

ACUMAR DataCapture™

User Instructions



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Introduction

Welcome to the Acumar DataCapture™ system manual. This document will assist you in basic functions of the inclinometers and Acumar DataCapture™ as well as provide information on advanced features and technical data.

The Acumar Digital Inclinometer Suite functions using three components:

1. Dual digital inclinometers that store data
2. A wireless USB computer interface
3. DataCapture™ Data forms that can capture and analyze stored data.

Please take some time and browse this manual, as it will help you get the most out of your Acumar Digital Inclinometers and the DataCapture™ Recording Forms.

Installing the Hardware

First make sure you have all the necessary components

- Dual digital inclinometers
- USB IR receiver unit
- USB connecting cord

Then make sure that your computer meets the system requirements

- One (1) GHz processor or faster
- 512MB RAM
- Windows XP, with Service Pack 3, or better

Installing the IR receiver is straightforward. The IR receiver uses a USB interface, so plug the square end of the USB cable into the back of the available USB port on your computer and it should automatically install without any drivers. While you can plug the interface unit into your computer while it is on, we recommend that you turn off your computer before connecting the device. When properly connected, the green LED on the interface unit will be on, indicating that it is ready to use.

You may test the Interface hardware and USB cable by pressing the “Device ID” button located on the bottom of the Interface unit. To test, first open a text editor such as notepad or Microsoft Word, or an Excel blank sheet. Then press the ID button. You should see it display a message like: “Acumar rev 3.0 - All Rights Reserved.” This means that the receiver and cable are working correctly. Place the receiver in a convenient location (say on top of or beside your computer) within line-of-sight of where you will be sending the data. The comfortable range is 3 to 15 feet.

Important: Remember that before sending data, the target form must be opened and the starting data cell selected where the line of data is to go.

Navigation

To navigate through Acumar DataCapture™, use the controls positioned in the header.



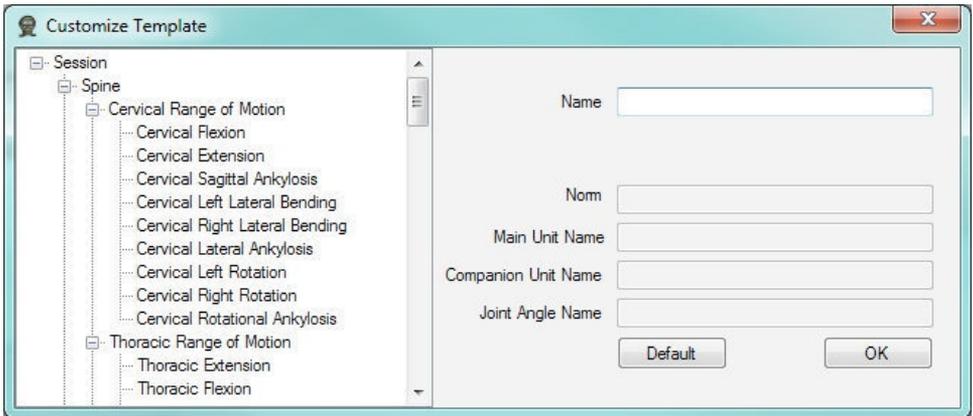
The controls and their basic functionality:

1. Patient Home: This button returns you to the main patient screen.
2. Review Session: This button takes you to the Review page where you can sort and search through data previously taken.
3. ROM Values: This button takes you to the Range of Motion page where you can enter values to record.
4. New Patient: This button takes you to a screen allowing you to create a new patient.

1. Edit Patient: This button takes you to a screen allowing you to edit an existing patient.
2. Save Patient: This button saves the current patient data to a file.
3. Open Patient: This button opens an existing patient data file.
4. Add Session: This button takes you to a screen allowing you to create a new session.
5. Edit Session: This button takes you to a screen allowing you to edit an existing session.
6. Delete Session: This button deletes the current session.
7. Regions: Use this drop down box to select the region the desired measurement is part of.
8. Subregions: After you select your Region, this drop down is populated with the appropriate subregions. When you select a subregion, you will be automatically taken to the input form.
9. Sessions: This drop down contains a list of all of the current patients sessions. You may change what session you are working in at any time, as well as add a new session.

Templates

Acumar DataCapture™ supports the ability to customize the names and norms of all regions, subregions, and movements. To do so, find Template Options in the tool bar, and click on Customize Template. There you will see a tree of the regions, subregions, and movements and the currently used names.



After making a selection in the tree, the text boxes to the right will be filled with the current template data. To change the data, just change the text in the text boxes. The

template will be updated when you make another selection or close the Customize Template window.

Header Templates

Header templates are used to fill in the information at the top of the window. To open up the Customize Header dialog find Header Options in the tool bar and click Customize Header. The dialog should look the image at right.



Inclinometer Use

The Acumar Digital Inclinometers measure angles relative to gravity. When the companion unit is connected to the main unit, it reads the subtraction of the two angles. To begin, press START to turn on the units and clear the memory. If the units are already on, press START to turn them off and then again to reset the memory. You will want to do this before each new test sequence.

Some movements are most accurately measured using two inclinometers such as the spinal region, while other such as the upper extremities require only one, as long as all other confounding body movement is stabilized. To use two inclinometers, first connect them with the provided connecting cable.

Become familiar with the placement and functions of the various buttons on the unit as you will need to be comfortable with them during each examination.

Holding data

Holding data is easy with Acumar Digital Inclinometers. For each measurement, have the individual in the neutral position. Place the units firmly in position and press the ZERO button on the main unit to set the units for measuring. Then have the individual attempt the desired motion.

In order for data to be stored from both the main and companion units, they must be connected with the connecting cable.

Sending data

Send data only after you have stored your readings for a particular measurement. Make sure that your computer has Acumar DataCapture™ open to the desired form. If you would like to review your stored readings before sending them to the computer, press VIEW. This will run through each measurement, as well as the maximum, minimum, and average values for the data set.

The inclinometers send data using an IR (infra red) transmitter, which is located on the back of the unit just above the serial number label. Make sure that when sending data you hold the unit with the transmitter facing the IR receiver. To send data, press the SEND button firmly and briefly (.5-1 second). In some environments, it may take a few attempts for the IR receiver to accept the data. Best results are achieved sending from a distance of three or more feet and less than fifteen feet. When data has been received, the IR receiver beeps and the LED blinks.

Note: It is best to avoid pointing the IR Wireless Receiver into the direct sun or a bright light.

Data Format

DataCapture™ breaks the measurements into sections of regions and subregions. There are three regions, and each region contains a number of subregions. The regions, subregions, and movements are listed below.

Measurement Sections

The Spine

Cervical

- Flexion, Extension
- Left, Right Lateral Bending
- Left, Right Rotation

Thoracic

- Flexion, Extension
- Left, Right Lateral Bending
- Left, Right Rotation

Lumbar

- Flexion, Extension
- Left, Right Lateral

Upper Extremities

Shoulder

- Flexion, Extension
- Abduction, Adduction
- External, Internal Rotation

Elbow

- Flexion, Extension

Wrist

- Flexion, Extension
- Radial, Ulnar Deviation

Lower Extremities

Hip

- Flexion, Extension
- Abduction, Adduction
- External, Internal Rotation

Knee

- Flexion, Extension

Ankle

- Flexion, Extension
- Inversion, Eversion

Technical Data

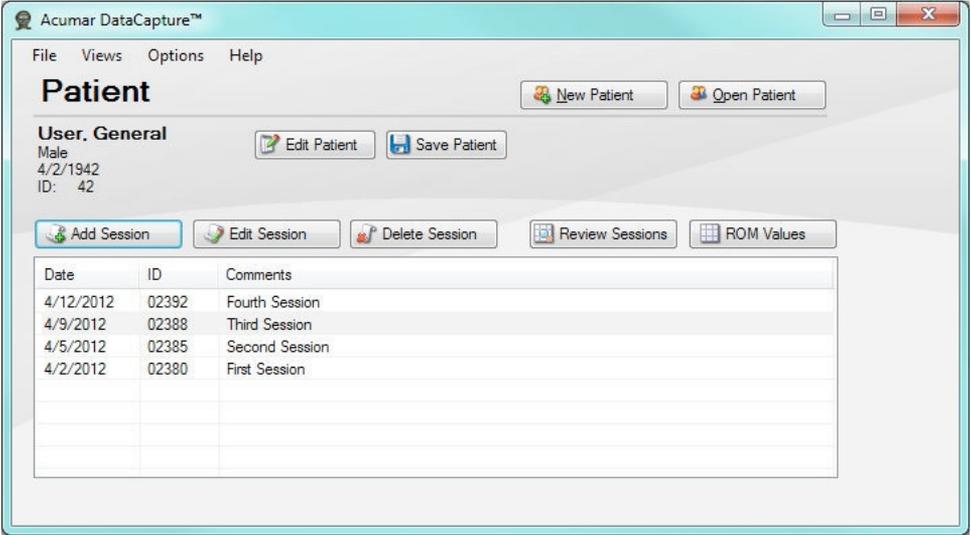
Acumar DataCapture™ automatically calculates statistical information about the data you enter into the form. Thus it is important to understand how the data is calculated so you can more accurately use it for your purposes.

When the inclinometers have finished sending data to the computer, it assesses how many data points have been sent. When at least three data points are detected, the program samples the data in sets of three. Within these sets of three, the program first searches for the sets with all three data within \pm or 10% of their mean, whichever is greater. It then selects the three-data set with the maximum value and highest average. These data will be bolded in the sheet. If no three data-sets are within such variances, then the three-data set with the highest maximum value and highest average otherwise will be selected and these data will be subsequently bolded.

Then the average, maximum, and variance values are calculated and displayed for the bolded data, not for the entire set. If only two data are present, then the average, maximum, and variance applies to both data points, and if only one data is present, then the maximum and average values will be the same as the data point.

DataCapture™ Walkthrough

Welcome to the Acumar DataCapture™ walkthrough. Here you will be guided through the program step by step, from creating a patient file to capturing data, and then to reviewing the data and creating reports.



Home

To get started, open up Acumar DataCapture™. You should be at the home screen, as shown above.

Entering a new patient

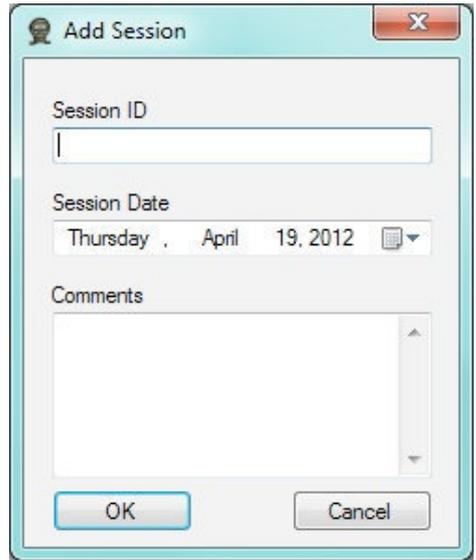
To add a new patient, you may either click on the New Patient button, or click File in the tool bar in the top left corner and click New Patient. A dialog will appear where you may input patient information. The Patient Name, Patient Identifier, and Date of Birth fields are required. When you are done, click 'OK' to continue.



Now that you have a patient file, you need to add a session. Sessions have an identifier, a date, and optional comments. They are used to store the data captured during any particular session. To add a session, click the Add New Session button to make the New Session Dialog appear.

Enter a Session ID. The ID may be a number or a word or phrase. The date is already filled in with today's date, but you can click on a field in order to change it. The comments field is optional. Click 'OK' to continue. The session will appear in the white list box with the format of "Session ID - Session Date: Session Comments".

Now that you have created a new patient, you will want to save the file. You can save or load a file at any time by going to File in the tool bar and clicking the respective Save or Load option.



Capturing Data

To record measurements, navigate to the subregion form that you wish to capture. Take a look at navigation for more information on navigating Acumar DataCapture™. Once there you should see a screen similar to the screen shot below.

The screenshot shows the Acumar DataCapture™ application window. The title bar reads 'Acumar DataCapture™'. The menu bar includes 'File', 'Views', 'Options', and 'Help'. Below the menu bar, there are two buttons: 'Patient Home' and 'Review Session'. The main heading is 'Range of Motion'. Underneath, it says 'User: General' with the date '4/2/1942' and ID '42'. There are three dropdown menus: 'Regions' set to 'Spine', 'Subregions' set to 'Cervical Range of Motion', and 'Sessions' set to '02384 - 4/19/2012: First Session'. A table for 'Cervical flexion ROM' is partially visible. The main section is titled 'Cervical Extension' and includes a 'Customize' button. To the right of this section is a summary table with columns: Max, Average, SD, CV, Norm, and % From Norm. Below this is a 'Comments' field with the text 'Data Is Valid'. The main data table has columns for 'Test 1' through 'Test 6' and rows for 'Calvarium extension angle', 'T1 angle', and 'Cervical extension ROM'. The 'Calvarium extension angle' row shows values: 38, 38, 38, 38, 38, 38. The 'T1 angle' row shows values: -27, -27, -27, -26, -26, -26. The 'Cervical extension ROM' row shows values: 65, 65, 65, 64, 64, 64. The first cell of the 'Calvarium extension angle' row is highlighted in yellow. Below the 'Cervical Extension' section is another section for 'Cervical Left Lateral Bending' with a 'Customize' button. It has a similar summary table and data table. The 'Cervical Left Lateral Bending' summary table shows 'Norm' as 45.00. The data table for 'Calvarium left lateral flexion angle' is currently empty.

| | Test 1 | Test 2 | Test 3 | Test 4 | Test 5 | Test 6 |
|---------------------------|--------|--------|--------|--------|--------|--------|
| Calvarium extension angle | 38 | 38 | 38 | 38 | 38 | 38 |
| T1 angle | -27 | -27 | -27 | -26 | -26 | -26 |
| Cervical extension ROM | 65 | 65 | 65 | 64 | 64 | 64 |

| Max | Average | SD | CV | Norm | % From Norm |
|-------|---------|------|------|-------|-------------|
| 65.00 | 65.00 | 0.00 | 0.00 | 60.00 | 8.33 |

| Max | Average | SD | CV | Norm | % From Norm |
|-----|---------|----|----|-------|-------------|
| | | | | 45.00 | |

To start taking measurements, make sure that the desired control is selected and that the cursor is in the first cell. If it is not, click any empty place in the movement you desire to capture and it will be placed into the first cell. The cell that is currently selected will be highlighted in yellow.

Single / Dual Inclinometry

Some measurements are best taken with two inclinometers. The spine is a good example of this. Others, however, may only require one as long as the rest of the body is stabilized as not to add artifacts to the recorded data. These templates support both single and dual inclinometers for Upper/Lower extremity forms.

Before you send data into the Upper and Lower extremity forms, be sure that the correct mode is selected. You can switch modes by clicking on the 'Single Mode' or 'Dual Mode' radio buttons located underneath the label for each measurement. A dialog will appear asking if you want to use that setting for all future measurements. These options are only relevant to the Upper and Lower Extremity forms.

Some measurements in the spine form also use only one inclinometer, but these movements cannot be modified (e.g. Ankylosis measurements, and straight leg raising measurements.) Please note that sending data from the incorrect number of inclinometers will cause errors in your form. Please check how many inclinometers to use before sending.

Capturing Data

When you have selected a form for the region and subregion that you wish to measure and a movement is highlighted with the cursor in the yellow cell, hold your data and press the SEND button. Remember that some measurements use one inclinometer and other use two.

When sent data is received, the IR receiver will beep and the LED on the front panel will blink. It will then directly enter the values of the Main and Companion Units (if two inclinometers are used) and then the joint angle between them.

When all data is entered, statistical tests are run on the joint angle (A-B) readings. The three readings which have the highest value and consistency are bolded and then the maximum, average, standard deviation, coefficient of variance, and percentage from the norm are calculated and displayed.

Reviewing Data

Once you have completed capturing any data that you need, click the Review in the upper middle of the window. It will take you directly to the Review form, where you can search through any data collected. It should look similar to the image below.

Here is a short list of what is in the window, more detailed information will be given later.

1. The list of all sessions for the current patient. Selecting one or more sessions will fill the table to the right (#5).
2. This is an expandable tree that is used to filter the table to display only the type of object that is selected.
3. These are the search options, used to look for specific pieces of data from the sessions selected.
4. Each graph retrieves data from the current table and organizes it to display in the appropriate fashion.
5. This is the main table. Here is where any measurements from the selected sessions will be displayed. When you use the search or filter, the table will display the results of the search or filtering.

Selecting Data

In order to filter or search for the data you want, you must select the session(s) that you want to search through. The sessions are listed in reverse chronological order (most recent to oldest) in the list. When you make a selection, the table will populate with all the movements from the selected session(s). Movements that do not have any captured data are not displayed in the table, and will not be placed in any graphs or reports.

To simply filter the data, expand the tree until you get to the item you want e.g. the Cervical subregion. When you make a selection in the tree, the data will filter out everything that is not within the region or subregion, or is not called the same movement as what is selected.

You search through the data using the search options. Using the Search drop down box, you can select just what you want to look for. You can search for a name using All Names, Region, Subregion, and Movement, or you can look for a value using Max, Average, Norm etc. If you select an option that requires a numerical value, then two new options will appear in the Is search box below: Greater Than and Less Than. These allow you to search for a value greater than or less than your search.

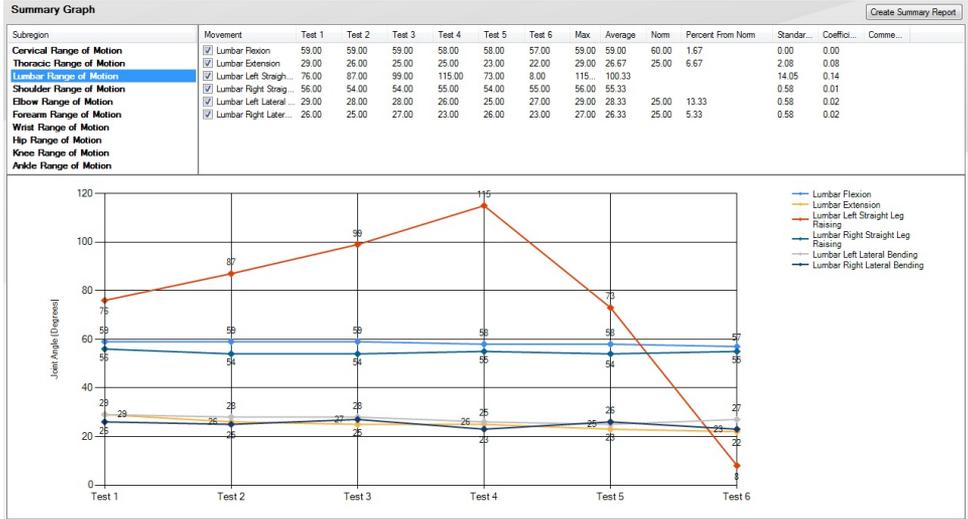
Below the Is drop down are the two Search Style radio buttons, Narrow Search and Replace. If Narrow Search is selected, when you run the search it will only search through the items currently displayed in the table. If you replace is selected, it will search through every item in the currently selected session(s) and place everything into the table.

The table itself has a number of columns, most of them self explanatory. The only two that aren't related directly to the movements themselves are the Date and ID columns. These refer to the sessions that the movements were taken in.

Graph Tabs

There are 3 tabs in addition the main Review Tab: Summary Graph, Range of Motion Graph, and History Graph. The Summary and Range of Motion graphs are session graphs; they only use data from a single session. If you have multiple sessions selected, you will be asked to pick a single session to use. If you have multiple sessions selected, you will be asked to choose a single session to use for the graph. The history graph, on the other hand, requires data from two or more sessions. It is used to graph the measurement of movements over an extended period of time. The data that is selected for the graph differs from the History graph and the session graphs. The session graphs always takes in all data from a single session that you select, due to the way the data is organized. The history graph, however, uses only the data that has been searched for and is currently being displayed within the Review Tab's table.

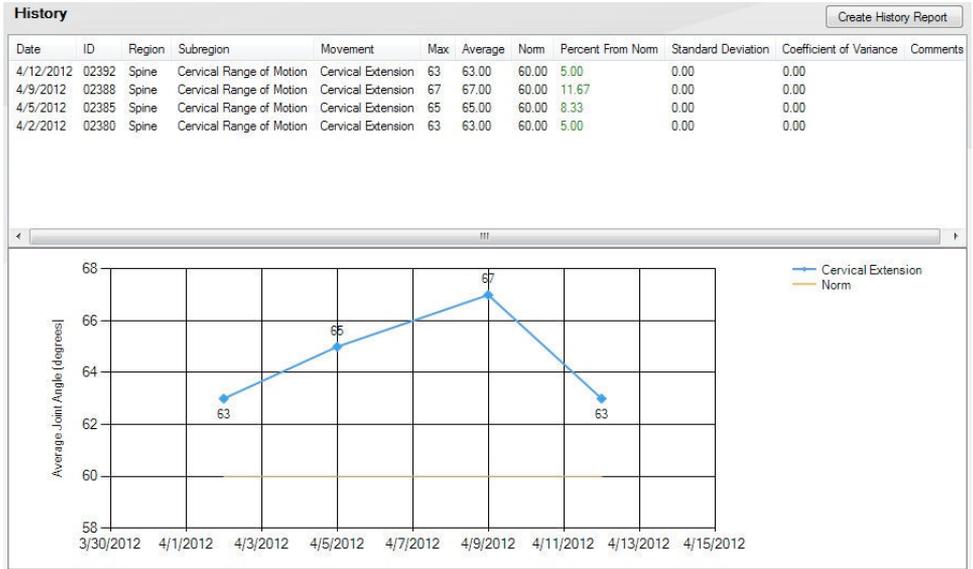
Summary Graph



The summary graph graphs movements based on the subregion it is contained in. In the top left is the Range of Motion list, where you can select which subregion(s) you want graphed. When you make a selection, all measurements in the selected subregions are placed in the table to the right. It is similar to the table in the Review tab, but the Date and ID columns have been removed and replaced with columns for each of the 6 tests.

You can select multiple subregions to put in the table. As you can see, there are checkboxes next to each item in the table. These checkboxes denote whether the item is displayed in the graph below. Checking and unchecking these boxes will add and remove the item from the graph. Just above the top left corner of the graph, below the Range of Motion list, is a button labeled 'Create Summary Report'. Clicking on the button will create a report using the data that is currently being graphed.

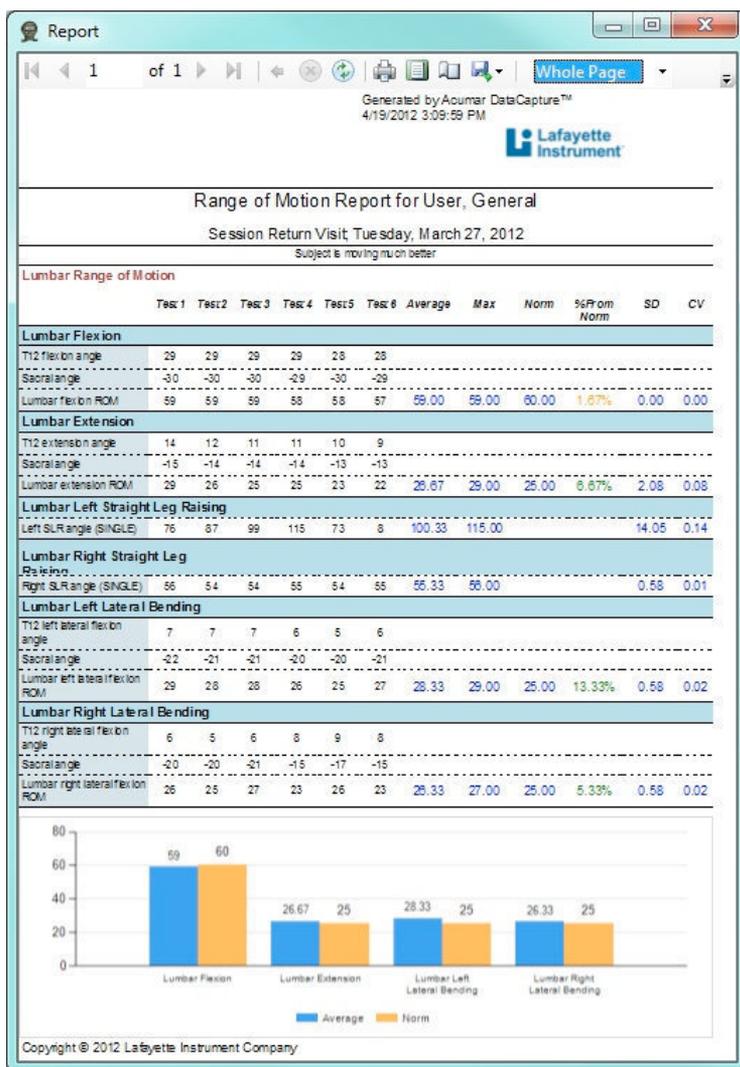
History Graph



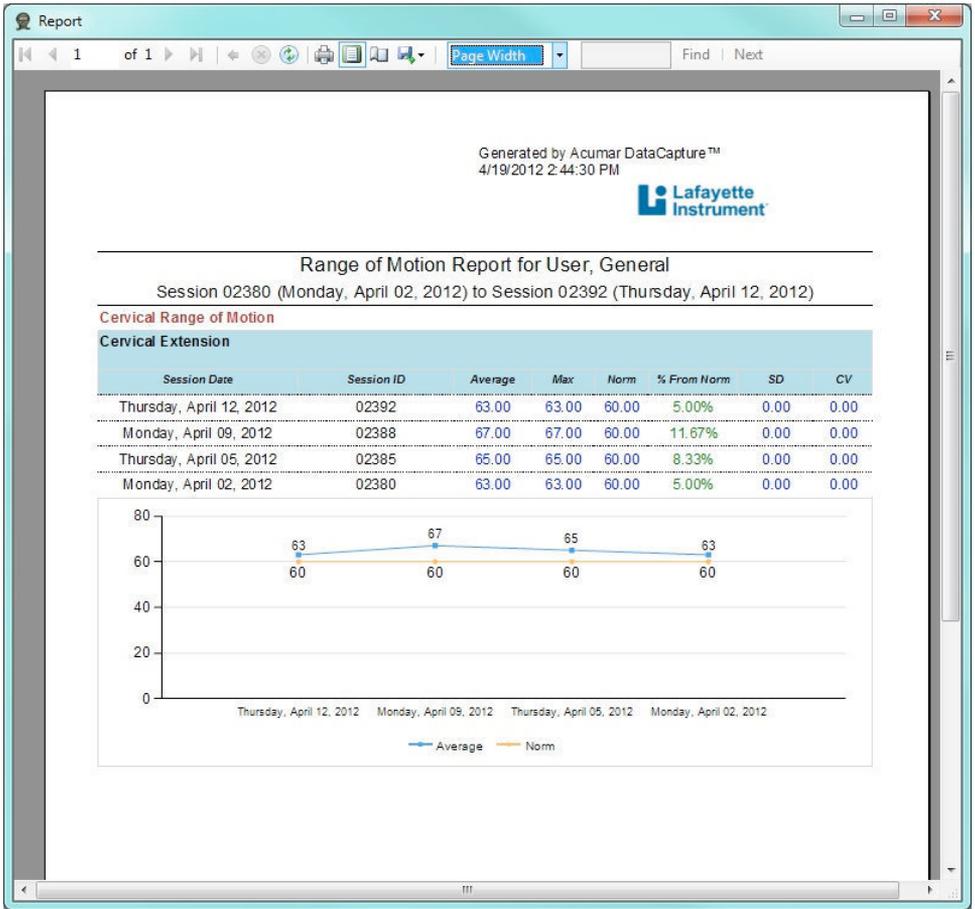
The history graph is used to display the data over a series of sessions taken over time. The data that is used here is taken directly from the table in the Review Tab. It is best to have movements from multiple sessions in order for the graph to be effective. You may graph multiple different movements (e.g. flexion and extension) or you can just graph a single movement. If there is only one movement being graphed, a line for the norm of that movement will be displayed as well. The points that are displayed for each movement are the average for that session. Just above the top left corner of the graph is a button labeled 'Create History Report'. Clicking on the button will create a report using the data that is currently being graphed.

Reports

Acumar DataCapture™ makes it easy to generate reports based on captured data. There are two kinds of reports that can be generated: Summary reports and History reports. The summary report takes data from a single session and displays a table and graph of each of the movement's data.



The history graph requires data from multiple sessions. Each movement has a separate table that lists the measurements for that movement in chronological order. Below each of these tables is a graph of the movements over time, compared against the norm for the movement.



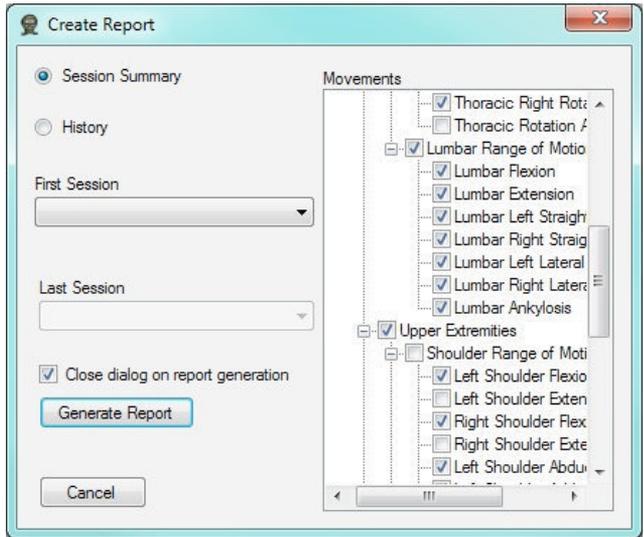
Generating Reports

To generate a report, click on the Generate a Report button in the home window, or you may go to File -> Generate Report in the tool bar. A dialog window should appear.

At the top are radio buttons that set whether the report you will generate is a Session Summary or a History report. Below those is the First and End Session drop downs. If Session Summary is checked, then only the First Session drop down is enabled. The session selected there will be the session chosen for the summary report.

If History is checked, then, once a selection is made in First Session, End Session will be enabled and contain the Sessions that are chronologically after the session selected in First Session. Example: If a Session on 8/22/2011 is selected in First Session, then only sessions dated after August 22, 2011 will be displayed in End Session.

On the right half of the window is a tree that contains all of the Regions, Subregions and Movements in a Session. Each of these has a check box next to it. Movements that are checked will be displayed in the report from the session(s) selected via the drop downs. If a Region or Subregion is checked, then all Subregions or Movements it contains will also be checked. If it is unchecked, then only some or no child subregions or movements are checked.



Creating Reports from Review

You may also generate reports from the review page. To generate a Session Summary report, select the session you want to report and then go to either the Summary or Range of Motion tabs. Select the specific data that you want to report. Before clicking the Create Summary Report button above the graph, make sure that any movements you want to report are currently in the graph. Only data that is currently being graphed will be used in the report.

Creating a history report is similar to creating the summary report. Select the sessions and movement(s) you want to graph and click on the History tab. If all the data you want to graph is currently displayed, then just click the Create History Report button and it will be automatically created. As the summary graph, only data that is currently being graphed will be used to create the report.

Terms and Conditions

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Phone, Fax, Email or Mail-in Orders

All orders need to be accompanied by a hard copy of your purchase order. All orders must include the following information:

- Quantity
- Part Number
- Description
- Your purchase order number or method of pre-payment
- Your tax status (include tax-exempt numbers)
- Shipping address for this order
- Billing address for the invoice we'll mail when this order is shipped
- Signature and typed name of person authorized to order these products
- Your telephone number
- Your email address
- Your FAX number

Domestic Terms

There is a \$50 minimum order. Open accounts can be extended to most recognized businesses. Net amount due 30 days from the date of shipment unless otherwise specified by us. Enclose payment with the order; charge with VISA, MasterCard, American Express, or pay COD. We must have a hard copy of your purchase order by mail, E-mail or fax. Students, individuals and private companies may call for a credit application.

International Payment Information

There is a \$50 minimum order. Payment must be made in advance by draft drawn on a major US bank; wire transfers to our account; charge with VISA, MasterCard, American Express, or confirmed irrevocable letter of credit. Proforma invoices will be provided upon request.

Exports

If ordering instrumentation for use outside the USA, please specify the country of ultimate destination, as well as the power requirements (110V/60Hz or 220V/50Hz). Some model numbers for 220V/50Hz will have a "C" suffix.

Quotations

Quotations are supplied upon request. Written quotations will include the price of goods, cost of shipping and handling, if requested, and estimated delivery time frame. Quotations are good for 30 days, unless otherwise noted. Following that time, prices are subject to change and will be re-quoted at your request.

Cancellations

Orders for custom products, custom assemblies or instruments built to customer specifications will be subject to a cancellation penalty of 100%. Payment for up to 100% of the invoice value of custom products may be required in advance. Cancellation for a standard Lafayette Instrument manufactured product once the product has been shipped will normally be assessed a charge of 25% of the invoice value, plus shipping charges. Resell items, like custom products, will be subject to a cancellation penalty of 100%.

Exchanges and Refunds

Please see the cancellation penalty as described above. No item may be returned without prior authorization of Lafayette Instrument Company and a Return Goods Authorization (RGA#) number which must be affixed to the shipping label of the returned goods. The merchandise should be packed well, insured for the full value and returned along with a cover letter explaining the reason for return. Unopened merchandise may be returned prepaid within thirty (30) days after receipt of the item and in the original shipping carton. Collect shipments will not be accepted. Product must be returned in saleable condition, and credit is subject to inspection of the merchandise.

Repairs

Instrumentation may not be returned without first receiving a Return Goods Authorization Number (RGA). When returning instrumentation for service,

please call Lafayette Instrument to receive a RGA number. Your RGA number will be good for 30 days. Address the shipment to:

Lafayette Instrument Company
3700 Sagamore Parkway North
Lafayette, IN 47904, USA.

Shipments cannot be received at the PO Box. The items should be packed well, insured for full value, and returned along with a cover letter explaining the malfunction. An estimate of repair will be given prior to completion ONLY if requested in your enclosed cover letter. We must have a hard copy of your purchase order by mail or fax, or repair work cannot commence for non-warranty repairs.

Damaged Goods

Damaged instrumentation should not be returned to Lafayette Instrument prior to a thorough inspection. If a shipment arrives damaged, note damage on delivery bill and have the driver sign it to acknowledge the damage. Contact the delivery service, and they will file an insurance claim. If damage is not detected at the time of delivery, contact the carrier/shipper and request an inspection within 10 days of the original delivery. Please call the Lafayette Instrument Customer Service Department for repair or replacement of the damaged merchandise.

Limited Warranty

Lafayette Instrument Company warrants equipment manufactured by the company to be free of defects in material and workmanship for a period of one year from the date of shipment, except as provided hereinafter. The original manufacturer's warranty will be honored by Lafayette Instrument for items not manufactured by Lafayette Instrument Company, i.e. resell items. This assumes normal usage under commonly accepted operating parameters and excludes consumable products.

Warranty period for repairs or used instrumentation purchased from Lafayette Instrument is 90 days. Lafayette Instrument Company agrees either to repair or replace, at its sole option and free of part charges to the customer, instrumentation which, under proper and normal conditions of use, proves to be defective within the warranty period. Warranty for any parts of such repaired or replaced instrumentation shall be covered under the same limited warranty and shall have a warranty period of 90 days from the date of shipment or the remainder of the original warranty period whichever is greater. This warranty and remedy are given expressly and in lieu of all other warranties, expressed or implied, of merchantability or fitness for a particular purpose and constitutes the only warranty made by Lafayette Instrument Company.

Lafayette Instrument Company neither assumes nor authorizes any person to assume for it any other liability in connection with the sale, installation, service or use of its instrumentation. Lafayette Instrument Company shall have no liability whatsoever for special, consequential, or punitive damages of any kind from any cause arising out of the sale, installation, service or use of its instrumentation. All products manufactured by Lafayette Instrument Company are tested and inspected prior to shipment. Upon prompt notification by the Customer, Lafayette Instrument Company will correct any defect in warranted equipment of its manufacture either, at its option, by return of the item to the factory, or shipment of a repaired or replacement part. Lafayette Instrument Company will not be obliged, however, to replace or repair any piece of equipment, which has been abused, improperly installed, altered, damaged, or repaired by others. Defects in equipment do not include decomposition, wear, or damage by chemical action or corrosion, or damage incurred during shipment.

Limited Obligations Covered by this Warranty

1. In the case of instruments not of Lafayette Instrument Company manufacture, the original manufacturer's warranty applies.
2. Shipping charges under warranty are covered only in one direction. The customer is responsible for shipping charges to the factory if return of the part is required.
3. This warranty does not cover damage to components due to improper installation by the customer.
4. Consumable and/or expendable items, including but not limited to electrodes, lights, batteries, fuses, O-rings, gaskets, and tubing, are excluded from warranty.
7. Failure by the customer to perform normal and reasonable maintenance on instruments will void warranty claims.
8. If the original invoice for the instrument is issued to a company that is not the company of the end user, and not an authorized Lafayette Instrument Company distributor, then all requests for warranty must be processed through the company that sold the product to the end user, and not directly to Lafayette Instrument Company.

Export License

The U.S. Department of Commerce requires an export license for any polygraph system shipment with an ULTIMATE destination other than: Australia, Japan, New Zealand or any NATO Member Countries. It is against U.S. law to ship a Polygraph system to any other country without an export license. If the ultimate destination is not one of the above listed countries, contact us for the required license application forms.