΩ

Range	Res.	Voltage	Accuracy
2 to 999kΩ 1.000 to 3.999MΩ	1kΩ	50, 100, 250, 500, 1000V	5% of R ± 3cts
4.00 to 39.99MΩ	10kΩ	50, 100, 250, 500, 1000V	
40.0 to 399.9MΩ	100kΩ	50, 100, 250, 500, 1000V	
400 to 999MΩ 1.000 to 3.999GΩ	1MΩ	50, 100, 250, 500, 1000V	
4.00 to 39.99GΩ	10MΩ	50, 100, 250, 500, 1000V	
40.0 to 399.9GΩ	100MΩ	50, 100, 250, 500, 1000V	15% of R ± 10cts
400 to 999GΩ 1.000 to 3.999TΩ	1GΩ	250, 500, 1000V	

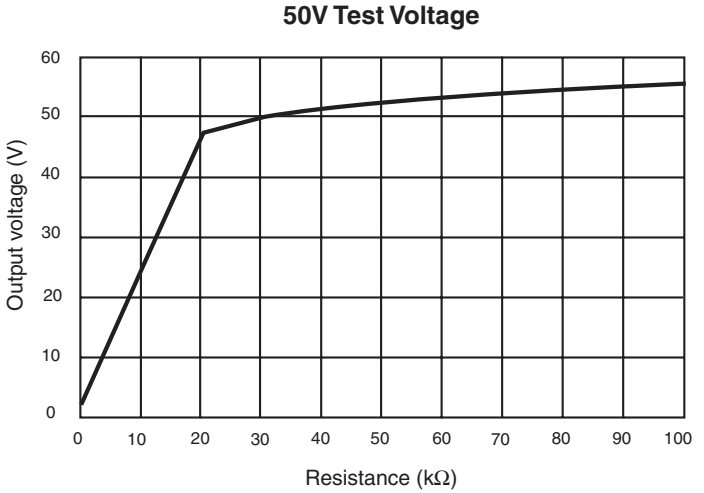
DC Voltage Measurement (after Insulation Test)**:**

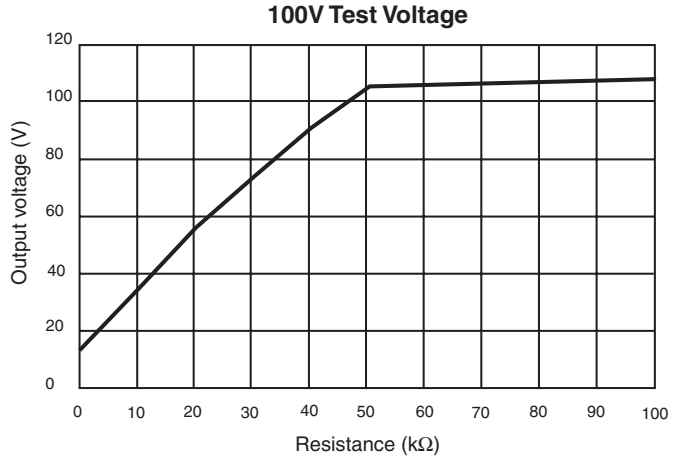
- DC Voltage Range: 25 to 1000V
- Resolution: 0.5% V_{DC}
- Accuracy: ±1% of Reading ± 3cts
- Voltage vs Load Curve

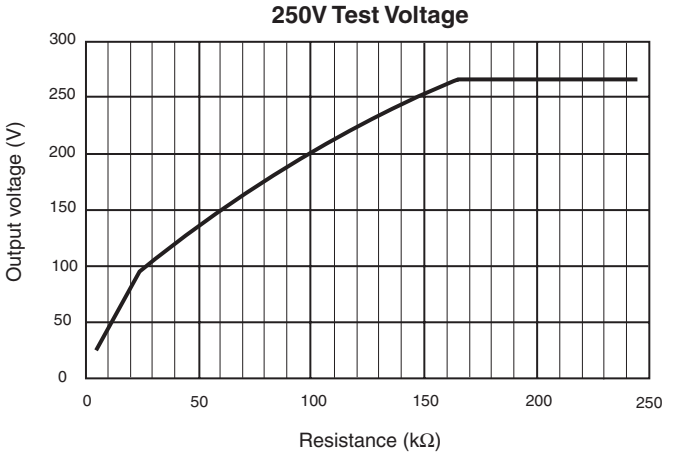
Capacitance Measurement (following the discharging of test object):

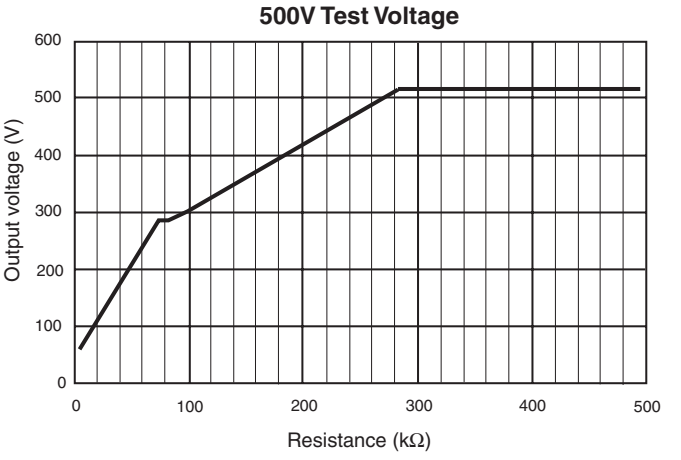
- Range: 0.005 to 4.999µF
- Resolution: 1nF
- Accuracy: ±10% ± 1ct

Graphs showing the typical changes in test voltage as a function of the load:

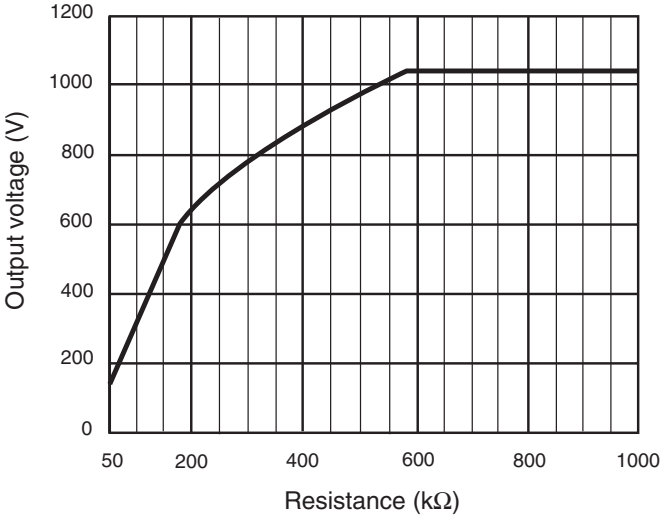



100V Test Voltage
Output voltage (V)
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
90
100
Resistance (kΩ)


250V Test Voltage
Output voltage (V)
300
250
200
150
100
50
0
0
50
100
150
200
250
Resistance (kΩ)


500V Test Voltage
Output voltage (V)
600
500
400
300
200
100
0
0
100
200
300
400
500
Resistance (kΩ)

1000V Test Voltage



Typical settling time of the measurement:

	Non-capacitive load	Load with 1µF capacitor
1MΩ insulation	7s	7s
500GΩ insulation	17s	20s

These values include the influences on the auto-range and supply voltage regulation system due to the charge of the capacitive component.

Discharge time of the tested element (across a 750kΩ internal resistance) up to 25V:

Initial Voltage	Discharge Time
1000V	2.8s
500V	2.2s
250V	1.7s
100V	1s
50V	0.5s

Range of DAR and PI Ratios: 0.000 to 9.999

Accuracy: ±5%

3.4 Continuity

Method: Voltage-current method according to EN 61557-4 (ed. 02/97)

Open-circuit Voltage: 12.4VDC max (<15V with external supply)

Short-circuit Current: >200mADC

Maximum Voltage Surge:
1200VAC/DC for 10 seconds between the "+" and "-" terminals
660VAC/DC between the "G" and "-" or "G" and "+" terminals

Test Lead Compensation:
RΔ is measured for the test leads in short-circuit when in the **SET-UP** menu (see § 2.5.7), this value is stored and subtracted from all continuity measurements. The compensation is limited to 5Ω.

R displayed = R measured - RΔ

Continuity Measurement Range: 0.01 to 39.99Ω

Resolution: 0.01Ω

Operating Current:
>200mA from 0.01 to 20.00Ω and >140mA from 20.01 to 39.99Ω

Accuracy: ±3% R ± 4cts

Maximum Inductive Load: 5 hrs without damage to the instrument

Maximum Serial Mode Voltage:
3VAC/DC; measurement is prohibited above this value

3.5 Resistance

Method: Voltage-current measurement

Open-circuit Voltage: Max. 12.4VDC (<15V with external supply)

Short-circuit Current: <6mADC

Max. Voltage Surge:
1200VAC/DC for 10 seconds between the "+" and "-" terminals
660VAC/DC between the "G" and "-" or "G" and "+" terminals

Max Serial Mode Voltage:
3VAC/DC; measurement is prohibited above this value

Range	Resolution	Accuracy
0.01 to 39.99Ω	0.01Ω	±3% R ± 3cts
40.0 to 399.9Ω	0.1Ω	
0.400 to 3.999kΩ	1Ω	
4.00 to 39.99kΩ	10Ω	
40.0 to 399.9kΩ	100Ω	

3.6 Power Supply

- 8 x 1.5V (C cell) alkaline batteries; LR14 (Model 1050)
- Rechargeable battery NiMH (Model 1060)
- Recharge: 85 to 256V / 50-60Hz (electrical safety: 256V, CAT III)

Model 1050:

Measurement: Average operating time

Insulation Measurement:
21,000 x 5s measurements with 20s pause, for normal load (1000V/1mA)*

Continuity Measurement:
16,000 measurements lasting 5s with pause of 20s at nominal load (1000V/1mA)*

**Assuming that a 10 minute long PI measurement is made 5 times a day, the operating time will be 67 days (10 weeks or 2.5 months).*

Model 1060:

Measurement: Average operating time

Insulation Measurement:
5000 x 5s measurements with 29s pause, for normal load (1000V/1mA)*

Continuity Measurement:
4000 measurements lasting 5s with pause of 20s at nominal load (1000V/1mA)*

**Assuming that a 10 minute long PI measurement is made 5 times a day, the operating time will be 16 days (2.5 weeks or 0.5 months).*

Recharging Time (1060)
4.5 hours to reach 100% of its capacity (max recharge time: 6 hours)
0.5 hours to reach 10% of its capacity (operating radius: 1 day approx)

3.7 Mechanical Specifications

Case Dimensions:
9.45 x 7.28 x 4.33" (240 x 185 x 110mm)

Weight: 7.5 lbs (120 oz)

3.8 Environmental Specifications

Operating Range: 14° to 104°F (-10° to 40°C) during recharging of batteries
14° to 131°F (-10° to 55°C) during measurement
20 to 80% RH

Nominal Temperature Range: 32° to 95°F (0° to 35°C)

Storage: -40° to 158°F (-40° to 70°C); 10 to 90% RH

Temperature Influence on Measurement Accuracy (all functions):
±0.15% per °C

Altitude: <2000m

3.9 Safety Specifications

Electrical safety according to EN 61010-1 + A2 (ed. 95),
EN 61557 (ed. 97)

CE

Double Insulation: 

600V CAT III

Pollution Degree 2

Electromagnetic Compatibility:
Emission: NF EN 55 081 -1 (June 92)
Immunity: NF EN 55 082 -1 (June 95)

Mechanical Protection:
IP 54 according to NF EN 60529 (Oct 92)
IK 04 according to NF EN 50102 (June 95)

**All specifications are subject to change without notice.*

CHAPTER 4

OPERATION

NOTE: Charge the instrument fully before use (Model 1060). Measurements cannot be performed during battery charging.

4.1 Measurement Procedure

- Start the instrument by selecting the corresponding position (MΩ, 40Ω •ıl) or 400kΩ) with the selector switch. All the segments on the LCD screen are displayed, then the battery (or rechargeable battery) voltage is displayed.
- Connect the leads to the "+" and "-" terminals and the points of measurement.
- The input voltage is constantly measured and displayed on the small display. If an external voltage is present that is greater than the thresholds described in § 4.2, 4.3 and 4.4, then measurement is prohibited.
- Press the **START/STOP** button to start the measurement.
- Press **START/STOP** again to stop the measurement. The last result remains on the display until the next measurement is started, or the selector switch is turned.

WARNING: If a voltage >25VAC or 35VDC is detected during measurements, the instrument indicates this voltage on the small display, the warning symbol flashes and the measurement is stopped.

Note: There are several special functions that can be used (see § 2.5).

4.2 Insulation Measurement (see § 2.6.2)

This function allows the instrument to measure insulation resistance from 1kΩ to 40GΩ at a test voltage of 50V, 100V, 250V and up to 1TΩ at 500V and 1000V.

- Use the rotary switch to select the required test voltage (MΩ-50V, or MΩ-100V, or MΩ-500V, or MΩ-1000V).
- Connect the instrument to the insulator to be tested.
- Start the measurement using the **START/STOP** button and read the results.

WARNING: If the voltage present exceeds 8V for MΩ-50V, 16V for MΩ-100V, or 25V at all the other test voltages, then measurement is prohibited.

Scroll through the results on the main display with the **R-DAR-PI** button, or on the small display with the **V/TIME** button.

Use **R(t)** when carrying out a 'time-controlled test' to scroll through the interval measurement values saved at the sampling rate specified in **SET-UP**.

These values are available until another measurement is taken or the selector switch is turned.

When measuring high levels of insulation (>1GΩ), it is advised that the guard terminal be used to eliminate the influence of surface leakage currents. The guard is connected between the two measurement contact points, and the surface susceptible to surface currents, (e.g. dusty, damp cable or transformer insulation). In this case, alligator clips are preferable to test-probes held in the hand.

As soon as insulation measurement is stopped, the test circuit is automatically discharged using the instrument's internal resistance.

4.3 Continuity Measurement (see § 2.6.3)

The measurement current is >200mA from 0Ω to 20Ω and >140mA from 20Ω to 40Ω in this function.

This measurement serves to test the low resistance. The measurement ranges increase automatically up to 40Ω with a maximum resolution of 0.01Ω.

- Select the 40Ω position with rotary switch.
- Connect the instrument to the test object.
- If the voltage present is >3V, then measurement is prohibited.
- Start the measurement and read the results.

NOTE: It is possible to compensate for the lead resistance (see § 2.5.10)

⚠ **NOTE:** The R-DAR-PI and V/TIME buttons are not active for this function. There is no automatic polarity change in continuity measurement.

4.4 Resistance Measurement (see § 2.6.3)

The measurement current is limited to 6mA in this function. The measurement ranges increase automatically up to 400kΩ with maximum resolution of 0.01Ω.

- Select 400kΩ position with the rotary switch.
- Connect the instrument to the test object.
- If the voltage present is >3V, then measurement is prohibited.
- Start the measurement and read the results.

During measurement, the potential difference at the input is indicated on the small display (useful for measurement of multi-junction components: thyristors, high voltage diodes, etc).

The open circuit voltage is equal to the voltage of the instrument's battery.

⚠ **NOTE:** The R-DAR-PI and V/TIME buttons are not active for this function.

4.5 Capacitance Measurement

Capacitance measurement is automatically carried out during insulation measurement. It is displayed after the measurement is stopped and the circuit is discharged, using the **R-DAR-PI** button.

MEMORY / RS-232 (Model 1060)

5.1 RS-232 Specifications

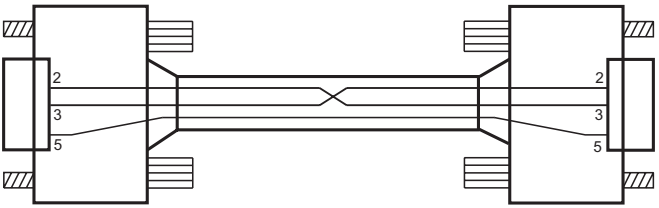
The Communication Rate, for DataView software connection, can be set to 300, 600, 1200, 2400, 4800, 9600.

This setting is carried out in the **SET-UP** menu (see § 2.5.7).

Data format: 8 data bits, 1 stop bit, no parity, Xon / Xoff protocol.

Connection to a PC:

Cable, PC RS-232, DB9 F/F 6 ft Null Modem Cable (1060)..... **Cat. #2119.45**



9-pin female connector to Model 1060

9-pin female connector to serial printer

5.2 Saving / Recalling Values (MEM/MR Button)

NOTE: After replacing or completely discharging the battery, the message “Memory OFF” appears when you try to save a measurement in memory.

To be able to save your measurements, you will need to do the following:

Set the instrument to **SET-UP** and press the **MEM** button (the display shows “MEM All clr”). Press the **MEM** button for 2s (the display shows “MEM ALL FrEE”). Measurements are now ready to be saved.

First Function - MEM (Save)

Results can be recorded in the instrument’s memory and stored along with addresses defined by an object number (OBJ) and a test number (TEST).

An object represents a ‘box’ into which we can place 99 tests. Thus, an object can represent a machine or an installation upon which a certain number of measurements (insulation, resistance and continuity) are carried out.

1) When the button is pressed, the **MEM** symbol flashes and the small display indicates the first free **OBJ : TEST** number (e.g. 02 : 01). The main display indicates "**FrEE"**.
   - The **OBJ** number is the same as that of the last saved measurement, and the **TEST** number goes up in increments of 1.
   - It is always possible to modify **OBJ : TEST** with ▶ and ▲▼.
   - If the user happens to select a memory address that is already occupied, then **OCC** appears on the main screen.
   - If a new **OBJ** is selected, the **TEST** goes back to 01.

2) By pressing **MEM** once again, the present measurement results will be recorded in the selected memory address (occupied or otherwise). The **MEM** symbol stops flashing and remains displayed. The time and the date of this recording are stored with the available data (R, V, t).

   If a button other than MEM is pressed, or the selector switch is moved before pressing MEM a second time, the instrument exits from MEM mode without saving the results.

3) If a time-controlled test has been initiated, interval values (samples) are available. They are automatically saved under the same **OBJ : TEST** number as the final measurement.

Memory Capacity:

- Total memory space: 128kb
- Data management: 8kb
- Free memory space: 120kb

An insulation measurement result takes up approximately 80 bytes. For a "time-controlled test", a sample takes up 10 more bytes. A resistance or continuity measurement takes up 26 bytes. Therefore, it is possible to record about 1500 insulation measurements or about 4000 resistance or continuity tests.

Free Memory Space

This function is automatically activated when a result is saved.

Press **MEM** once to get the following free OBJ : TEST number; the bargraph displayed corresponds to the available free memory space.

- If the entire memory is free, all of the bargraph segments appear.
- If the entire memory is full, the arrow to the left of the bargraph flashes.
- As soon as the storage is complete, the bargraph disappears.

Each segment of the bargraph equals approximately 50 recordings.

Second Function - MR

The **MR** function allows a recall of any saved data from memory, regardless of the position of the rotary selector switch.

- When the button is pressed, the **MR** symbol is displayed. The small display indicates the last OBJ : TEST number to be assigned (e.g. 02 :11).

- 02 “11” flashes opposite the **TEST** symbol. Use the ▶ and ▲▼ buttons to select the desired OBJ : TEST number.
- If a new OBJ is selected, TEST is automatically set to the maximum stored number. At this stage it is possible to review the entire memory with the ▶ and ▲▼ buttons, since the measurement values corresponding to the selected OBJ : TEST number are displayed on the main display. Use the **R-DAR-PI** button to scroll through them.
- The **V/TIME** button gives access to the date/time/V/OBJ-TEST number for each result.
- If the recording selected by the OBJ : TEST number corresponds to a time-controlled test, the R(t) values can be accessed by pressing the **R(t)** button. The small display changes and indicates min:sec (time of 1st sample) and the symbol ⏲ flashes on the screen. You can scroll through the other samples with the ▲▼ button.

To exit from R(t) mode and return to the normal memory recall mode (OBJ : TEST)**,** press **R(t) or R-DAR-PI** again. **To exit the MR function**, press the **MR** button once again or turn the selector switch.

5.3 Printing Measured Values
(PRINT/PRINT MEM Button - Model 1060)

NOTE: AEMC suggests that printing be performed through the DataView software vs. the PRINT Button.

However, if you use a serial printer, choose the appropriate communication speed (communication rate) in the **SET-UP** menu, between 300 and 9600, then program the printer to the format run by the instrument (see § 5.1).

If you are using a parallel printer, you should set the communication rate to **“Parallel”** when in **SET-UP** and use the optional serial-to-parallel adapter.

There are two printing modes possible:

- Instantaneous printing of measurement (PRINT)
- Printing of recorded data (PRINT memory)

⚠ **If the data transmission to the printer is successful**, the COM symbol flashes once on the screen. **If a problem has occurred**, the COM symbol remains on the LCD screen without flashing.

5.4 Instantaneous Printing of Measurements (PRINT button)

Following a measurement or after accessing values in **MR** mode, use the **PRINT** function to print the measurement results.

NOTE: PRINT only works when the test is stopped by pressing the START/STOP button and the value is displayed on the LCD.

Press the **PRINT** button to print the following:

- 1 set of measurements (V/R/DAR/PI/date/time) for normal tests.
- The R(t) values if the "time-controlled test" has been used.

To stop printing, move the position of the selector switch.

According to the function used, the following models are obtained:

Insulation Measurement

AEMC® Instruments Model 1060
Instrument number: 000 001
INSULATION RESISTANCE TEST
OBJECT: 01..... TEST: 01 *(only printed in MR mode)*
Description: .....
.....
Date: 03.31.2001
Start time: .....14 :55
Test duration: ..... 15 min. 30 sec
Temperature: .....°C ..... °F
Relative humidity: ..... %
Test voltage: 1000V
Insulation resistance (R):.....385GOhm
DAR (R 1'/R 30"): 1.234
PI (R 10'/R 1"): 2.345
Comments: .....
.....
Date of next test: ...../..../.....

After a 'time-controlled test' other results are printed (interval samples):

Time	Resistance	Voltage
00 : 30	35.94 GOhm	1005V
01 : 00	42.00 GOhm	1005V
01 : 30	43.50 GOhm	1005V
etc...		

A space for the operator's signature is available at the end of the printout.

Continuity or Resistance Measurement

AEMC® Instruments Model 1060

Instrument number: 000 001

CONTINUITY TEST or RESISTANCE TEST

OBJECT: 01..... TEST: 01 (only printed in MR mode)

Description:.....

.....

Date: 03.31.2001

Start time: .....14 : 55

Test current: ..... > 200mA

Lead compensation: 0.12Ω

Potential difference: 0.9V

Continuity or Resistance: 0.45Ω

Comments: .....

.....

.....

Date of next test: ...../..../.....

A space for the operator's signature is available at the end of the printout.

5.5 Printing Data in Memory (PRINT MEM button)

Prints out the contents of the instrument's read-write memory.

The small display indicates 01 : 01 for the OBJ : TEST number (starting address of printing).

The main display indicates the last recording in memory (the end address of printing). e.g. 12 : 06.

01 flashes opposite the OBJ position, the usual selection procedure should be used (► and ▲▼ buttons) in order to define the start/end addresses of the printout.

- **To exit without printing**, alter the position of the selector switch.
- **To proceed with printing**, press the **PRINT** button once more.
- **To stop printing**, alter the position of the selector switch.

Only the main results are printed out.

Example :

AEMC® Instruments Model 1060

Instrument number: 000 001

CONTINUITY TEST

OBJECT: 01.....TEST: 01

Date: 03.31.2001

Start time: 14:55

Continuity: 0.45Ω

CONTINUITY TEST

OBJECT: 01.....TEST: 02
Date: 03.31.2001
Start time: 14:55
Continuity: 0.91Ω

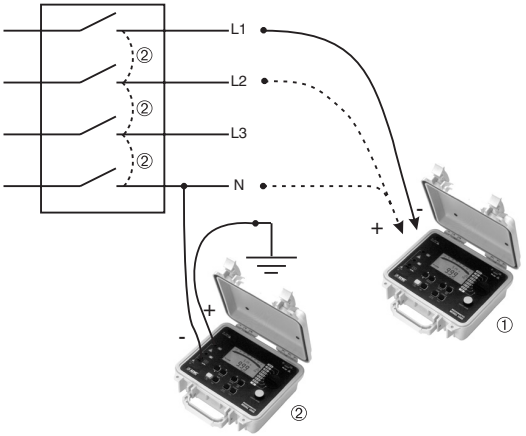
INSULATION RESISTANCE TEST

OBJECT: 01.....TEST: 03
Date: 03.31.2001
Start time: 14:55
Test duration: ..... 15 min 30 sec
Temperature: .....°C .....°F
Relative humidity: ..... %
Test voltage: ..... 1000 V
Insulation resistance (IR): .....385 GΩ
DAR (RI 1'/30"): 1.234
PI (RI 10'/RI 1'): 2.345
Comments: .....
.....
.....

A space for the operator's signature is available at the end of the printout.

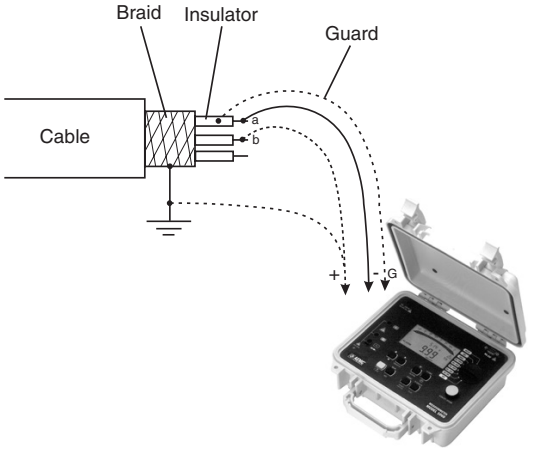
APPLICATION EXAMPLES

6.1 Insulation Measurements on Electrical Installations



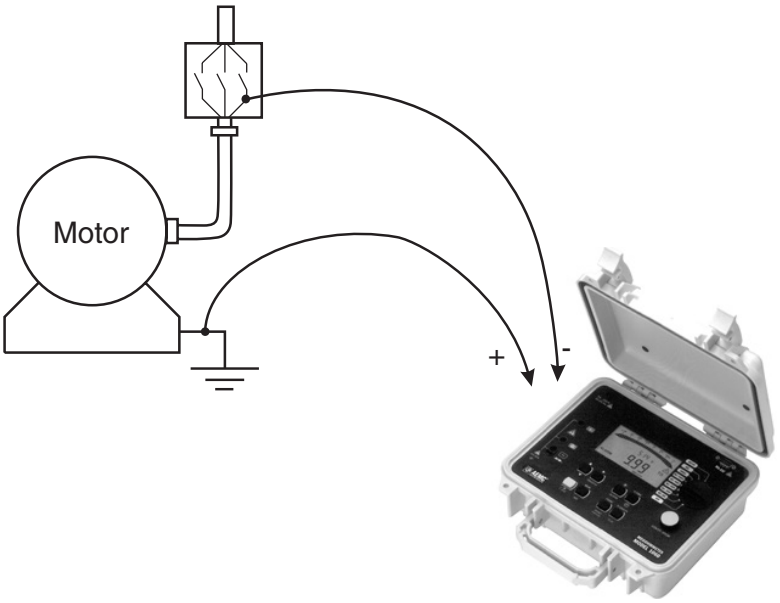
The measurements are performed between conductors ① or between all the conductors and the earth ②.

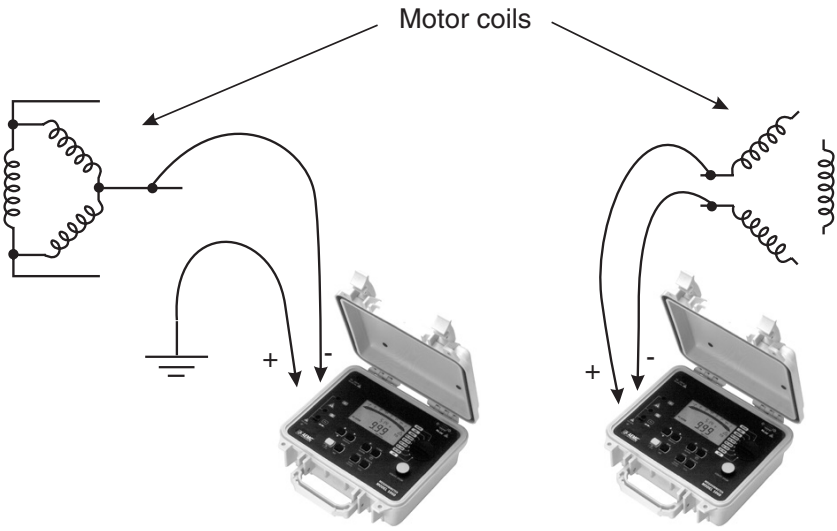
6.2 Measurements on Electrical or Telecom Cable



Insulation between wires or between each wire and the earth.

6.3 Insulation Measurements on Motors





CHAPTER 7

USING DATAVIEW®

7.1 Installing DataView®

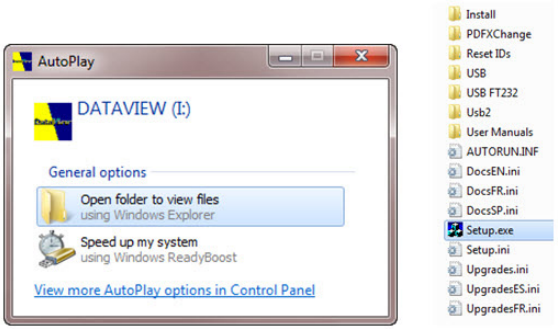
DO NOT CONNECT THE INSTRUMENT TO THE PC BEFORE INSTALLING THE SOFTWARE AND DRIVERS.

NOTE: When installing, the user must have Administrative access rights during the installation. The users access rights can be changed after the installation is complete.

DataView® must be reinstalled for each user in a multi-user system.

USB Flash Drive Install

1. Insert the USB stick into an available USB port (wait for driver to be installed).
2. If Autorun is enabled then an AutoPlay window should appear as shown.



NOTE: If Autorun is disabled, it will be necessary to open Windows Explorer, then locate and open the USB stick drive labeled “DataView” to view the files on the drive.

3. In the AutoPlay window, select **Open Folder to view Files**.

4. Double-click on **Setup.exe** from the opened folder view to launch the Data-View setup program.

NOTE: If installing onto a Vista based computer the **User Account Control** dialog box will be displayed. Select the **Allow** option to proceed.

5. A **Set-up** window, similar to the one below, will appear.

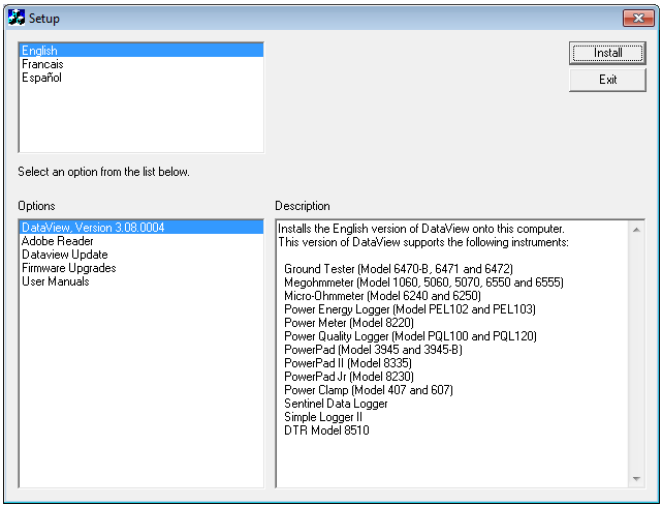


Figure 7-1

There are several different options to choose from. Some options(*) require an internet connection.

- **DataView, Version x.xx.xxxx** - Installs DataView® onto the PC.
- ***Adobe Reader** - Links to the Adobe® website to download the most recent version of Adobe® Reader to the computer. *Adobe® Reader is required for viewing PDF documents supplied with DataView®.*
- ***DataView Updates** - Links to the online DataView® software updates to check for new software version releases.
- ***Firmware Upgrades** - Links to the online firmware updates to check for new firmware version releases.

- **Documents** - Shows a list of instrument related documents that you can view. Adobe® Reader is required for viewing PDF documents supplied with DataView®.

6. **DataView, Version x.xx.xxxx** option should be selected by default. Select the desired language and then click on **Install**.

7. The **Installation Wizard** window will appear. Click **Next**.

8. To proceed, accept the terms of the license agreement and click **Next**.

9. In the **Customer Information** window, enter a Name and Company, then click **Next**.

10. In the **Setup Type** window that appears, select the **"Complete"** radio button option, then click **Next**.

11. In the **Select Features** window that appears, select the instrument's control panel that you want to install, then click **Next**.

NOTE: The **PDF-XChange** option must be selected to be able to generate PDF reports from within DataView®.

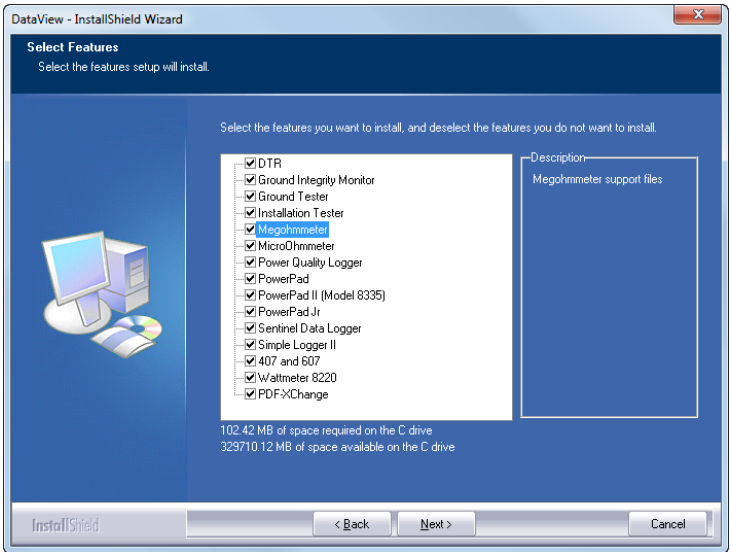


Figure 7-2

12. In the **Ready to Install the Program** window, click on **Install**.

13. If the instrument selected for installation requires the use of a USB port, a warning box will appear, similar to Figure 7-3. Click **OK**.

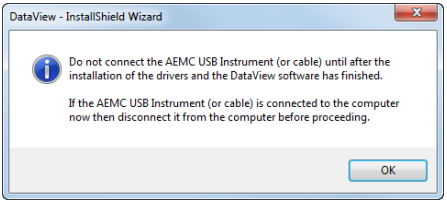


Figure 7-3

NOTE: The installation of the drivers may take a few moments. Windows may even indicate that it is not responding, however it is running. Please wait for it to finish.

14. When the drivers are finished installing, the **Installation Successful** dialog box will appear. Click on **OK**.
15. Next, the **Installation Wizard Complete** window will appear. Click on **Finish**.
16. A **Question** dialog box appears next. Click **Yes** to read the procedure for connecting the instrument to the USB port on the computer.

NOTE: The Set-up window remains open. You may now select another option to download (e.g. Adobe® Reader), or close the window.

17. **Restart** your computer, then connect the instrument to the USB port on the computer.
18. Once connected, the **Found New Hardware** dialog box will appear. Windows will complete the driver installation process automatically.

Shortcuts for DataView® and each instrument control panel selected during the installation process have been added to your desktop.

NOTE: If you connected your instrument to the computer before installing the software and drivers, you may need to use the **Add/Remove Hardware** utility to remove the instrument driver before repeating the process.

7.2 Connecting the Model 1060 to your Computer

The Model 1060 is supplied with a serial interface cable necessary for connecting the instrument to the computer. This cable (Cat. #2119.45) is equipped with a 9-pin female connector on each end, thus providing the ability to interface with computers that have 9-pin connectors (see diagram in § 5.1).

To connect the megohmmeter to your computer:

- Connect the 9-pin connector from one end of the cable to the serial port on the front panel of the Model 1060 megohmmeter.
- Connect the 9-pin from the other end of the cable to an available serial port on the back of your computer.

You are now ready to communicate using the DataView® software with the megohmmeter.

7.3 Using DataView®

Once the serial connection between the computer and the Model 1060 has been completed, as described above, start DataView®.

There are two ways to open and use the DataView® software:

Using the Megohmmeter Icon

- Double-click the **Megohmmeter Icon** that was created during installation, located on the desktop.
- DataView® will open and the **Connection** window will appear (see Figure 7-5).

Using the DataView Icon

- Double-click the **DataView Icon** that was created during installation, located on the desktop.
- DataView® will open and display the **DataView Quick Start** window (see Figure 7-4).
- Click the **Configure Instrument** button and the **Connection** window will appear (see Figure 7-5).

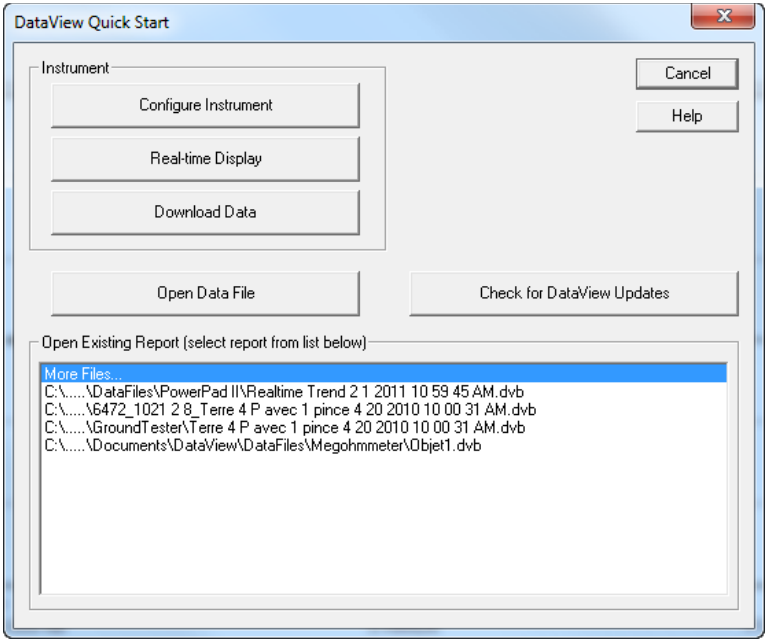


Figure 7-4

7.3.1 Configuring the Instrument

To configure the instrument, perform the following steps.

1. Click the **Configure Instrument** button. A dialog box will open, allowing you to select the Communication Rate and the Serial Port for communicating with the Model 1060.

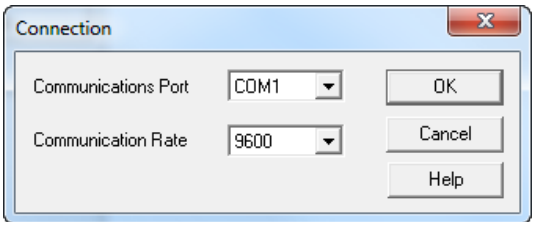


Figure 7-5

2. Make sure that the serial port displayed in the dialog box matches the port you plugged the serial cable into. If the correct serial port is not selected, click on the drop down arrow and select the proper one.

3. The Communication Rate will default to 9600 and should be acceptable to any computer. This is also the default rate for the Model 1060. You may select a different rate by clicking on the Communication Rate drop-down menu and selecting from the available values.

4. Once the proper communication parameters have been specified click on the OK button.

NOTE: The instrument must be configured for the same communications rate specified in Figure 7-5. If it is not, then you must either select the corresponding rate or change the instruments rate.

When a serial communication link is established, the DataView® program will automatically identify the instrument that it is connected to. An instrument selection screen will appear for a few seconds while this takes place.

Once identification is complete, the Setup dialog box will appear on the screen.

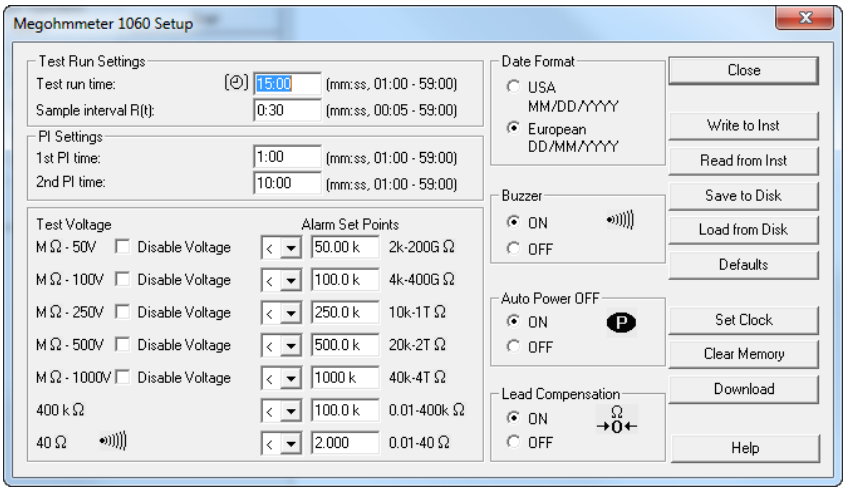


Figure 7-6

This dialog box lets you configure every aspect of the Model 1060 megohmmeter. Each field in the dialog box is identical to the programmable features available from the instrument front panel itself. Refer to § 2.5 for a complete description of each configurable function.

Several of the functions are configured by typing the appropriate value in the field provided, such as test run time, which may be programmed from a value of one minute to 59 minutes 59 seconds.

Others are configured by clicking on the appropriate radio button, such as, activating or deactivating the buzzer by either selecting ON or OFF.

The right hand side of this setup dialog box contains nine command buttons:

- **Close:** Closes the Configuration dialog box and brings up the Control Panel.
- **Write to Inst:** Programs the megohmmeter using the current settings.

- **Read from Inst:** Reads the current configuration of the megohmmeter attached via the serial cable.
- **Save to Disk:** Saves the current configuration. This file will reside on the computer's disk drive. Saving different configuration setups can be useful for future functions and tests.
- **Load from Disk:** Retrieves a saved file from the computer's disk drive to be used in programming the megohmmeter.
- **Defaults:** Resets all fields in the Setup dialog box back to the original factory settings.
- **Set Clock:** Programs the computer's time and date into the configuration of the megohmmeter.
- **Clear Memory:** Erases all contents in all memory locations in the megohmmeter.
- **Download:** Retrieves the stored data from all memory locations within the megohmmeter for naming and storing on the computer's disk drive memory.

Once all fields in the Setup dialog box have been configured, it is recommended that you perform the following steps.

1. Click on the **Save** button
2. Name and save the file.
3. Click on the **Write** button to configure the megohmmeter with this new configuration.
4. Click on the **Close** button to exit Setup and open the Control Panel.

⚠ **NOTE:** While connected, both the DataView® and Megohmmeter windows are open. They have similar main menu options, so you need to be aware of which window you are working in.

You can tell which window you are working in by looking at the top left corner of the active window. It will either display "DataView" or "Megohmmeter".

You can select the Megohmmeter Control Panel via the Windows taskbar at the bottom of your screen.

7.3.2 Running the Test

After configuring the instrument, the Control Panel will automatically open. The Control Panel is used to initiate a timed test from the computer.

The Control Panel dialog box consists of five command buttons:

- **Start:** This button begins a timed test.

- **Clear Display:** Clears the statistical data, on the lower left side of the screen, and the graph, on the right side of the screen.
- **Save to Disk:** Saves the current data to a file in the computer.
- **Configure:** Returns to the megohmmeter Setup dialog box for configuring the instrument.
- **Download:** Retrieves data from the memory of the megohmmeter for storage in the computer.

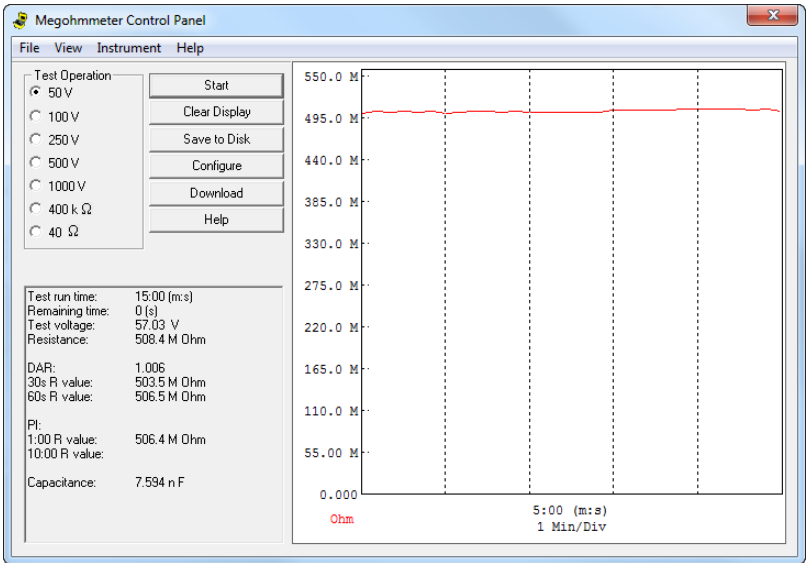


Figure 7-7

To run a timed test, perform the following steps:

1. Select the appropriate voltage for the test by clicking on the radio button next to the desired selection.
2. Press the **Start** button. This will run the test at the selected voltage.

   As the test is running, all other buttons are grayed out and the **Start** button becomes a **Stop** button.

Once the test has started, a graph will begin to appear and build on the right side of the Control Panel (see Figure 7-7).

The statistical data for the time of the test, DAR, PI, resistance value and other information will appear as they are completed on the lower left side of the Control Panel.

The test will stop automatically at the end of the programmed run time. You may also stop the test at any time by pressing the **Stop** button.

3. Once the test has been completed press the **Save to Disk** button to save the results of the test just completed to a disk drive in your computer.

4. Name the file, then press the **Save** button.

This will open the session properties dialog box:

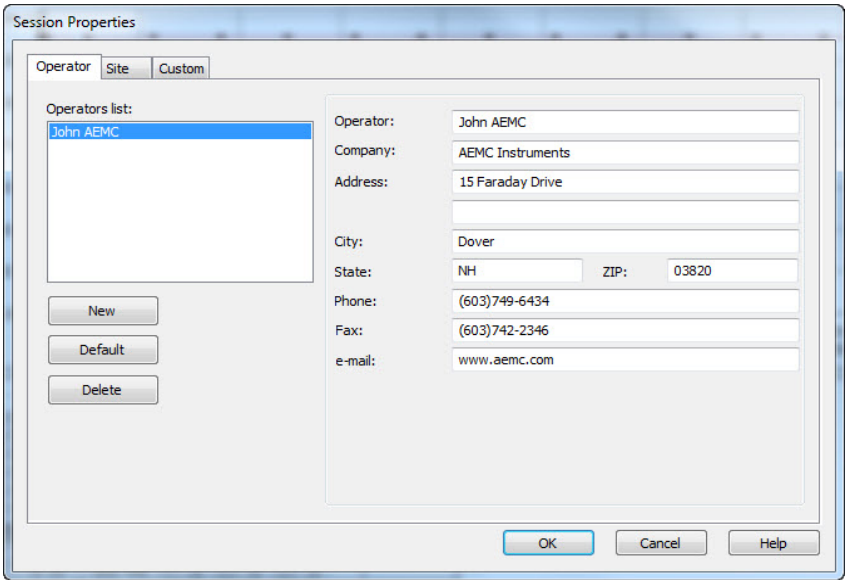


Figure 7-8

5. Once you have completed filling in all the information on the screen, press **OK**. This will open a dialog box allowing you to add a descriptive name for the object and test just performed.
6. Press the **OK** button. The information is now saved to disk.
7. You will then be asked if you want to open the database just downloaded. Click the **Yes** button, which will open a dialog box labeled Create View from Template.
8. In the Groups window of this dialog box, click on “megohmmeter” and in the Templates window click on “Megohmmeter 1060 Summary Report”.
9. In the Step 2: Specify Database(s) window, the file you just saved and named should be visible. If this is the file you wish to generate a report from, click the **OK** button. The report will now be available on the screen including graph, individual data points and all statistical data.
10. To print this report, either click on the Print icon or click on the File command and then Print.

This completes the process of configuring, running, retrieving data, and printing a report using DataView® with your Model 1060 megohmmeter.

CHAPTER 8

MAINTENANCE

Use only factory specified replacement parts. AEMC® will not be held responsible for any accident, incident, or malfunction following a repair done other than by its service center or by an approved repair center.

8.1 Battery Replacement (Model 1050)

The battery voltage is displayed on the small digital display for 2 seconds when switching on the instrument. The main display indicates **"bAt"**.

Before any measurements, make sure that the symbol is not displayed when a measurement function is selected. If it is displayed, change all the batteries.

NOTE: Make sure that none of the terminals are connected and that the switch is set to OFF before opening the battery compartment.

Batteries specified: LR14 alkaline (C cell)

1. Unscrew the 4 screws on the underside of the case to open the instrument.
2. Place the instrument on a table and press on the screws to extract the front panel.
3. Turn the instrument over to remove the front panel unit from the case. The batteries are then accessible at the back of the panel unit.
4. Unscrew the two screws on the battery compartment.
5. Replace cover before operating the instrument.

NOTE: Make sure that the seal is not damaged during the removal and replacement of the front panel.

8.2 Recharging the Battery (Model 1060)

If the symbol is flashing, then it is necessary to recharge the battery. Connect the instrument to the 120VAC power cord via the connector, charging starts automatically:

- **bAt** on the small display and **CHrG** on the main display, signifies fast charging in progress.
- **bAt** on the small display and **CHrG** flashing on the main display, signifies slow charging (starts off with fast charge, temperature conditions permitting).

- **bAt** on the small display and **FULL** on the main display, signifies that charging is over.

If the instrument is started up and the battery voltage is >8V, then the normal use of the device is permitted.

⚠ **NOTE:** The battery should be changed by an authorized repair facility recognized by AEMC® Instruments.

Changing the battery causes data to be lost from the memory.

Press the **MEM/MR** button. "**OFF"** is displayed. Proceed with a total clearing of memory in SET-UP (see § 2.5.7) so the MEM/MR functions can be used again.

8.3 Fuse Replacement

If **FUS HI** or **FUSE -G-** flashes on the LCD when turning the instrument ON, or during continuity measurement, then it is imperative that the corresponding fuses be changed, taking all the necessary precautions when opening up the instrument (see § 8.1 for opening procedure).

⚠ **NOTE:** Make sure that none of the terminals are connected and that the selector switch is set to OFF before opening up the case.

Using only the types of fuses shown on the sticker in battery compartment:

- "+" terminal fuse F1 (FUS HI):
  F 2.5A fast fuse - 1.2kV - 8 x 50mm - 15kA
- "G" terminal fuse F2 (FUS G):
  F 0.1A fast fuse - 660V - 6.3 x 32mm - 20kA

8.4 Cleaning

⚠ **Disconnect the instrument from any source of electricity.**

Use a soft cloth lightly dampened with soapy water. Rinse with a wet cloth and then dry with a dry cloth. Do not use alcohol, solvents or hydrocarbons.

8.5 Storage

If the instrument is not used for an extended time period (longer than two months), remove the battery and store separately (Model 1050).

Repair and Calibration

To ensure that your instrument meets factory specifications, we recommend that it be scheduled back to our factory Service Center at one-year intervals for recalibration, or as required by other standards or internal procedures.

For instrument repair and calibration:
You must contact our Service Center for a Customer Service Authorization Number (CSA#). This will ensure that when your instrument arrives, it will be tracked and processed promptly. Please write the CSA# on the outside of the shipping container. If the instrument is returned for calibration, we need to know if you want a standard calibration, or a calibration traceable to N.I.S.T. (Includes calibration certificate plus recorded calibration data).

Ship To: Chauvin Arnoux®, Inc. d.b.a. AEMC® Instruments
15 Faraday Drive
Dover, NH 03820 USA
Phone: (800) 945-2362 (Ext. 360)
(603) 749-6434 (Ext. 360)
Fax: (603) 742-2346 or (603) 749-6309
E-mail: repair@aemc.com

(Or contact your authorized distributor)

Costs for repair, standard calibration, and calibration traceable to N.I.S.T. are available.

NOTE: You must obtain a CSA# before returning any instrument.

Technical and Sales Assistance

If you are experiencing any technical problems, or require any assistance with the proper operation or application of your instrument, please call, mail, fax or e-mail our technical support team:

Chauvin Arnoux®, Inc. d.b.a. AEMC® Instruments
200 Foxborough Boulevard
Foxborough, MA 02035 USA
Phone: (800) 343-1391
(508) 698-2115
Fax: (508) 698-2118
E-mail: techsupport@aemc.com
www.aemc.com

NOTE: Do not ship Instruments to our Foxborough, MA address.

Limited Warranty

The Megohmmeter Model 1050/1060 is warranted to the owner for a period of one year from the date of original purchase against defects in manufacture. This limited warranty is given by AEMC® Instruments, not by the distributor from whom it was purchased. This warranty is void if the unit has been tampered with, abused or if the defect is related to service not performed by AEMC® Instruments.

Full warranty coverage and product registration is available on our website at www.aemc.com/warranty.html.

Please print the online Warranty Coverage Information for your records.

What AEMC® Instruments will do:

If a malfunction occurs within the one-year period, you may return the instrument to us for repair, provided we have your warranty registration information on file or a proof of purchase. AEMC® Instruments will, at its option, repair or replace the faulty material.

REGISTER ONLINE AT: www.aemc.com

Warranty Repairs

What you must do to return an Instrument for Warranty Repair:

First, request a Customer Service Authorization Number (CSA#) by phone or by fax from our Service Department (see address below), then return the instrument along with the signed CSA Form. Please write the CSA# on the outside of the shipping container. Return the instrument, postage or shipment pre-paid to:

Ship To: Chauvin Arnoux®, Inc. d.b.a. AEMC® Instruments
15 Faraday Drive • Dover, NH 03820 USA
Phone: (800) 945-2362 (Ext. 360)
(603) 749-6434 (Ext. 360)
Fax: (603) 742-2346 or (603) 749-6309
E-mail: repair@aemc.com

Caution: To protect yourself against in-transit loss, we recommend you insure your returned material.

NOTE: You must obtain a CSA# before returning any instrument.

Notes:

10/15

99-MAN 100237 v30

Chauvin Arnoux®, Inc. d.b.a. AEMC® Instruments
15 Faraday Drive • Dover, NH 03820 USA • Phone: (603) 749-6434 • Fax: (603) 742-2346
www.aemc.com