MEGOHMMETER

5050
5060

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 #: 2130.20 / 2130.21

Model #:   5050 / 5060

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

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.

- Only use the leads that are supplied with the megohmmeter. If they are defective or worn, replace before testing.

- This instrument can be used on installations rated for 1000V, Category III, or 2500V, Category I.

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 I: For measurements on circuits not directly connected to the AC supply wall outlet such as protected secondaries, signal level, and limited energy circuits.

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

• Match the contents with the ordering information.

• 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.

⚠ **NOTE:** Charge the instrument fully before use. ⚠

1.4   Ordering Information

Megohmmeter Model 5050..**Cat. #2130.20**
Includes extra large classic tool bag, set of three 10 ft (5kV) leads (red/black/blue) with integral 5000V rated hippo clips, one guard terminal jumper lead, US 115V power cord, rechargeable battery pack, and user manual.

Megohmmeter Model 5060..**Cat. #2130.21**
Includes extra large tool bag, set of three 10 ft (5kV) leads (red/black/blue) with integral 5000V rated hippo clips, one guard terminal jumper lead, RS-232 DB9 F/F 6 ft null modem cable, RS-232 to USB adapter, US power cord, rechargeable battery pack, and a USB stick with DataView® software and user manual.

1.4.1   Accessories and Replacement Parts

Cable, PC RS-232, DB9 F/F 6 ft Null Modem Cable (5060).............**Cat. #2119.45**

Set of 3, Color-coded 10 ft Safety Leads (5000V), 3 Color-coded
Alligator Clips (600V CAT IV) ....**Cat. #2119.76**

Lead – Replacement 1 ft jumper lead..**Cat. #2119.78**

Fuse, Set of 5, 0.1A, 380V, 5 x 20, .10kA...**Cat. #2119.84**

Replacement Lead – Set of 3, Color-coded 10ft (5kV) Safety
with Integral Hippo Clips **(JUMPER LEAD INCLUDED)**............................**Cat. #2119.85**

Lead – Set of 3, Color-coded 25ft (5kV) Safety with
Integral Hippo Clips **(JUMPER LEAD NOT INCLUDED)** ....**Cat. #2119.86**

Lead – Set of 3, Color-coded 45ft (5kV) Safety with
Integral Hippo Clips **(JUMPER LEAD NOT INCLUDED)** ....**Cat. #2119.87**

Extra Large Classic Tool Bag ....**Cat. #2133.73**

Inverter – 12V_{DC} to 120V_{AC} 200 Watt for Vehicle use......................**Cat. #2135.43**

Battery – Rechargeable 9.6V ....**Cat. #2960.21**

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

Adapter – RS-232 to USB 2.0 (5060)...**Cat. #5000.60**

1.5   Accessory Information

1.5.1   DataView® Software (for Model 5060)

Dataview® software makes it possible to:

- 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.
- Set up and control the instrument entirely by the RS-232.

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

PRODUCT FEATURES

The Megohmmeter Models 5050 and 5060 are portable instruments, housed in rugged casing.

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

Measures:

- Voltage
- Insulation Resistance
- Capacitance
- Leakage Current

Advantages:

- Automatic voltage detection in all functions, before or during the measurement, which inhibits or stops the measurement.
- 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
- Digital filtering of insulation measurements
- Automatic discharge of residual high voltage on the tested device
- Automatic shut-off to save the batteries
- Battery level indicator
- Large easy-to-read back-lit LCD

Additional Features (Model 5060):

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

MODEL 5050
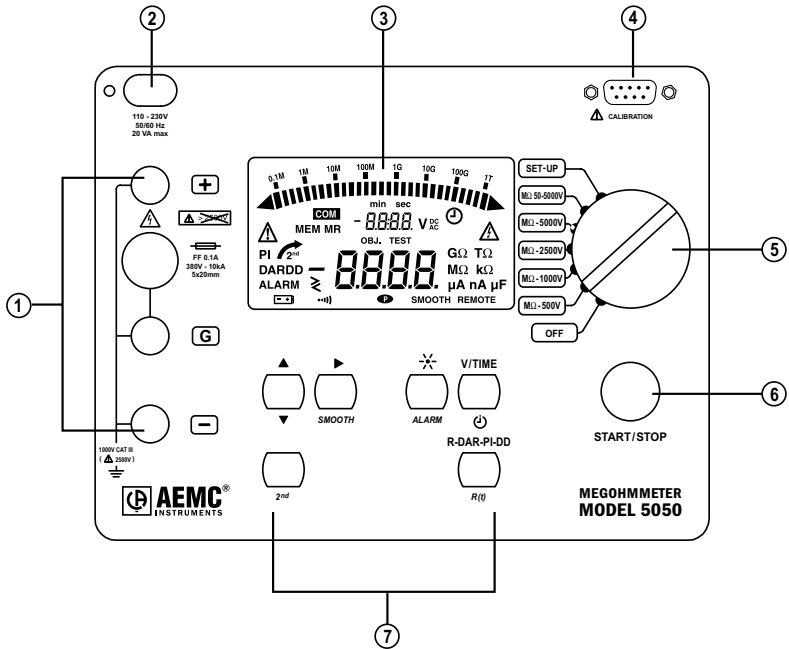
MODEL 5060
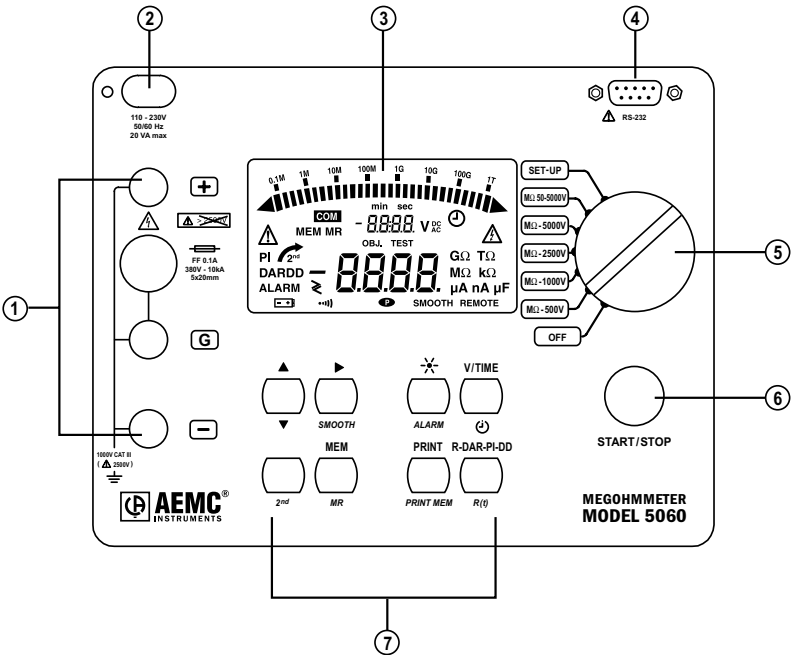
2.1 Megohmmeter Features

1. Safety terminals: "+", "G" and "-" and access to the protective fuse.

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

3. Back-lit liquid crystal display.

4. RS-232 serial interface male plug (9-pin)
   - For calibration only (Model 5050)
   - For connection to a PC or printer (Model 5060)

5. Rotary selector switch with 7 positions:
   - **OFF** - Instrument is off
   - **MΩ - 500V** - Insulation measurement (to 2TΩ)
   - **MΩ - 1000V** -Insulation measurement (to 4TΩ)
   - **MΩ - 2500V** - Insulation measurement (to 10TΩ)
   - **MΩ - 5000V** - Insulation measurement (to 10TΩ)
   - **MΩ - 50V-5000V** - Insulation measurement with selectable test voltage
   - **SET-UP** - Set-up of the megohmmeter

6. START/STOP button

7. 6 buttons (5050) or 8 buttons (5060), each with a first and second function. The second functions are highlighted in yellow below each button:
   - **2nd (yellow button)** - Selects the second function on each button.
   - **R-DAR-PI-DD** - Lets you choose the type of measurement to be performed. Instantaneous Resistance (R), Dielectric Absorption (DAR), Polarization Index (PI), or Dielectric Discharge (DD).
   - **R(t)** - Shows/hides 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.
   - $\left(\begin{array}{c}\square\end{array}\right)$ - 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 5060 only:

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

2.2 Digital Features
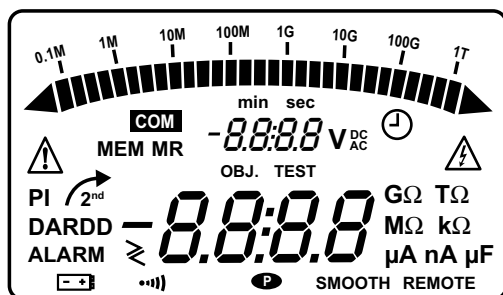
Main Display

Indicates the value of:

- Insulation measurement (resistance, DAR and PI, DD, capacitance).

Small Display

Indicates:

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

After recording a set of data (5060), 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 (5060) - indicates the memory operation.

OBJ:TEST: Memory address (5060) - the number is displayed on the small digital display.

COM: Flashes on the screen when data is transmitted to the serial interface (5060) or remains permanently displayed if there is a problem during transfer.

DAR/PI/DD: 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 (5060).
2ⁿᵈ	(Yellow button) Selects the second (bottom) function of a button.
🔋	Flashes if the battery voltage is low, indicating that the battery should be recharged (see § 8.1). 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.
•◂)))	Warning buzzer is activated.
P	Indicates that the automatic switch-off function has been deactivated.

SMOOTH: Smooths the insulation measurements displayed.

REMOTE: Remote control via an interface (5060). In this mode, all the buttons and the rotary switch on the instrument are non-functional, except for the OFF position.

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

2.5   Push-button Functions

2.5.1   2nd Button

- Selects the second function (highlighted in yellow) on the buttons.
- The $\overrightarrow{2^{nd}}$ 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).

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-DD / R(t) Button

First Function - R-DAR-PI-DD

The **R-DAR-PI-DD** button allows automatic measurement of:
- Dielectric Absorption Ratio (DAR)
- Polarization Index (PI)
- Dielectric Discharge Test (DD)

The PI and DAR values 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 inter-fering 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.

Then the **PI** or the **DAR** ratios are calculated:

$PI^* = R_{10\ min} / R_{1\ min}$ (2 values recorded during a 10 minute measurement)

$DAR = R_{1\ min} / R_{30\ s}$ (2 values recorded during a 1 minute 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

The 10 and 1 minute times can be modified in the SET-UP menu, to adapt to any changes or specific applications.

For multi-layer insulation, if one of the layers is defective, but all the others show strong resistance, the calculation of the PI and PAR ratios is not sufficient to show this type of problem.

Therefore, it is necessary to supplement the PI and DAR indications by a dielectric discharge test (DD).

This test measures the dielectric absorption of heterogeneous or multi-layer insu-lation while ignoring the parallel-surface leak currents.

It consists of applying a test voltage for a period sufficient to electrically "charge" the insulation to be measured (a typical value is the application of a 500V voltage for 30 minutes).

The test voltage is chosen in the same way as the insulation measurement in the SET-UP menu. The device then causes a fast discharge during which the insulation capacity is measured, then measured 1 minute after the residual current is circulating in the insulation.

The DD value is calculated from the formula below:

$$DD = \frac{\text{current measured after 1 minute (mA)}}{\text{test voltage (V) x capacity measured (F)}}$$

The indication of the insulation quality as a function of the resulting value is as follows:

DD value	Insulation quality
DD >7	Very bad
7 >DD >4	Bad
4 >DD >2	Doubtful
DD <2	Good insulation

⚠ **NOTE:** The dielectric discharge test is suited for the insulation measurement of rotating machines, and in general, for the insulation measurement of heterogeneous or multilayer insulation containing organic materials.

Using the R-DAR-PI-DD Function:

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

- DAR (for measurements lasting > 1 min)

- PI (for measurements lasting > the programmed PI times)

- DD can only be calculated 1 minute after the end of the insulation measurement and circuit discharge, and only if it was selected before beginning the measurement.

- Capacitance in µF (only after the measurement has stopped and the circuit has been discharged)

- Residual leakage current circulating in the installation in µA or nA

- Insulation resistance in MΩ, GΩ or TΩ

⚠ **NOTE:** During the measurement, the DAR value is not available if the DD value was preselected before the measurement. The PI value is not available if DAR or DD values were preselected before the measurement.

Automatic Measurement of DAR or PI:

If the R-DAR-PI-DD button is pressed during the voltage measurement before the start of a measurement, the following is displayed:
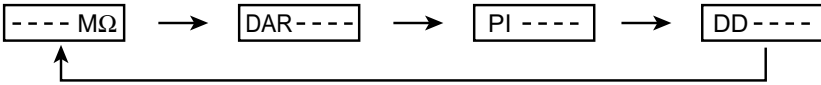
⚠️ **NOTE:** The input current may be a depolarization current resulting from an earlier insulation measurement. It is recommended to start a new DAR and PI measurement after the current has dropped to a negligible value (on the order of 100pA) to avoid variations on these measurements.

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 ratio 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-DD** 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 ratio is not possible (t < programmed PI times).

e.g.:

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

c) **DD:** Press **START** - the **DD** symbol flashes and the display indicates "- - - -" as long as the calculation of the ratio is not possible (t <30 min +1 min).

e.g.:

1 minute after the measurement stops, the DD symbol becomes steady, the display automatically show the value of DD.

Therefore: if the measurement lasts 1 min. - DAR
if the measurement lasts longer than the programmed PI time - PI
if 1 min. after the end of the measurement - DD

⚠ **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:

DAR MΩ   or   PI MΩ   or   DD MΩ
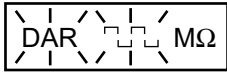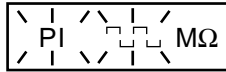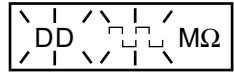
The display of the DD value is:

- Unknown (- - - -) if C < 1nF and Idd < 100pA
- Known and flashing if 1nF ≤ C < 10nF and 100pA ≤ Idd < 1nA
- Known and permanent if C ≥ 10nF and Idd ≥ 1nA

(with C = measured capacitance and Idd = measured leakage current)

⚠ **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 5050, which has neither a read-write memory for saving measured data, nor an interface for data retrieval from the instrument by a PC.

Model 5050:
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 5060:
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-DD** 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 500, 1000, 2500, 5000, and set.

- 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 Up Arrow Key to make your selection.

- Press the Right Arrow Key again to move to the Resistance Value Set Point Selection. You can change this value digit by digit using the Up Arrow / Left Arrow 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.

The flashing parameter 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 Function

Configures 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 then displayed.
- The instrument ID number is displayed next.
- "**PUSH"** appears on the small display and "**btn"** on the main display, prompting 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 following table 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"	⏲	tESt	30:00	min. sec	1:00 - 59:59
1st and 2nd times for PI calculation	R-DAR-PI-DD	second time (10:00)	first time (1:00)	min : sec	:30 - 59:59
Time between interval samples in "time-controlled test"	R(t)		00:30	min : sec	0:05 - 30:00
Limit for 500V - 2TΩ	ALARM	500kΩ	500V	ALARM <	30k-2TΩ and >/<
Limit for 1000V - 4TΩ	ALARM (2nd press)	1MΩ	1000V	ALARM <	100k-4TΩ and > / <
Limit for 2500V - 10TΩ	ALARM (3rd press)	2.5MΩ	2500V	ALARM <	300k - 10TΩ and > / <
Limit for 5000V - 10TΩ	ALARM (4th press)	5MΩ	5000V	ALARM <	300k - 10TΩ and > / <
Limit for Var - 50/5000V	ALARM (5th press)	5MΩ	Set	ALARM <	10k - 10TΩ and > / <
Time	V/TIME		12 :55	⏲	hh (00-23) mn (00-59)
Date (European version)	V/TIME (2nd press)	17.03	2000		dd.mm.yyyy
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)	FrEE/OCC	OBJ : TEST number	MEM	00...99
Baud	PRINT	9600	bAUd		300...9600
Buzzer	☀	0n		••1))	ON / OFF
Auto switch-off	☀ (2nd press)	0n		P	ON / OFF
Default configuration	☀ (3rd press) then START	DFLt	SEt		
User selectable test voltage	☀ (4th press)	SEt	100V	V	40 / 5100V
Disturbance limit voltage	☀ (5th press)	0.03 V	dISt	V	0.03/0.10/0.20
Automatic range	☀ (6th press)	Auto	rAnG		Auto/1/2/3
Test voltage locking	☀ (7th press)	oFF	1000V		ON / OFF 40-5100V

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 § 2.5.10).

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 small display indicates **"ALL"**
- The main display indicates **"FrEE"**

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

- Select the number using the ▶ and ▲▼ buttons
- **"FrEE"** or **"OCC"** appears 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 (e.g. 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 via the serial-to-parallel adapter (RS-232 Centronics).

2.5.10 Default Device Configuration

In **SET-UP**, press the ☼ button three times:

- "**SEt"** appears in the small display.
- "**DFLt"** (flashing) appears in the main display.

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

2.5.11 Voltage Disturbance Limit

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

- • "**dISt"** appears in the small display.
- • **"003U"** (flashing) appears in the main display.
- • Modify this value if necessary using the ♦ button (possible choice between: 0.10 - 0.20 - 0.03).

⚠ **NOTE:** This adjustment provides the best compromise between the measurement build-up time and the presence of external interference voltages (§ 4.2).

If no interference voltage is present, choose 0.03 to obtain a rapid measurement build-up time.

Example: If an insulation measurement is performed at a test voltage of 5000V and the limit is set to 0.10, it will be possible to perform a correct measurement with the presence of an external interference voltage $\leq$500V, to the detriment of a longer measurement build-up time.

2.5.12 Automatic Measuring Range

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

- • "**rAnG"** appears in the small display.
- • **"Auto"** appears in the main display.

Use the ♦ button to choose a fixed (1, 2 or 3 on the main display) or automatic (Auto on the main display) measurement range.

⚠ **NOTE:** The fixed measurement ranges correspond to the current ranges of the following measurements:

   1: 50pA to 200nA (>500GΩ)

   2: 150nA to 50µA (500KΩ to 500GΩ)

   3: 30µA to 3mA (<500KΩ)

The choice of a fixed measurement range optimizes the measurement build-up time for a known value of insulation resistance.

Example: Choice of range 1 for a measurement greater than 500GΩ.

Note: In most cases, **"Auto"** should be selected.

2.5.13 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.

To set the maximum variable test voltage:

- Turn the rotary switch to **SET-UP**

- Press the ☀ button seven times
  - "**1000V"** appears in the small display
  - **"OFF"** appears (flashing) in the main display

- Press the ▶ button to toggle to the maximum test voltage ("1000V" will now be flashing)

- To increase the voltage, press the ▲ button
  To decrease the voltage, press the yellow **2ⁿᵈ** button, then the ▼ button

- After setting the maximum test voltage, toggle back to **"OFF"** by pressing the ▶ button

- Press the ▲ button to turn **"ON"**

Example: By choosing **ON** and a test voltage limit of 750V, the measurement will be performed at 500V for the 500V switch position on the rotary switch, and at 750V for all the other positions on the rotary switch (LIM will appear for 3 seconds on the main display).

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

Measurement Range	1.0 to 99.9V	100 to 999V	1000 to 2500V	2502 to 4000V
Frequency Range*	DC and 15Hz to 500Hz			DC
Resolution	0.1V	1V	2V	2V
Accuracy	1% of Reading ± 5cts	1% of Reading ± 3cts		
Input Impedance	750kΩ at 3MΩ depending on measure voltage			

*Over 500Hz, the small display indicates "- - - -" and the main display gives only an assessment of the peak value of the measured voltage.

Measurement Category: 1000V CAT III or 2500V CAT I (transients ≤2.5kV)

3.3 Insulation Resistance

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

Nominal Output Voltage:
500, 1000, 2500, 5000VDC (or adjustable from 40 to 5100V)

No Adjustment in Variable Mode: 10V from 40 to 1000V
100V from 1000 to 5100V

Open-circuit Voltage: ≤1.1 x Vn ±2V (Vn ±2% in variable mode)

Max. Overload of Voltage Vn: (1.05 + dISt) Vn + 50V
with dISt - 0.03 - 0.10 or 0.20

Nominal Current: >1mADC

Short-circuit Current: <1.6mA ± 5%

Load Current: 3mADC approx when starting measurement

Max. Acceptable AC Voltage:
Vpeak - (1.05 + dISt) Vn with dISt = 0.03 - 0.10 or 0.20

Measurement Ranges:
500V: 30kΩ to 1TΩ   2500V: 300kΩ to 9.99TΩ
1000V: 100kΩ to 3.999TΩ   5000V: 300kΩ to 9.99TΩ

Variable: 40V to 5100V (see graph below)

Resistance Range in Voltage Mode

Variable Voltage (V)
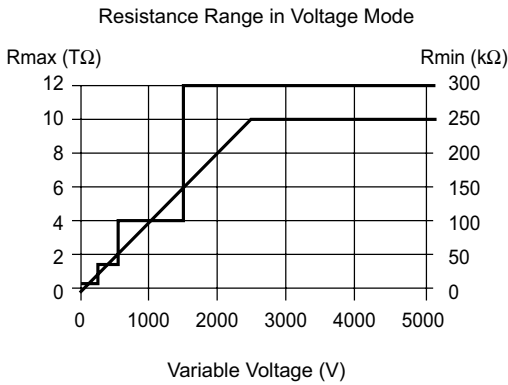
Resolution and Accuracy Chart (see curves - pages 26 and 27)

Test Voltage	500V	500V - 1000V	500V - 1000V - 2500V - 5000V			
Range	30 to 99kΩ	100 to 299kΩ	300 to 999kΩ	1MΩ to 3.999kΩ	4.00 to 39.99MΩ	40.0 to 399.9MΩ
Resolution	1kΩ				10kΩ	100kΩ
Accuracy	±5% of Reading + 3cts					

Test Voltage	500V - 1000V - 2500V - 5000V				1000V - 2500V 5000V	2500V 5000V
Range	400MΩ to 3.999GΩ	4.00 to 39.99GΩ	40.0 to 399.9GΩ	400GΩ to 1.999TΩ	2.000 to 3.999TΩ	4.00 to 10.00TΩ
Resolution	1MΩ	10MΩ	100MΩ	1GΩ		10GΩ
Accuracy	±5% of Reading + 3cts		±15% of Reading + 10cts			

DC Voltage Measurement (during insulation test)**:**

Range	Resolution	Accuracy
40.0 to 99.9V	0.1V	
100 to 1500V	1V	1% of Reading ± 1ct
1501 to 5100V	2V	

DC Voltage Measurement (after insulation test)**:**

Range	Resolution	Accuracy
25 to 5100V	0.2% Vn	5% of Reading ± 3cts

Typical build-up time for the measurement according to components tested (V_{dist} = 0.03Vn).

These values include the influences caused by the charge of the capacitive component, by the automatic range system and to the test voltage control.

Test Voltage	Load	Non Capacitive (unsmoothed measurement)	With capacitance of 1μF (smoothed measurement)
500V	1MΩ	3s	4s
	100GΩ	8s	40s
1000V	1MΩ	3s	4s
	100GΩ	8s	80s
2500V	3MΩ	3s	4s
	100GΩ	8s	90s
5000V	5MΩ	4s	16s
	100GΩ	8s	120s

Typical discharge time for a capacitive component to reach 25V$_{DC}$.

Initial Voltage	500V	1000V	2500V	5000V
Discharge time (C in μF)	C x 3s	C x 4s	C x 4s	C x 7s

Typical changes in test voltages as a function of the load:

500V Range
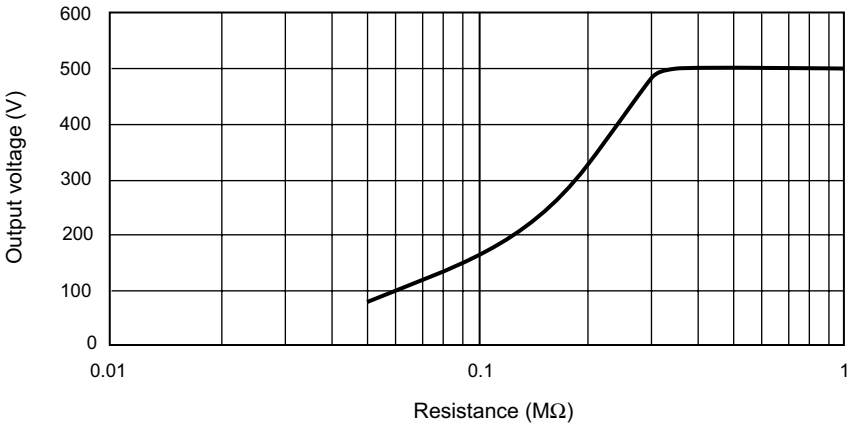
1000V Range

Typical changes in test voltages as a function of the load (cont.):

2500V Range
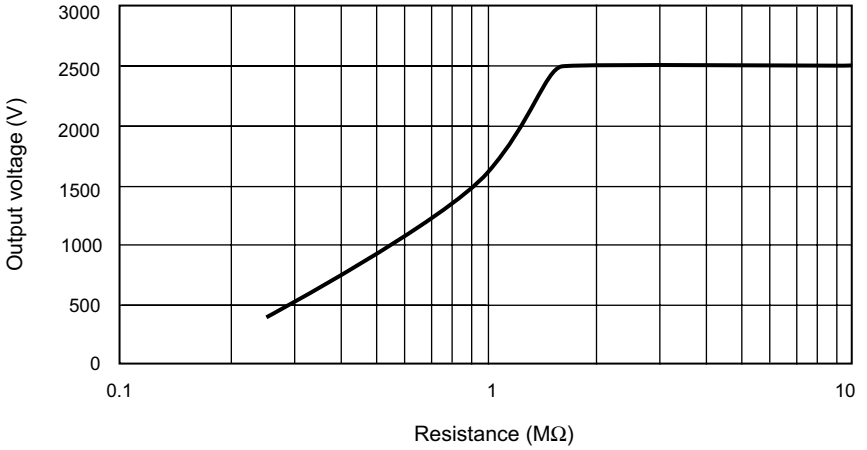
5000V Range
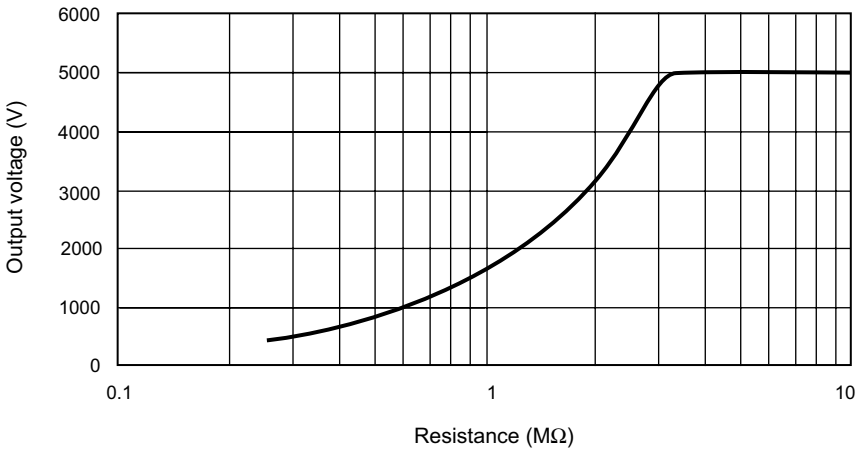
Capacity Measurement (after discharge of tested component)**:**

Range	Resolution	Accuracy
0.005 to 9.999µF	1nF	10% of Reading ± 1ct
10.00 to 49.99µF	10nF	

Leak Current Measurement

Range	Resolution	Accuracy
0.000 to 0.250nA	1pA	15% of Reading ± 10cts
0.251 to 9.999nA		10% of Reading
10.00 to 99.99nA	10pA	5% of Reading
100.0 to 999.9nA	100pA	
1.000 to 9.999µA	1nA	
10.00 to 99.99µA	10nA	
100.0 to 999.9µA	100nA	
1000 to 3000µA	1µA	10% of Reading

Calculation of Terms DAR and PI

Range	Resolution	Accuracy
0.02 to 50.00	0.01	5% of Reading ± 1ct

Calculation of Term DD

Range	Resolution	Accuracy
0.02 to 50.00	0.01	10% of Reading ± 1ct

3.4   Power Supply

- Rechargeable battery NiMh (8 x 1.2V / 3.5Ah)
- Recharge: 85 to 256V / 50-60Hz

Minimum Battery Charge Life (per NF EN 61557-2)

Test Voltage	Nominal Charge	Number of Measurements 5s on nominal charge (with 25s pause between each measurement)
500V	500kΩ	6500
1000V	1MΩ	5500
2500V	2.5MΩ	4000
5000V	5MΩ	1500

Average Battery Life: The operating time will be 15 days or 3 weeks, based upon a 10 minute long PI measurement.

Recharge Time:
6 hours for 100% capacity (10 hours if the battery is completely drained)
0.5 hours for 10% capacity (charge life: 2 days approximately)

⚠️ **NOTE:** It is possible to recharge the batteries while performing insulation measurements provided that the values measured are higher than 20MΩ. In this case, the recharging time is higher than 6 hours and depends on the frequency of the measurements.

3.5   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
10 to 80% RH

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

Altitude: <2000m

3.6   Mechanical Specifications

Case Dimensions:
10.63 x 9.84 x 7.09" (270 x 250 x 180mm)

Weight: 9.5 lbs (4.3kg) approx.

Mechanical Protection
IP 53 per NF EN 60529 (Ed. 92)
IK 04 per NF EN 50102 (Ed. 95)

3.7   Safety Specifications

Electrical safety according to EN 61010-1 (Ed. 2 for 2001),
EN 61557 (ed. 97)

CE ▣

1000V CAT III, Pollution Degree 2
2500V CAT I

Electromagnetic Compatibility:
NF EN 61326-1 (Ed. 97) + A1, industrial environment category

3.8   Variations in Operating Range

Influential Quantity	Range of Influence	Quantity Influenced*	Influence	
			Typical	Max.
Battery Voltage	9V to 12V	V MΩ	<1ct <1ct	2cts 3cts
Temperature	-10° to +55°C	V MΩ	0.15% R/10°C 0.20% R	0.3% R ± 1ct 1% R ± 1ct
Humidity	10 to 80% HR	V MΩ (10kΩ to 40GΩ) MΩ (40GΩ to 10TΩ)	0.2% R 0.2% R 3% R	1% R ± 2cts 1% R ± 5cts 15% R ± 5cts
Frequency	15 to 500Hz	V	0.3% R	0.5% R ± 1ct
AC voltage superimposed on test voltage	0% to 20% Vn	MΩ	0.1% R / % Vn	0.1% R / % Vn ± 5cts

The terms DAR, PI, DD and the capacity and current leak measurements are included in the quantity "MΩ".

MEASUREMENT FUNCTIONS

4.1 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.

4.2 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.

⚠ **WARNING: If the external voltage present at the device's terminals exceeds the threshold shown below, 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.

Threshold: V peak ≥ dISt x Vn

- Vpeak: External peak voltage or DC present at unit terminals.
- dISt: Coefficient defined in the set-up menu (adjustable to 0.03 - 0.10 - 0.20 - default value: 0.03).
- Vn: Test voltage chosen for insulation measurement.

If the external voltage present at the device terminals is less than the value defined previously, 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.

⚠ **WARNING:** If the test voltage is considered to be dangerous (>120V), the ⚡ symbol is displayed. If, during insulation measurement, an external voltage higher than the value defined by the following threshold 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.

Threshold: V peak > (dISt + 1.05) Vn

Note: Adjustment of the dISt factor optimizes the measurement build-up time. If there is no interference voltage present, the dISt factor may be adjusted to the minimum value to obtain a build-up time for the minimum measurement.

⚠ **If a significant interference voltage is present,** the dISt factor may be increased so that the measurement is not interrupted by the appearance of a negative alternation during the generation of the test voltage, which is the same as optimizing the measurement build-up time in the presence of the interference voltage.

If the measurements are unstable, the **SMOOTH** function can be enabled.

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.

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-DD** button. This button can also be used before the measurement is begun.

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

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.

Display of values after measurement

R-DAR-PI-DD Button		V-TIME Button
Main Display	Small display	Small display if the MR button is pressed (Model 5060)
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
DD*	duration (min. sec)	date, time, test voltage, OBJ : TEST
Current	duration (min. sec)	
Capacitance**		
R(t)	duration (min. sec)	last test voltage

The value of DD is displayed only one minute after the measurement stops.

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

OPERATION

⚠ **NOTE:** Charge the instrument fully before use. ⚠

5.1 Measurement Procedure

- Start the instrument by turning the switch to the corresponding position. All the segments on the LCD screen are displayed, then the battery voltage.

- Connect the leads to the "+" and "-" leads to the measurement points.

- The voltage is continuously measured and displayed on the small display.

- 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 an external voltage is present that is greater than the thresholds described in § 4.2, 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).

5.2 Insulation Measurement

This function allows the instrument to measure insulation between 10kΩ and 10TΩ at a test voltage of 500V, 1000V, 2500V, and 5000V or programmed voltage between 40V and 5100V.

- Use the rotary switch to select the required test voltage (MΩ-500V, or MΩ-1000V, or MΩ-2500V, MΩ-5000V, or Var. MΩ-50-5000V).

- Connect the instrument to the insulator to be tested.

- Start the measurement using the START/STOP button and read the results.

⚠ **WARNING:** If an external voltage is present that is greater than the thresholds described in § 4.2, then measurement is prohibited.

Scroll through the results on the main display with the **R-DAR-PI-DD** 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 "G" 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.

5.3 Operation Examples

Connection diagram for measurement of low insulation (e.g. motor)
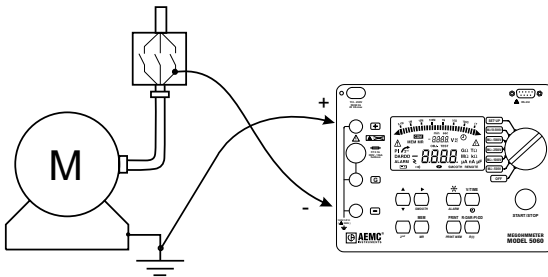
Connection diagram for measurement of strong insulation

a) Example of a motor (reduction of capacitive effects)
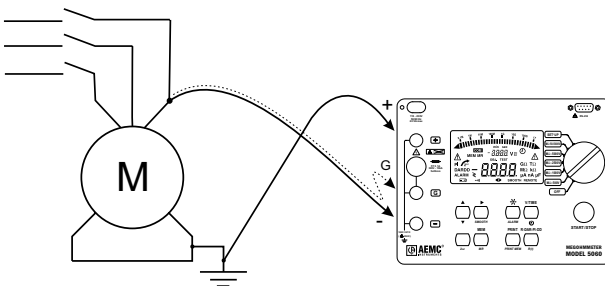
b) Example of a cable (reduction of superficial leak effects)
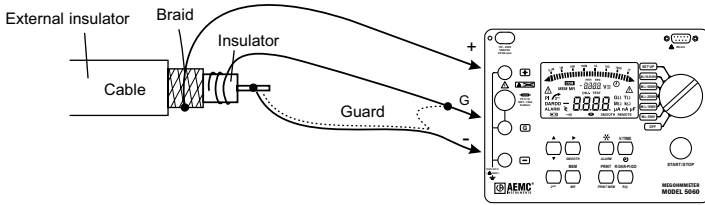
5.4   Capacitance Measurement

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-DD** button.

5.5   Residual and Leakage Current Measurement

The measurement of residual current circulating in the installation is automatically made during an insulation measurement. It is displayed at the end of the measurement with the **R-DAR-PI-DD** button.

MEMORY / RS-232 (5060)

6.1   RS-232 Specifications

The Baud Rate can be set to 300, 600, 1200, 2400, 4800, 9600, or "Parallel" for printing results on parallel printers via the optional serial-to-parallel adapter.

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 or to a Parallel Printer

Cable, PC RS-232, DB9 F/F 6 ft Null Modem Cable (5060)............. **Cat. #2119.45**

9-pin female connector   9-pin female connector
to Model 5060   to serial printer
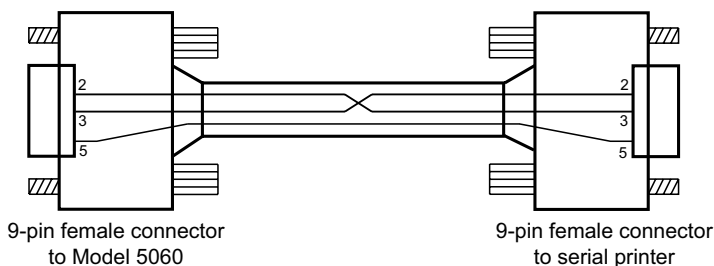
6.2   Saving / Recalling Values (MEM/MR Button)

⚠ **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 requires 80 bytes. A "time-controlled test" sample requires 10 additional bytes. Therefore, it is possible to record about 1500 insulation measurements.

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-DD** 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-DD** again.

To exit the MR function, press **MR** button once again or turn the selector switch.

6.3   Printing Measured Values
(PRINT/PRINT MEM Button - Model 5060)

If you use a serial printer, choose the appropriate communication speed (baud rate) in the **SET-UP** menu, between 300 - 9600 baud, then program the printer to the format run by the instrument (see § 6.1).

There are two printing modes possible:

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

⚠️ **NOTE: 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.

6.4   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/DD/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.

Depending on the function used, the following models are obtained:

Insulation Measurement
AEMC® Instruments Model 5060
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.

6.5 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 (use the ▶ and ⬍ buttons 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 5060
Instrument number: 000 001

INSULATION RESISTANCE TEST
OBJECT: 01.....................................TEST: 01
Description:..
....
Date: 03.31.2001
Starting time: 13h 35
Running time: .... 16 min 27 sec
Temperature: ....°C ....°F
Relative humidity: .... %
Test voltage: .... 5000 V
Insulation resistance (IR): ....3.85 TΩ
DAR: 1.234
PI: 2.382
DD: ....
Capacitance:... µF
I residual:... nA
Comments: ....
....
Date of next test: ....

OBJECT: 01.....................................TEST: 02
Date: 03.31.2001
Starting time: 15h 10
Running time: .... 15 min 30 sec

Temperature: ....°C ....°F

Relative humidity: .... %

Test voltage: .... 1000 V

Insulation resistance (IR): ....3.85 GΩ

DAR: 1.234

PI: 2.345

DD: ....

Capacitance:... µF

I residual:... nA

Comments: ....

....

Date of next test: ....

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

DATAVIEW® SOFTWARE

7.1   Installing DataView®

[i]   **DO NOT CONNECT THE INSTRUMENT TO THE PC BEFORE INSTALLING THE SOFTWARE AND DRIVERS.**

Minimum Computer Requirements:

• Windows XP / Windows Vista & Windows 7/8 (32/64 bit)

• 256MB of RAM for Windows XP
  1GB of RAM for Windows Vista & Windows 7/8 (32 bit)
  2GB or RAM for Windows Vista & Windows 7/8 (64 bit)

• 80MB of hard disk space (200MB recommended)

• USB port

Windows is a registered trademark of Microsoft Corporation in the United States and other countries.

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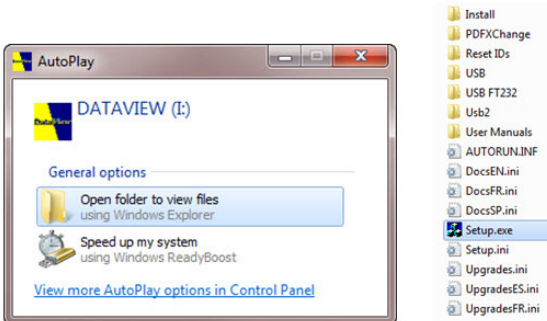
| i | **NOTE:** If Autorun is disabled, it will be necessary to open Windows Explorer, then locate and open the USB stick drive labeled "DataView" to view the files on the drive. |

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.

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

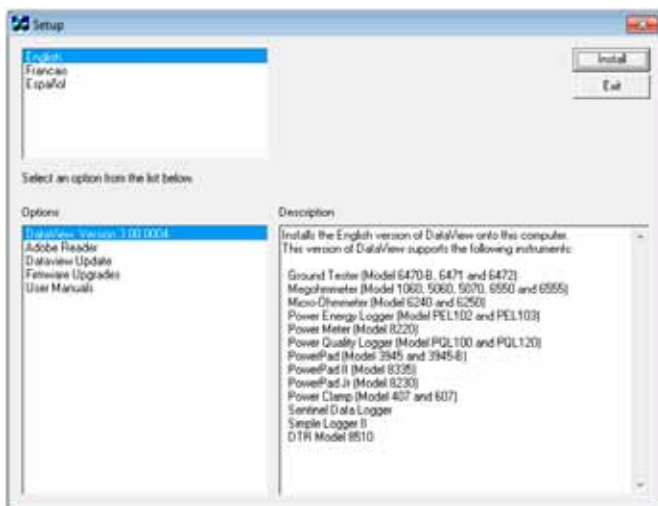**5.** A **Set-up** window, similar to the one below, will appear.

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**.

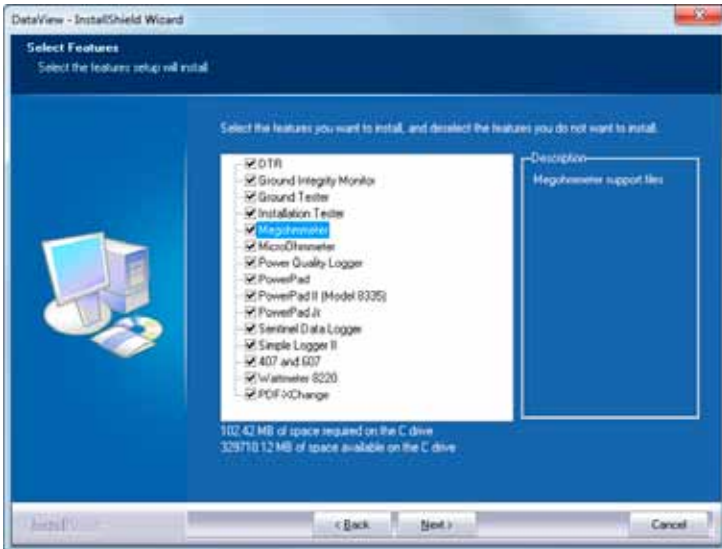| i | **NOTE:** The **PDF-XChange** option must be selected to be able to generate PDF reports from within DataView®. |

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**.
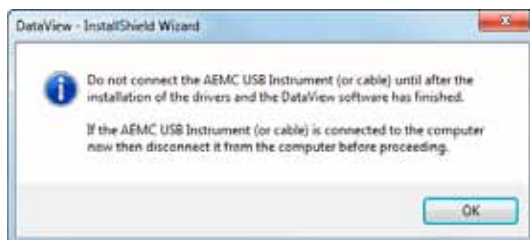
Figure 7-3

| | **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 5060 to your Computer

The Model 5060 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 § 6.1).

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 5060 megohmmeter.

- Connect the 9-pin connector 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 DataView® with the megohmmeter.

7.3   Using DataView®

Once the serial connection between the computer and the Model 5060 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 7-6).

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).

The Quick Start Dialog Box contains the following options:

- **Configure Instrument:** Creates a configuration for the megohmmeter.

- **Create View from Template:** Creates a printable report from existing data already stored on the computer.
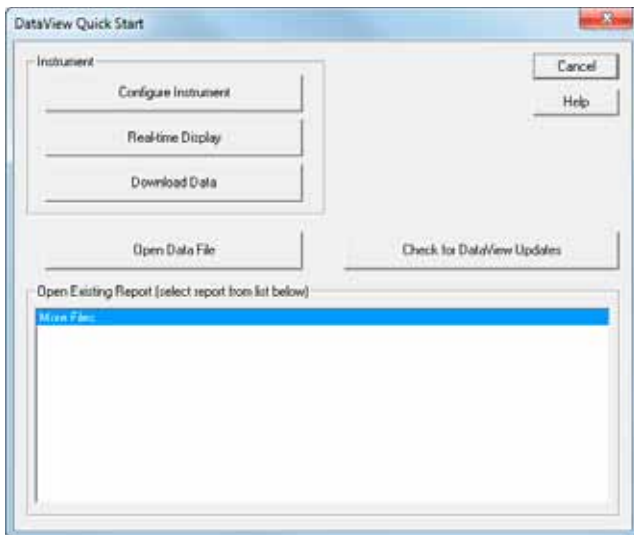
Figure 7-4

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 5060.
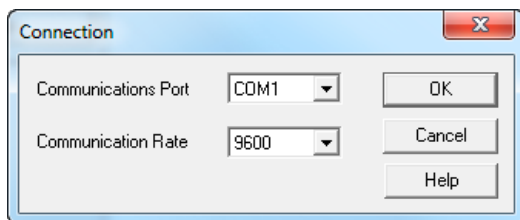

Figure 7-5

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 5060. 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 instrument's rate.

When a serial communication link is established, DataView® 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 5060 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 will bring 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 use 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.

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 toggle between both windows via the Windows taskbar at the bottom of your screen.

7.3.2   Running the Test

After configuring the instrument (see § 7.3.1), 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.

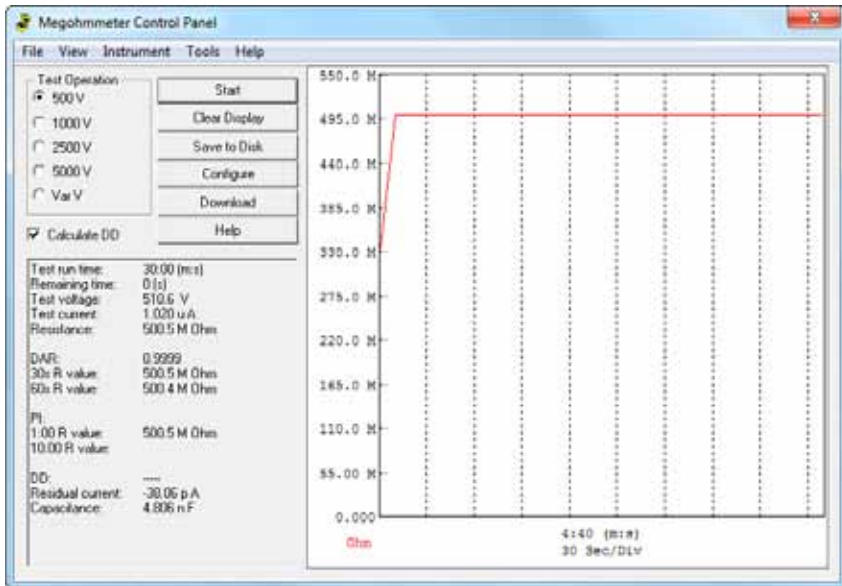- **Download:** Retrieves data from the memory of the megohmmeter for storage in the computer.

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. When the test is complete, if the "Calculate DD" check box was enabled, the Model 5060 will automatically calculate dielectric discharge ratio. This test takes 60 seconds.

⚠️ **NOTE:** On small motors and machinery it is possible that the capacitance values are too low for this test to be completed accurately. In these cases, simply press the Stop button to stop the dielectric discharge test.

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.
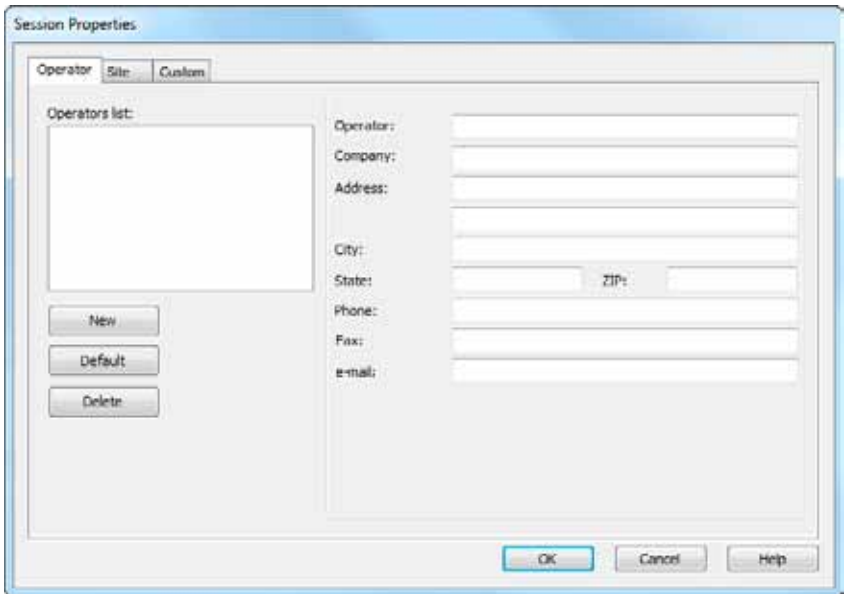
This will open the session properties dialog box:

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 the computer's memory.

7. Close the dialog box by clicking on the small ✕ at the top right hand corner of the dialog box.

8. You will then be asked if you want to open the database just saved. Click the **Yes** button, which will open a dialog box labeled Create View from Template.

9. In the Groups window of this dialog box, click on "megohmmeter" then select the desired template, if other than the default is desired.

10. In 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.

11. To print this report, either click on the Print icon or click on the File command and then Print.

7.4 DataView® Megohmmeter Templates

7.4.1 Megohmmeter Summary Report Template

The Megohmmeter Summary Report template generates a view with two work-sheets. An example of the first page is shown in Figure 7-9 below.
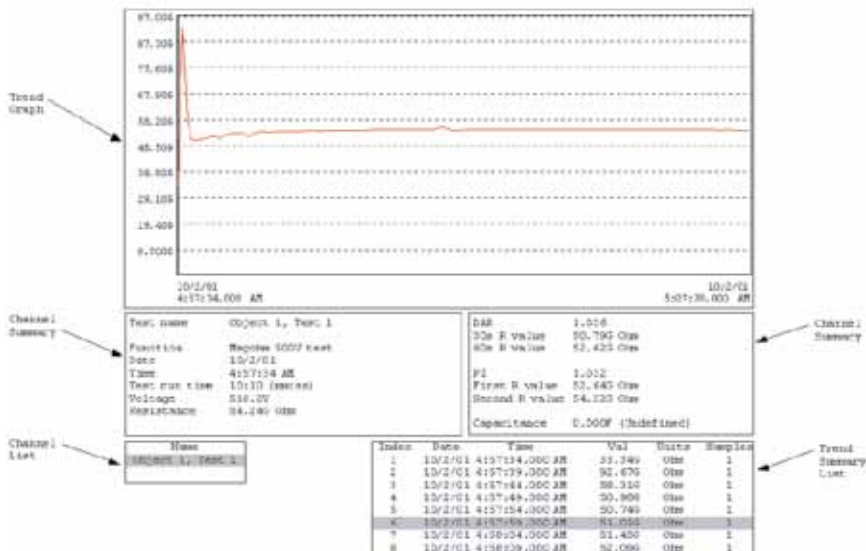

Figure 7-9

This worksheet contains the following frames:

- **Trend Graph:** This frame provides a graph of the measurement points in the selected test.

- **Channel Summary:** This frame displays a textual summary of the selected test.

- **Channel List:** This frame displays a list of tests. If more than one test is listed you can display the results of each test by selecting it with the mouse pointer.

- **Trend Summary List:** This frame displays a textual list summary of the sample points for a selected test. Each summary line contains user-spec-ified parameters of a group of sample points.

An example of the last worksheet is shown in Figure 7-10.

Figure 7-10

This page contains the following frames:

- **Title Box** - containing the text "Trend Summary Report"
- **Operator Summary** - containing operator information
- **Site Summary** - containing test site information
- **Comments Summary** - containing typed in operator comments
- **Database** - containing the name of the database used to generate the report

Each of these frames is customized by using the associated properties dialog box. The properties dialog box for a frame is displayed by selecting the frame, right-clicking and selecting Properties from the list displayed.

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   Recharging the Battery

If the ⎓ symbol is flashing, the battery needs to be recharged.

Connect the instrument to the 120VAC power cord via the connector (charging starts automatically).

- **bAt** on the small display and **CHrG** or **chAr** 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 only 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.

8.2 Fuse Replacement

If **FUSE -G-** flashes on the display, the fuse must be replaced, taking all the necessary precautions when opening up the instrument.

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

Only use the type of fuse shown on label inside the unit's cover:

0.1A - Fast Acting - 380V, 5x20mm, 10kA

8.3 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.

8.4 Storage

If the instrument is not used for an extended period of time, it is recommended to charge the instrument every two or three months.

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 5050/5060 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.

AEMC®

INSTRUMENTS

08/13

99-MAN 100258 v22