

Elmo

User's Guide



SCIENTIFIC

SOLUTIONS

www.LabMaster.com

Solving Problems for Problem Solvers

Elmo

User's Guide



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Agency Approvals

FCC-B FCC NOTICE-WARNING

This equipment generates and uses radio frequency energy and if not installed and used in accordance with the instructions, may cause interference to radio or television reception. It has been tested and found to comply with the limits for a Class B computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a residential installation.

If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect equipment into an outlet on a circuit different from the receiver.
- Consult the dealer or an experienced radio/TV technician for help
- Shielded cables must be used in order to comply with the emission limits.

CAUTION: Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

CE-Mark Declaration of Conformity

This product meets the essential health and safety requirements and is in conformity with the relevant EC directives herein listed using the relevant section of the following EC standards or normative documents:

Application of Council Directives:

89/336/EEC, 92/31/EEC and 93/68/EEC Article 5

Standards for which conformity is declared:

EN55022, EN50082-1 (IEC 801-2, 801-3, 801-4)

Manufacturer: Scientific Solutions Inc., - USA

Type of Equipment: Digital Test Apparatus - Laboratory grade

The CE marking has been affixed on the device according to Article 5 and 13 of the council directive 93/68/EEC.



Checklist

The Scientific Solutions Elmo consists of the following items:

- LabRack Computer System
- Master Control Unit (MCU)
- High-Density 68pin cable for computer to MCU connection
- Device Control Unit (DCU)
- 25pin cable for MCU to DCU connection

- Temperature Probe and Cable (Optional item)

Be sure and return your product registration card.
Registration is required for any repairs or support!

The Master Control Unit can accommodate from 1 to 4 Device Control Units. A minimum configuration consists of one MCU and one DCU.

If any of these items are missing or damaged, or if problems are encountered with this product, please notify Scientific Solutions.



Product Features & Options

Features

- Powerful, easy to use system for durability testing of devices
- Supports both “Standard” and “Smart” window motor testing
- Single system can test up to 16 standard motors or 8 smart motors
- Modular design - start with 4 devices and expand to 16 when needed
- Rackmount design popular for laboratory use
- Controls and monitors motors up to 15 Volts and 25 Amps
- Front panel light indicators for easy device identification
- Feature rich graphical software for defining and running tests
- Durability testing by time or cycles with continuous fault monitoring
- Data journaling protects data from power failure
- Temperature recording capabilities from -40 to +257 deg F.

Options

- Temperature Probe and cable
- Additional Device Control Units



Product Description

The Scientific Solutions Elmo test system is designed for the durability testing of electric motors and systems. The Elmo system incorporates a modular design for ease of expansion.

The system contains software and programmable hardware to control electric window motor UP/DOWN position, detect stall over-current conditions and monitor failures.

The Scientific Solutions Electric Motor Tester consists of a self-contained computer (LabRack Computer System) incorporating a Scientific Solutions data acquisition system.

The computer system connects to a Master Control Unit (MCU) with a single cable connection.

The MCU has four additional connectors for cabling to Device Control Units (DCU). Each DCU can control up to four devices.

As an example, a fully configured system, can simultaneously test 16 electric window motors, i.e. four "virtual" cars.



Components

LabRack Computer System:



The LabRack Computer System contains the Scientific Solutions LabMaster data acquisition system. This is the brains of the tester and is responsible for the control signals and the monitoring and acquiring of the data.

The LabRack Computer System runs the system software which includes a graphical user interface for easy test configuration. The LabRack Computer System is housed in a rackmount unit (4U or 2U).

The LabRack Computer System directly connects to the Master Control Unit with a single high-density cable.



Components

Master Control Unit (MCU):



The Master Control Unit (MCU) decodes the signals from the computer system and creates individual interfaces for connecting up to four Device Control Units (DCU). The MCU has logic to determine the quantity of DCUs attached and reports this back to the computer system so the control software can automatically determine the test matrix.

The Master Control Unit has five connections on the back; one for connection to the computer system (as previously described), and four for connection to the individual DCUs.

Cable for connecting LabRack Computer and the MCU:

A single cable connection is made between the LabRack Computer System and the Master Control Unit. This cable is supplied with the LabRack Computer System.



Components

Device Control Unit (DCU):



The Device Control Unit (DCU) contains the necessary high current outputs and associated control logic to directly control four devices.

The front of the DCU has four sets of connections labeled Device #1, Device #2, Device #3 and Device #4. It also has an additional set of connections labeled Voltage Input.

The DCU requires an external voltage source (not included with the system) to be connected to the Voltage Input connector. Under software control, the DCU switches the externally supplied voltage to the four Device connections.

Cable for connecting DCU to the MCU:

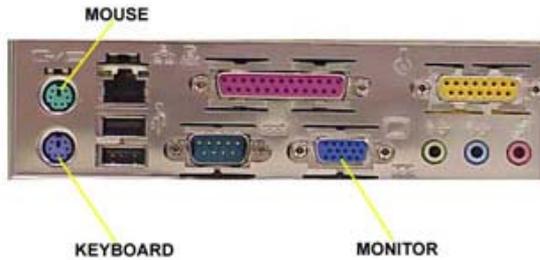
The back of the DCU has a single connection to connect to one of the four connections on the back of the MCU. The cable to make this connection is supplied with each DCU.



System Connections

Connection: Computer - Monitor, Keyboard, Mouse & Power

Connect a monitor, keyboard and mouse to the LabRack Computer System. You can also connect the power cable to the Computer System and the monitor. Be sure that the Computer System and monitor are powered-off before connecting the additional components.



System Connections

Connection: LabRack Computer System to MCU

Connect the Computer System to the MCU with the supplied cable. Note that this cable contains a high-density pin connector on each end. These connectors are designed for only one correct alignment. Make sure the cable connections and the connections on the back of the Computer System and the MCU are properly aligned before trying to make the connection. Be careful not to bend any of the pins. After the connections are properly made, use the thumb screws to secure the connectors on the back of the Computer System and the MCU.



System Connections

Connection: MCU to DCU

Connect the MCU to the DCUs. Each DCU is supplied with a cable for this connection. The MCU can accommodate from one to four DCUs. Connect the first DCU to the "Device Control Unit 1" connection. If you are using a second, third or fourth DCU unit, then connect these to the corresponding Device Unit connection. Do not skip DCU connections - start with number 1 for the first, 2 for the second, 3 for the third and so on. These connectors are designed for only one correct alignment. Make sure the cable connections and the connections on the back of the MCU and DCU are properly aligned before trying to make this connection. Be careful not to bend any of the pins. After the connections are properly made, use the thumb screws to secure the connectors on the back of the MCU and DCU.



Device Connections

Device Control Unit - Four Sections



Device Section - U, D and T connections



U/D Connections: (Output from DCU)

The voltage that is applied to the Voltage Input terminals on the front of the DCU are available on the U/D output connections under control of the software. The software controls the on/off condition of the U/D voltage and also the polarity of the U/D outputs. The software also monitors the current from these terminals to detect events such as over-current stalling.

Device Connections

T Connections: (Input to DCU)

The 'T' connector on the DCU is an input terminal that is used for connection to a Scientific Solutions Temperature probe. A temperature probe allows the system to make temperature measurements. The T connector is a 3.5mm Stereo Jack. The temperature probe can typically make measurements from -40° Celsius to +125° Celsius (refer to the specification section of this document).

Temperature Probe

The temperature probe is a cylindrical device approximately 1" long and 1/3" in diameter. It has a single 3.5mm Stereo Plug connection.



You can insert the temperature probe directly into the front of the DCU unit to verify its operation. To remotely locate the temperature probe, you need to use a cable. The cable needs a 3.5mm Stereo Plug on one end and a 3.5mm Stereo Jack on the other end.

Device Connections

DCU Connections for Electric Window Motors

The design of the Elmo system makes it ideal for testing Electric Window Motors. A single DCU can control **either** Standard Motors or Smart Motors.

You can run a test with a mix of both Standard and Smart Motors - you just have to connect each motor type to a different DCU.

The following chart indicates the correct connections to make for a Standard Motor configuration. The last two columns of the chart indicate the voltage that will be present on the U/D terminals corresponding to the window direction (UP or DOWN).

Standard Motor Connections:

Standard Motor	Motor Connection	Device #	DCU Terminal	Voltage UP	Voltage DOWN
1	UP control	Device #1	U	+V	GND
1	DOWN control	Device #1	D	GND	+V
2	UP control	Device #2	U	+V	GND
2	DOWN control	Device #2	D	GND	+V
3	UP control	Device #3	U	+V	GND
3	DOWN control	Device #3	D	GND	+V
4	UP control	Device #4	U	+V	GND
4	DOWN control	Device #4	D	GND	+V

Since each Standard Motor requires one Device section, a DCU can control up to 4 Standard Motors.

A system with four DCUs can therefore test up to 16 Standard Motors.

Note: If the wiring is reversed, then the window direction will be opposite to what is expected.



Device Connections

DCU Connections for Electric Window Motors

For example, if a test requires 1 Standard Motor and 1 Smart Motor, then you would need 2 DCUs' - one for connection to the Standard Motor and one for connection of the Smart Motor. Since each Elmo system can have up to 4 DCUs, there is quite a bit of versatility in the testing of electric window motors.

The following chart indicates the correct connections to make for a Smart Motor Configuration. The last two columns of the charts indicate the voltage that will be present on the U/D terminals corresponding to the window direction (UP or DOWN).

Smart Motor Connections:

Smart Motor	Motor Connection	Device #	DCU Terminal	Voltage UP	Voltage DOWN
1	UP control	Device #1	U	+V	float
1	DOWN control	Device #1	D	float	+V
1	+V power	Device #2	D	+V	+V
1	Ground	Device #2	U	GND	GND
2	UP control	Device #3	U	+V	float
2	DOWN control	Device #3	D	float	+V
2	+V power	Device #4	D	+V	+V
2	Ground	Device #4	U	GND	GND

Since each Smart Motor requires two Device sections, a DCU can control up to 2 Smart Motors.

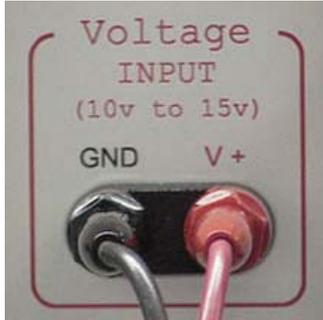
A system with four DCUs can therefore test up to 8 Smart Motors.

Note: If the wiring is reversed, then the motors will not operate properly.

Device Connections

Voltage Input Connection

The DCU requires that a voltage be connected to the Voltage Input terminals (banana jacks) on the front of the DCU.



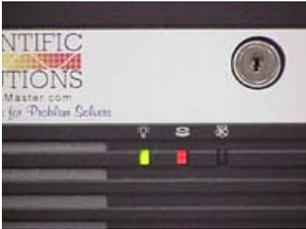
Adhere to the following when making this connection:

- Make sure the external supply VOLT and GROUND are made to the correct terminals on the front of the DCU.
- It is recommended that each DCU have its own power supply.
- Make the wire from the power supply to the DCU as short as possible.
- Use as thick of wire as you can - minimum 12 gauge.
- Solder the banana plug to the wire, i.e. do not just make a “contact connection” that is often used with banana plugs. A banana plug on the wire makes a good connection to the banana jack on the DCU, and makes it easy to connect and disconnect from the DCU.
- If you are going to use a single power supply for multiple DCUs, then you should also connect the GND input of each DCU together with a short thick ground wire. A straight piece of solid 12 awg wire can fit thru the holes in the back of the banana jacks and be passed thru each GND jack when the DCU units are stacked one on top of the other - creating a GND bus between the units.
- DO NOT EXCEED the Voltage Input range of the DCU of +10 volt to +15 volt
- Be sure the power supply has sufficient capability to supply a 25 Amp per motor stall current (100 Amp total for simultaneous motor stalling).

Status Lights

In addition to the information provided on the computer screen by the software, lights on the various components can be used to determine the status of the equipment.

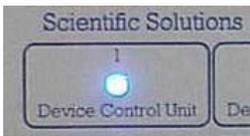
Computer System:



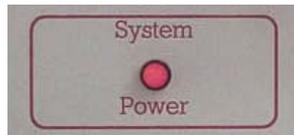
Green Light - Indicates computer power is ON

Red Light - Indicates access to the internal hard disk drive

Master Control Unit:



Indicates connections made to DCUs. There are four lights, one for each DCU that can be connected.



Indicates connection to the computer and that computer power is ON

Device Control Unit:

Unit Number LED indicates connection to the MCU and that the software has initialized the DCU.

All the LEDs are initially off. As the software initializes the DCU all the lights may blink, but once the initialization is finished only one of the four lights will remain illuminated to indicate the Unit Number. The software can also use the Unit Number light to indicate the status of a test - refer to the software documentation for details.



Using the Equipment

System Power Up:

After the proper connections have been made, you should power up the computer system and the external supply voltage. The system has some inherent safety features, one of these being that the external supply voltage is not present on the U/D outputs until the software has initialized the system. However, caution should always be exercised and it is good practice to verify all the connections and the correct polarity of the external voltage connections before applying any power.

Software Introduction:

When the test system is powered on, the computer will complete a boot-up sequence. Once this is complete, you can start the test software by selecting its icon on the computer desktop.

Once you start the software, you will need to create the test you would like to run. The software allows you to define tests with information such as the number of DCUs to use, the type of motor connected to each DCU, duration of test in cycles or time, and various measurements to make and actions to take when the measurements exceed your limits. The software allows you to save and reload the test configuration.

Refer to the Software's on-line help for details

Annual Calibration & Licensing Requirements:

The Elmo system as delivered is fully tested and calibrated. Annual calibration should be maintained for proper system operation. A label on the front of each system component indicates its serial number, calibration date, and calibration due date. The software license is also renewable on an annual basis. Scientific Solutions provides calibration of the equipment and renewal of the software license. Please contact Scientific Solutions at support@Scientific-Solutions.com to arrange for your annual calibration and software license renewal.



Part Numbers and Specifications

Part Numbers:

Part Number	Description	Contents
815306	LabRack Computer System & Master Control Unit	The LabRack Computer System and the Master Control Unit are generally supplied as a set, since each test system requires one of each
	LabRack Computer System	<ul style="list-style-type: none"> - Computer System - Operating System (Pre-Installed) - LabMaster PC Interface - Cable to connect PC Interface to MCU - Elmo Control Software (Pre-Installed) - US 110v power cable (others available)
	Master Control Unit	- Master Control Unit
815307	Device Control Unit	<ul style="list-style-type: none"> - Device Control Unit - Cable to connect DCU to MCU
815308	Temperature Probe	<ul style="list-style-type: none"> - Temperature Probe - Cable

Specifications:

Component	Specification
DCU: +Voltage Input Requirement	+10v to +15v, 25 Amp per active stalled device
DCU: U/D Output	Software controlled polarity: +V at 25 Amp maximum current output or Ground Banana Jack connector pair rated at 25A
DCU: T Input	Wired for Scientific Solutions Temperature Probe 3.5mm Stereo Jack
Temperature Probe	-40° Celsius to +125° Celsius (+/- 2° C) -40° Fahrenheit to +257° Fahrenheit (+/- 4° F) 3.5mm Stereo Plug connector
Computer System	Universal Switching Power Supply 90-220 VAC, 50/60 Hz.
Environmental	Operating Temperature: 0° Celsius to +70° Celsius Storage Temperature: -25° Celsius to +85° Celsius Relative Humidity: To 95% non-condensing Agency Approvals: FCC Class A, CE-Mark

Service Information

Your product should provide you with trouble free performance. However, if you have any questions about the installation or operation, or you encounter any problems, the following information will be helpful.

Scientific Solutions - Technical Support (Requires Product Registration)

Phone:	(440) 357-1400
Fax:	(440) 357-1416
E-mail:	support@LabMaster.com
Internet:	http://www.LabMaster.com

Should your product require factory service, the following guidelines must be followed and will help you get the fastest service.

1. Save your sales receipt. The product you purchased is covered under the limited warranty from the date of purchase, but you must submit proof of purchase for in-warranty repair.
2. Contact Scientific Solutions. You must obtain a Return Material Authorization (RMA) number prior to sending the unit to Scientific Solutions. This number must be displayed on the packing box.
3. Return all the components with your RMA. Complete troubleshooting is impossible if all components are not included. For protection against damage in transit, repack the system in its original packing.
4. Damaged and abused products will be repaired out of warranty only. Unauthorized attempts to repair, dropping, submitting to electrical surges, etc. will void the warranty.
5. Ship the unit to Scientific Solutions freight prepaid. After in-warranty service, the unit will be returned freight prepaid by a carrier designated by Scientific Solutions. Use of any other method will be freight collect or imposed shipping charge. Out-of-warranty service, will be returned freight collect or imposed shipping charge.
6. Cosmetic damage will not be repaired in warranty.

NOTE: Policies may change without notice.

Limited Warranty

Definitions:

Scientific Solutions means Scientific Solutions Inc., USA (www.LabMaster.com)

Warranty:

With respect to the product(s) delivered with this Limited Warranty, Scientific Solutions warrants to the original purchaser that:

- i) The product manufactured by Scientific Solutions will be free from defects in materials and workmanship for one (1) year from the date of delivery to such original purchaser
- ii) Any software/firmware is provided "as is" without warranty of any kind by Scientific Solutions
- iii) Any items not originally supplied by Scientific Solutions are without warranty of any kind. Use of components and accessories that do not conform to product specifications may void the warranty.

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If Scientific Solutions determines that any product which has been returned to Scientific Solutions in accordance with the provisions of the preceding paragraph is not under warranty, it will be repaired using Scientific Solutions' standard rates for parts and labor. Scientific Solutions will use its best efforts to repair the product after receipt thereof. Scientific Solutions shall not be responsible, however, for delays caused by shipping or non-availability of replacement components or other similar or dissimilar causes, events or conditions beyond its reasonable control.

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Keep your original sales receipt for the product with this warranty statement.

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General: This license constitutes the entire agreement between you and Scientific Solutions. It cannot be ratified except in writing signed by an officer of Scientific Solutions.

Product Registration Required for Repair or Support.



