MetLogix Inc

175 Canal Street

Manchester, NH 03101 USA

Tel: 603.836.4452

Fax: 603.369.6499

info@metlogix.com

www.metlogix.com

Mx200 User's Guide

Automation and Metrology International, LLC
8808 Tyler Blvd, Mentor, OH 44060
1-888-354-2525 | sales@auto-met.com
Request a quote: auto-met.com

Optical Edge and Crosshair Software

User's Guide

Mx200 Optical Edge and Crosshair Software User's Guide

Published by:
Metlogix Incorporated
175 Canal Street Suite 503
Manchester, NH 03101 USA
Telephone 603.836.4452
Facsimile 603.369.6499
info@metlogix.com
www.metlogix.com

User's Guide part number: 15100-00
Publishing date: October 21,2019
Printed in United States of America
Copyright © 2019 by Metlogix, Incorporated, Manchester, New Hampshire

Mx-200 software version: 1.00.00

All information set forth in this document, all rights to such information, any and all inventions disclosed herein and any patents that might be granted by employing the materials, methods, techniques or apparatus described herein are the exclusive property of Metlogix, Incorporated., Manchester, New Hampshire.

Terms, conditions and features referenced in this document are subject to change without notice.

No part of this document may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without prior written permission of Metlogix, Inc. Requests to Metlogix, Inc. for permission should be addressed to the Customer Services Department, Metlogix, Incorporated, 175 Canal Street, Manchester, New Hampshire 03101.

Limit of liability and disclaimer of warranty

While this guide was prepared with great care, Metlogix makes no representations or warranties with respect to the accuracy or completeness of the contents of this book and specifically disclaims any implied warranties of merchantability or fitness for a particular purpose. The advice, methods and instructions contained in this book might not be suitable for your situation. When in doubt regarding suitability, you are encouraged to consult with a professional where appropriate. Metlogix shall not be liable for any loss of profit or any damages, including but not limited to special, incidental, consequential or other damages.

Trademarks

Metlogix, is a registered trademark of Metlogix, Incorporated.
Android is a registered trademark of the Google Corporation in the United States and other countries.

1 Introduction

The Mx200 user guide describes the operation of the Mx200 readout. The Mx200 supports manual part positioning and feature measurement under direct user control. While this guide might include some material that doesn't apply to your specific Mx200 configuration, the concepts explained are applicable to all Mx200 systems. For example, Mx200 systems can be 2 or 3 axis systems with X, Y, Z or X, Y, Q axes. This guide will show images of an X, Y, Q axis system.

1.1 Mx200 Readout

The Mx200 is a metrology readout for performing two and three axis measurements. Measurements can be performed using optical comparators, measuring microscopes and a variety of other crosshair measurement systems. All user interaction with the software is through the color touchscreen or through the use of softkeys and function keys on the rubberized keypad.

Features are measured by entering points manually using a simple crosshair probe, or automatically using optical edge detection. The probes include:

- **Simple crosshair**

  Used for manual point entry.

- **Optical edge detection**

  Identifies the location of a point as the optical crosshair probe crosses an edge. There are two modes, Auto-Mode where points are immediately entered for use in a feature measurement, and manual edge mode where once a point is taken, the operator must press enter to "accept" the point for the measurement.

1.2 Prerequisites

Operators are assumed to understand the basics of dimensional metrology.

1.3 Getting Help

Help is available:

- In this guide.
- In the electronic version of this guide accessed from the Help function("?" Button) in the Mx200 Setup Menu toolbar.
- From your MetLogix distributor or system provider.
- From our product support page at www.metlogix.com.

If it becomes necessary to contact your MetLogix distributor or system provider, be prepared to supply the following information:

- The Mx200 software version number and serial number. These can be read from the main Setup--> “About” page in the Mx200 software.
- Information describing the system hardware.
- A detailed description of the problem and the steps that you’ve already attempted to resolve it.

User Guide Contents

This user guide is divided into 8 sections:

- The User Interface
- Probing, constructing, and creating features
- How to establish datums (Zeroing)
- Tolerancing
- Programming
- Data View
- Optical Edge Detection (Optional)
- User Setup

2 User Interface

The Mx200 Software interface consists of a feature list, function buttons, and toolbars for performing and displaying measurements all via a color touchscreen or keypad.

2.1 Screens

Primary screens of the software interface are:

- DRO (Home screen)
- Point entry screen
- Measure Feature screen
- Feature Detail screen
- Tolerance Entry screen
- Data View screen

Other screens will be described as part of instructions detailed later in this guide.

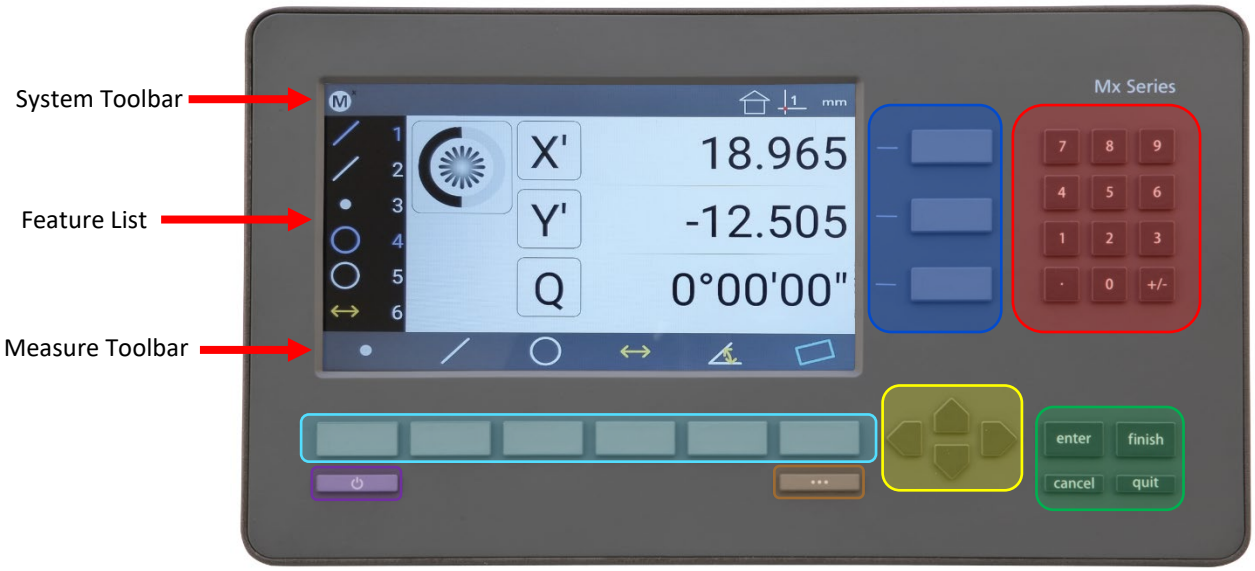
Screen contents include:

- The main screen function in the center
- The Feature List on the left
- The System toolbar at the top
- The Measure toolbar at the bottom

2.2 Touch Screen – Or not!

The Mx-200 features a color touchscreen that can be used to interact with the device. For caustic or harsh operating environments, the touch screen can be locked out and the readout can then be operated entirely by the soft keys and function keys of the rubberized keypad.

2.3 The Interface Roadmap

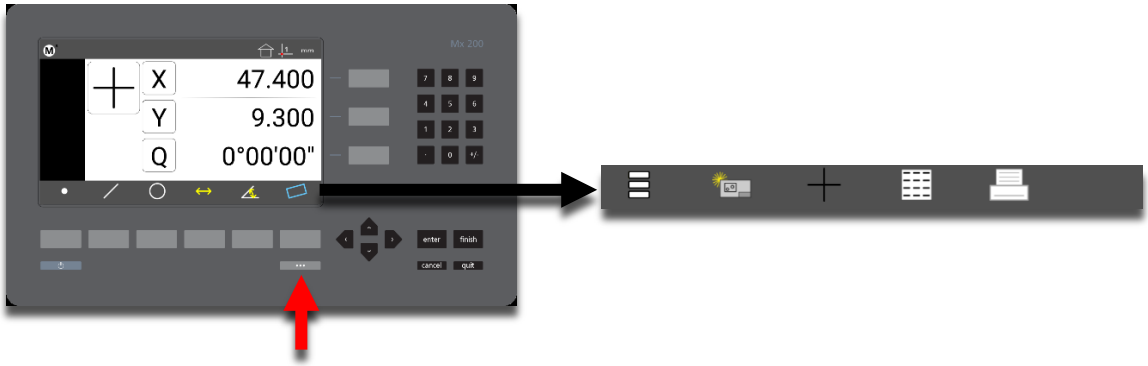


Keys	Function
Number Pad	Enter numeric digits, decimal points, and sign(+/-)into the current field.
Command Keys	Enter - Select data entry field or setup menu item. Finish - Confirm selected function or setup menu item. Cancel -Navigate up one level from current setting menu. Quit – Exit the current setting screen back to the top level settings screen.
Arrow Keys	Navigate the settings menu screens. The left and right arrows go in a level, or out a level. The up and down arrows move the current selection up/down.
Power Key	Single Press to Power On. When On, Single Press for Screen Off, Long Press for Power Off.
Soft Keys(1-6)	Executes the softkey button commands/selection displayed above the key.
DRO Keys	Execute X/Y/Z/Q zerroing funciton. Select functions as vertical softkeys.
Menu Button	Displays or advances the Softkey Menu. Long press to enter Mx200 Setup.

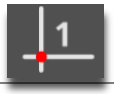
System Toolbar – A storage tray of commonly used functions. The default configuration displays an “Mx” button(access to Setup), a Home Button(return to home view), an Inch/Metric Button(to toggle display units), and a Datum indicator(displaying current coordinate system).

Measure Toolbar- A storage tray for the primary measure and construct feature buttons, and for extra menu buttons assigned via the Desktop Settings screen.

Pro-Tip: The bottom toolbar has a set of default function buttons for each view-type, which cannot be modified. The measure feature buttons are an example of these. When the “Desktop” setting for a particular function is set to “Bottom” or “Both” it will be displayed in the Mx200’s “Extra Functions” menu. This menu can be displayed by pressing the Menu key once. Additional keypresses of the Menu button will cycle through the pages of the Extra Functions menu.



Function	Button Icon	Description
Program Button		The Program Button navigates to the part program view.
Data View Button		The Data View button navigates to the feature results/report view.
IN/MM Button		The IN/MM button toggles the display units between Inch and Millimeter.
Cart/Polar Button		The Cart/Polar button toggles the positional display format between Cartesian and Polar coordinates.
Print Button		The Print button executes a print command.
Export Button		The Export button navigates to the export data file softkey menu.

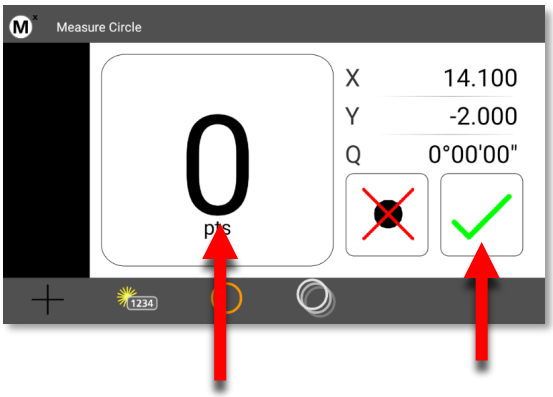
Help Button		The Help button provide access to the PDF User Guide. This button can only be added to the bottom toolbar.
Mag Button		The Mag button displays the magnification softkey menu, and also shows the currently selected mag.
Send Button		The Send button initiates the RS232 send function.
Ref Frame Button		The Ref Frame button toggles the Abs/Inc datum frame.
DMS/DD Button		The DMS/DD button toggles between Degrees Minutes Seconds and Decimal Degrees mode.
Setup Button		The Setup button navigates to the Mx200 setup screen.

3 How to Probe/Measure features

3.1 Probing Features

Point entry screen

Once you have selected a feature to measure, points can be entered by lining up the crosshair on your system then pressing either the Enter button, or the large point counter, as seen in the screen below. When you have entered enough points, press the green check mark or the Finish key.



Finish Measurement

Enter Point

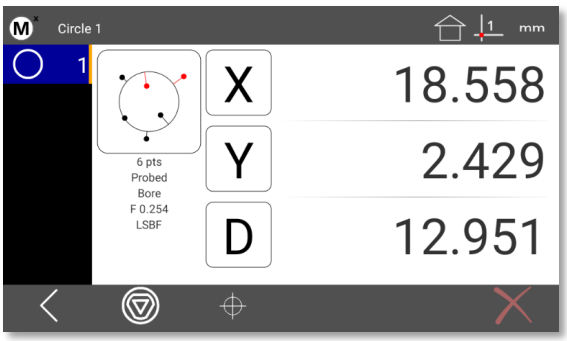
At the bottom of the point entry screen you will notice a series of icons, as seen below. The first icon indicates the probe type you are using(Optical edge or cross hair). The second button is the Create Feature function(allowing you to create a feature in space(addressed later in the guide)). The third icon displays the feature type you have selected to measure. The fourth is the “repeat” measure function(allowing repeat measurements of the same feature). And lastly, the construction mode function which allows you to construct a feature relationship from previously measured features.

3.2 Feature Detail Screen

Once you have completed your measurement, the results will be displayed in this window. Each feature will have a unique set of coefficients. In this example of a circle, the X and Y center position, plus the circle Diameter are displayed.

Pro-Tip: if you press the Diameter “D” button, or soft key, you will toggle from Diameter to Radius for the measured circle.

In this screen you will also see a graphical representation of the circle with the points used for the calculation. A circle requires a minimum of three point. If you probe more than the minimum number of required points for a feature, the worst-case points on each side of the calculated circle will be displayed in red, as seen below. The “F” or Form error of the feature is the radial distance between inner most and outer most points of the features point cloud.

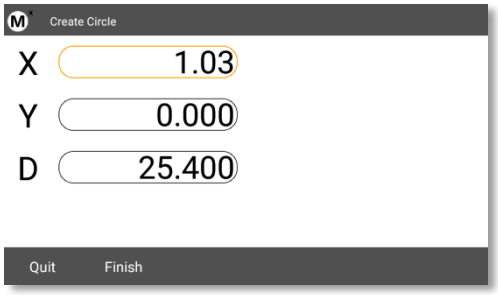


The total number of points probed for the feature and the features currently set fit type are also displayed below the feature graphic. The default fit type applied is a Least Squares Best Fit(LSBF) calculation. Other fit types can be applied by pressing the “Change Type” key( ). For circles features, other fit types include;

- Max Inscribed Fit - What is the largest pin that could fit in the this hole.
- Min Superscibed Fit - What is the largest diameter created from the three outer most points.
- ISO Fit(Best Form) - Fits the feature to the best, or lowest, form.

3.3 Creating Features

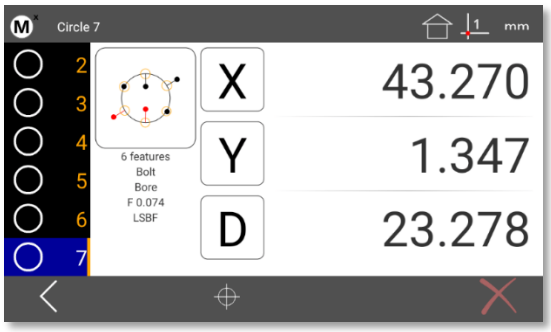
On occasion, you may need to create a feature somewhere in the coordinate system. Created features are not probed or constructed and thus cannot be played back in a program. To create a Circle, press the Circle key, then the “Create Feature” key( ). You will see a numerical entry screen. Enter the numeric value in the X axis, which is highlighted in orange, then press “Enter”. This will index the highlighted field to the Y axis. Enter the Y axis value and press enter. Do the same for the diameter coefficient. Then press finish. The created feature will be added to the feature list and displayed in the results window. Other feature types can be created using the same method.



3.3 Performing Constructions

A common measurement request is to construct a bolt hole pattern from three or more circles. The following example procedure will explain the general sequence that applies to all other supported feature constructions.

- **Step 1:** Measure three circles.
- **Step 2:** Press the measure circle button again. Now press the “Feature Construction” button( ).
- **Step 3:** In the feature list, a thin orange vertical “bar” will appear which should be next to the last circle you measured. Press “Enter” and the feature counter will now indicate “1”, and the feature you selected will turn blue. Press “Enter” two more times until all three features are highlighted.
- **Step 4:** Press “Enter” to complete the construction. The newly constructed feature is now displayed in the feature detail screen, you can see the parent cicrlces that make up the bolt hole in orange(the example image below uses 5 parent circels). The bolt hole circle construction will be displayed in black.



Pro-Tip: You can always use the keypad up/down arrows, or the touchscreen to move up and down the feature list, viewing the detailed results information for the selected feature.

Other Feature Constructions

To perform other construction types first declare the feature type you want as a result of the construction, then select the features you would like to include in that construction, then press “Enter”. This method can be used to perform a number if different construction types, including distances, angles, mid and end points, and many more.

Probing Rules

- The Minimum number of points required for each feature can be seen below;

>Point – One point (if you enter more than two points for a point measurement, you will get the average point)

>Line – Two points or more

>Circle – Three points or more

>Distance – two points or features

>Angle – minimum of two points per leg. It is better to probe towards the vertex, than away from it.

- A maximum of 99 points can be probed for any given feature type.

4 Datuming

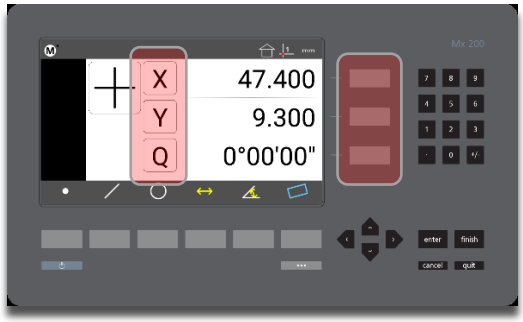
Creating a “Datum”, or zero point, is an essential part of coordinate metrology. When measuring rectangular parts, the first step is often to “Skew” the part or mathematically align the part as it sits on your stage, and then set the origin(or datum) of your part coordinate system.

4.1 Zeroing and Presetting the Stage Position

The stage position can be zeroed or preset to a value as the reference for a measurement.

To zero a stage position:

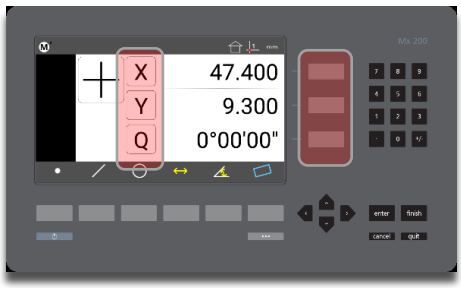
- **Step 1:** Move the stage to the desired measurement reference position.
- **Step 2:** Press the Home button to display the DRO view, if necessary.
- **Step 3:** Press the DRO Zeroing Button(screen or keypad) to zero the stage position for the desired axes.

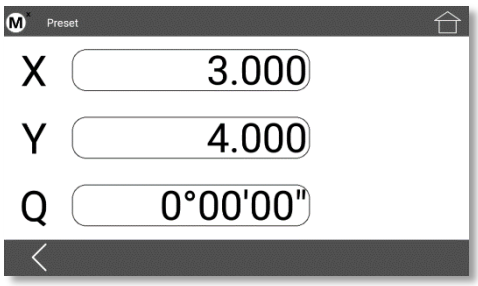


4.2 Presetting the Stage Position to Specific Coordinates

To preset a stage position:

- **Step 1:** Move the stage to the desired measurement reference position.
- **Step 2:** Press the Home button to display the DRO if necessary.
- **Step 3:** Long-press any DRO Zeroing Button(screen or keypad) to access the preset screen.
- **Step 4:** Enter the desired preset value for each axis and press “Finish” to complete the preset.

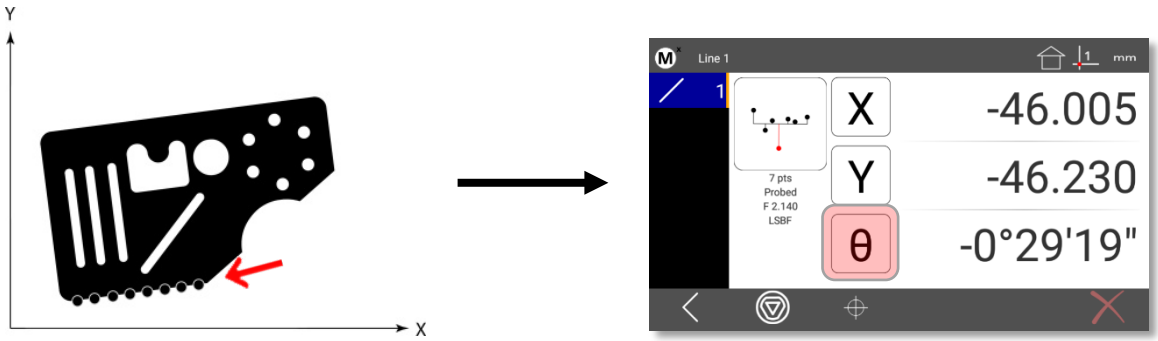




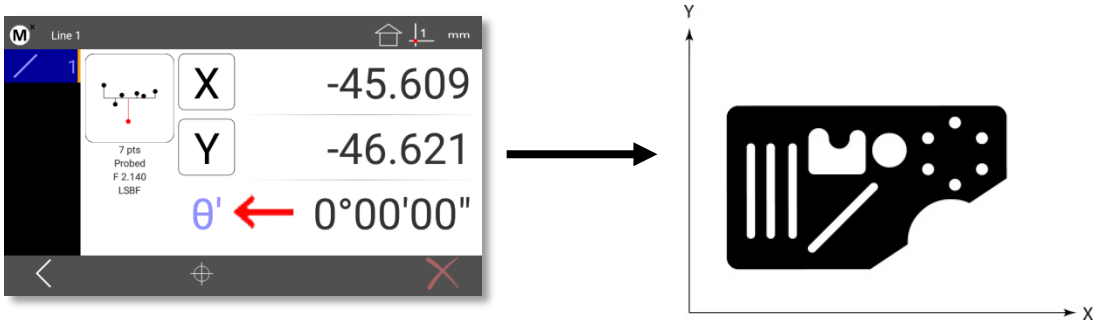
4.3 Performing a Skew Alignment on a Line Feature

To probe a skew alignment line:

- **Step 1:** Press the Measure Line button.
- **Step 2:** Probe points well distributed along the entire length of the desired part alignment edge (X axis in the example below). More points probed on the reference edge will increase measurement accuracy.
- **Step 3:** Press the “Finish” button to complete the measurement. The line will be shown in the Feature list and Feature Detail screen.



4 Zero the line angle by pressing the Angle button to align the part to the X axis. The X and Y coordinate button images will change from X and Y to X' and Y' to indicate that a skew alignment exists. The Angle value label will turn blue and a (‘) will be added to indicate it is a datum feature.

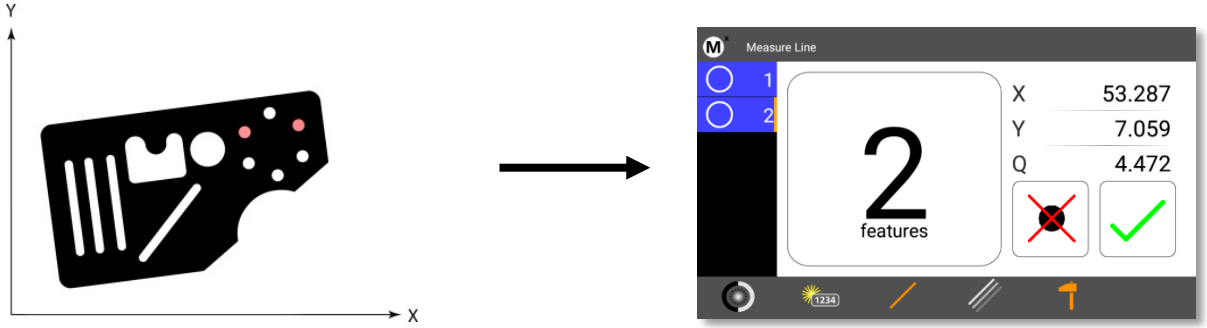


4.4 Constructing a Skew Alignment Between 2 Circles

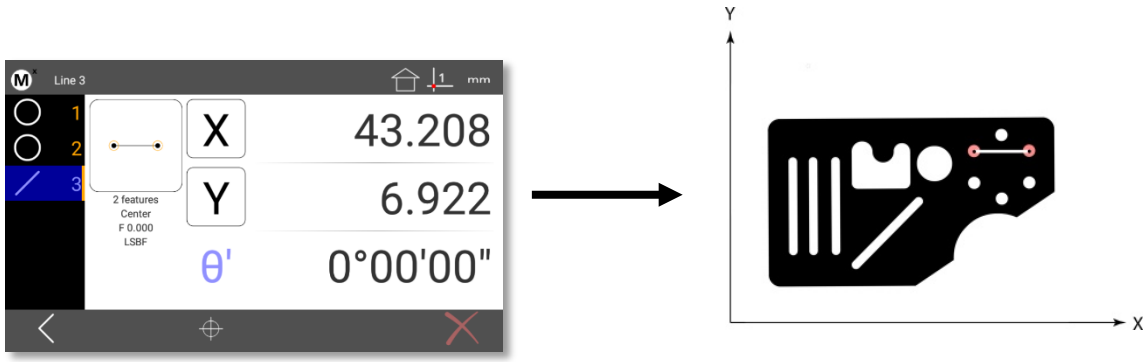
A skew alignment line can also be constructed between any two positional features.

To construct a skew alignment line:

- **Step 1:** Press the Measure Line button.
- **Step 2:** Select (press) the desired parent features in the Feature list (two circles in this example).



- **Step 3:** Press the “Finish” button to complete the line construction. The line will be added to the Feature list and shown in the Feature Detail screen.
- **Step 4:** Zero the line angle by pressing the Angle value button to align the part to the X axis. The Angle value label will turn blue and a (‘) will be added to indicate it is a datum feature.



- **Step 5(optional):** The constructed line can now be deleted if desired. Select the line and press the Delete button. The line will be deleted but the skew alignment will be retained for use in future measurements.

4.5 Part Datums

One or two datums can be used as measurement references. Datum 1 and Datum 2 can be used interchangeably at the user's discretion. A part datum can be established by:

- Zeroing a feature location

Or

- Presetting a feature location

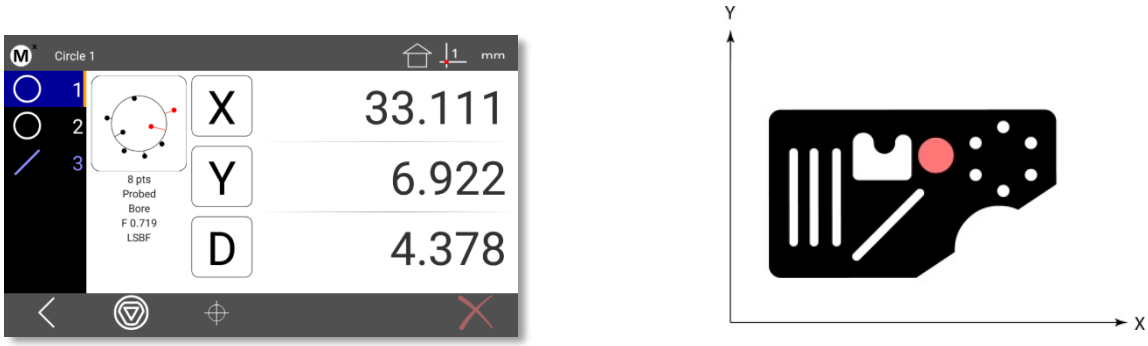
Datum features can be probed, constructed from parent features, or created from data provided by the user. It is assumed in the following examples that a skew alignment already exists, if required.

4.6 Zeroing a Feature Location

A part datum can be established directly by zeroing any positional feature's X and Y coordinates.

To zero part coordinates on a feature:

- **Step 1:** Select the desired positional feature from the Feature list (a circle in this example).



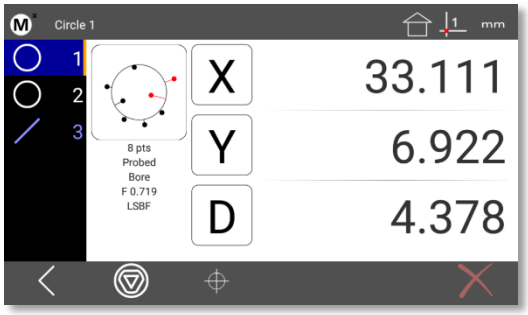
- **Step 2:** Press the Datum Selection button( ) to choose a datum (datum 1 in this example).
- **Step 3:** Press the X' and Y' value buttons to zero the center point of the selected feature as a datum.

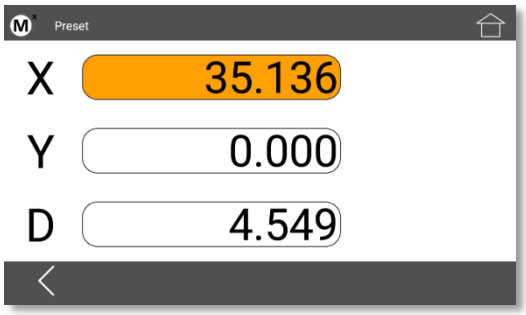
4.7 Presetting a feature location

A part datum can also be established by presetting a position directly on any feature's X and Y coordinates.

To preset part coordinates:

- **Step 1:** Select the desired feature from the Feature list. In this example a probed circle is selected.
- **Step 2:** Press the Datum Selection button( ) to choose a datum (datum 1 in this example).
- **Step 3:** Long-press any DRO Zeroing Button(screen or keypad) to access the preset screen.





- **Step 4:** Press each desired coordinate field to select it (highlighted in orange).
- **Step 5:** Use the keypad to enter the desired reference coordinate values. The “Cancel” key can be used to delete any incorrectly entered values.
- **Step 6:** Press the Return arrow to display the Home screen. The preset datum coordinates will be displayed.

4.8 Using Two Datums

To establish two zero points first follow the steps outlined above to set an initial part datum(XY origin).

- **Step 1:** Now create or measure the feature that you wish to establish as your secondary datum. While that feature is displayed in the feature detail screen, zero the X/Y coefficients.
- **Step 2:** Press the datum icon( )in the upper tool bar. The datum indicator will now display ‘2’. All features measured subsequently will be displayed relative to reference ‘2’. Additionally, any feature measured previous to the new datum will also now be relative to the new datum “2”, the reference frame system is always fully “floating”.

5 Tolerancing

Use the following steps to apply an X Y Positional Tolerance and Diameter Size tolerance to a measured circle:

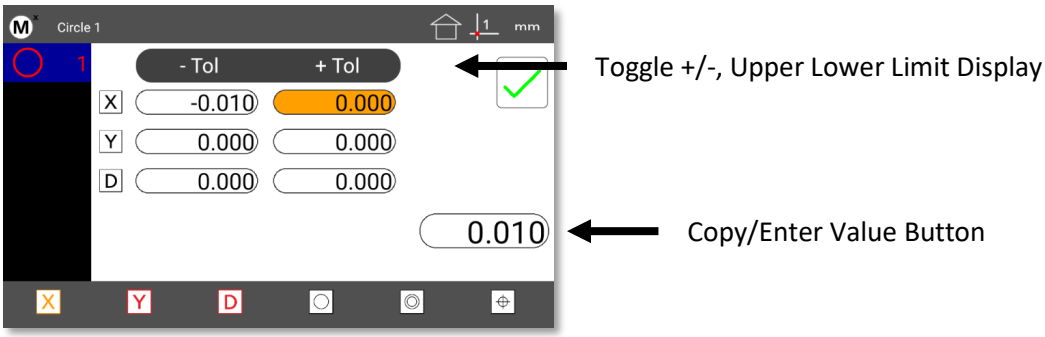
- **Step 1:** Skew and datum your part.
- **Step 2:** For this example measure the circle that you want to apply the tolerance to.
- **Step 3:** While in the feature detail screen, press the tolerance button( ).
- **Step 4:** You will now be looking at the Nominal Entry Screen, as indicated by the orange highlight on “NOM”.
- **Step 5:** Select the X axis field, it will turn orange. Use the numeric keypad to enter the nominal dimension for X.
- **Step 6:** Do the same for Y and Diameter.

Pro-Tip: In most cases the measured dimension will be close to the blue print nominal dimension. As such a digit typically just needs to be “rounded”. If the dimension is displayed as 5.013, and should be 5.010, simply press the “1” , this will round the 3 to 0, quickly setting the desired nominal value.

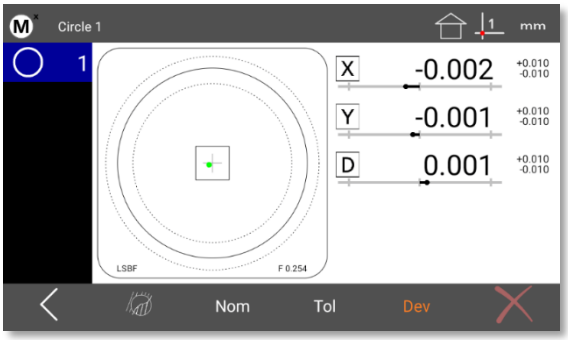
Pro-Tip: if you select the last digit of a nominal value using the touch screen, moving your finger left and right will index the value up and down until the desired value is reached.

- **Step 7:** Once your nominals are specified, press the “TOL” key, then press the Add Tolerance Button ( ). You can now select the tolerance types you would like to add. In the example below a cartesian tolerance for X and Y have been added as well as a size tolerance for the Diameter. When adding tolerances the -TOL and +TOL columns for each coefficient will be added.
- **Step 8:** Select the -TOL for the X tolerance , and enter .010. Do the same for the + TOL and for the Diameter. You can use the keypads directional arrows to move through the fields. (Upper and Lower limit display can be toggled by pressing the column header area).

Pro-Tip: When all of the limits will be the same, in this case .010, after you enter .010 in the field for -TOL, a field in the lower right will populate with .010. If you press the soft key next to this field in the lower right, it will auto fill the selected field with .010.



- **Step 9:** Once your tolerances have been applied press “Finish”. You will now see the results of the tolerance application. A graphical representation of where the upper and lower limits are set will be displayed as dashed circles. The actual circle will be displayed as a solid line circle. The rectangular tolerance zone will be indicated by a square at the circle center, with a dot showing the center location of the toleranced feature. The numerical deviation of the X, Y, and D dimensions will also be displayed. Tolerance failures will be displayed in red. There is also a “deviation fence” graphic showing how much of the tolerance band the actual dimension consumed.



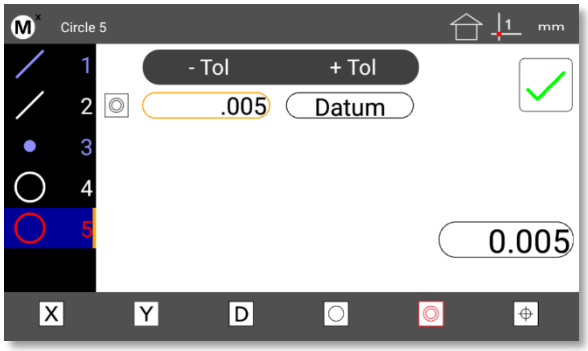
Other feature types use similar conventions for set up tolerancing

IMPORTANT: Most tolerances types are applied in a similar method as described above. In some cases however tolerances can make use of a reference feature, other than the datum. The two most common examples of this are for Concentricity and Angularity tolerances. An example has been provided below.

<u>Use the following steps to apply a concentricity tolerance to a circle:</u>

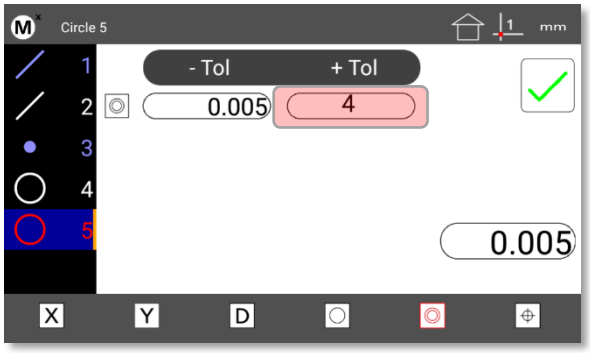
IMPORTANT: In all cases where a reference feature will be used for a tolerance, the feature being referenced must be measured prior to the feature being tolerance.

- **Step 1:** Measure all features required to establish your part datum, as well as the circle features to be used for the concentricity tolerance. Select the circle that you would like to apply the concentricity tolerance and apply the tolerance per the procedure described in the section above.



Note: It may be that the reference for the concentricity tolerance is the same as the part datum. In this case no tolerance reference is required, as the datum will be “assumed”.

- **Step 2:** To change the reference feature for your tolerance highlight the “Reference Feature” field, located under the “+Tol” column and use the numeric keypad to enter the feature number of the desired reference feature. In the example below you can see that feature number 4 has been referenced.



6 Part Programs

If you have parts that you measure on a consistent basis, you may want to create part programs to improve inspection speed and reliability. Part programs play back a sequence of feature measurements and constructions, including skew and datum operations, tolerance assignments, as well as report printing and data export steps. Part programs also provide a graphical guide to the sequence of measurements ensuring a consistent number of points are taken on all feature measurements.

Pro Tip: Before recording a part program it is recommended that you have a good plan in place as to how you will inspect your part. “Best Practice” is to first skew the part, then establish your X and Y datum, then measure the rest of your features.

6.1 Creating a part program

The following example part programming sequence will use a rectangular part where we will skew on the bottom line, establishing that line as Y axis datum, then measure the left hand vertical line, establishing that as X axis datum, then measure two circles and the distance between the circles.

- **Step 1:** Press the “Menu” button( ).
- **Step 2:** Press the “New Part” button( ). This will clear all features, and datums from the system.
- **Step 3:** Press the “Program” button( ), then the New Program button( ). Enter a number to be assigned to the program and press “Enter”. You will see a small red dot in the upper right toolbar, indicating you are in “Record” mode.
- **Step 4:** Measure the bottom line of the part and “Zero” the y axis.
- **Step 5:** Measure the left-hand line and “Zero” the X axis.
- **Step 6:** Measure the two circles, press measure distance, then select the two circles, then press “Finish”.
- **Step 7:** Press the more key, the program key, then the “Check Mark” button to stop recording.

6.2 Running a part program

- **Step 1:** Press the “Menu” button( ).
- **Step 2:** Press the “Program” button( ).
- **Step 3:** Highlight the part program number you want to run and then press the “Play” button( ).
- Step 4: You will be prompted to measure the first feature in your part program. Continue following the onscreen instructions to complete all datum feature measurements. Once the datum has been completely established(skew and zero), the feature graphic will provide directional guidance to each point in the remaining features of the part program. In this “registered” playback guidance, the optical probe sensor will be disabled when the “target ball” is red, and active when it is green.

6.2 Additional programming notes: Editing, Macros, and Part Management

- To edit a program, access the “Programs” screen, highlight the program number you would like to edit, and press the edit button from the bottom toolbar( ). The following properties can be modified for your program;

Units – Sets the part program to display results in either Inch or Metric.

Coordinates Mode – Set the program to display results in either Cartesian(X, Y) or Polar coordinates mode (Radius/Angle).

Fixture Mode – Set the fixture playback mode for the program. Programs can be set to “Permanent” or “None”. If permanent mode is selected, and the machine is configured for a startup zero position, “guidance” in playback will begin immediately and based on the recorded machine coordinate position. When set to none, guidance will not begin until a part skew and datum(X/Y)have been established.

Macro Mode – Macro mode can be enabled for any feature measurement sequence. Datum steps, printing, exporting, and sending are not supported within Macros. If you have a sequence of the measurements that you utilize regularly, a line/line/midline construction for example, you can create a program for that sequence, set the Macro flag to “Yes” and then assign it to one f the numeric keypad buttons.

➔ In Setup, scroll down to Quick Keys, press “Enter”. Highlight “Number pad” and press “Enter”, scroll down to the keypad number you want to assign the macro to. A dialog will be displayed requesting the program number you want to assign to the key. Enter the number and press enter twice. When the assigned numeric key is pressed from the main measure view it will launch your macro program sequence.

Duplicate Part – Duplicate part allows you to quickly make a copy of a given program. To use, highlight your part program in the program view and press the duplicate part button( ). You will be prompted to assign a program number to the newly duplicated part.

Importing and Exporting Parts: It is also possible to import a part file from a USB drive, or export a part to a USB drive. To execute a part import or export, highlight the desired program in the program view, press the duplicate part button ( ), and then select the Softkey for Import or Export. NOTE: You must have a USB drive connected to the Mx200 USB port to perform an Import or an Export. When importing a part you will be prompted to specify the number of the part program you would like to import.

7 Reporting

After performing measurements in the Mx200 you may want to view, print, or send the results.

The following settings can be configured in the “Printouts” settings menu.

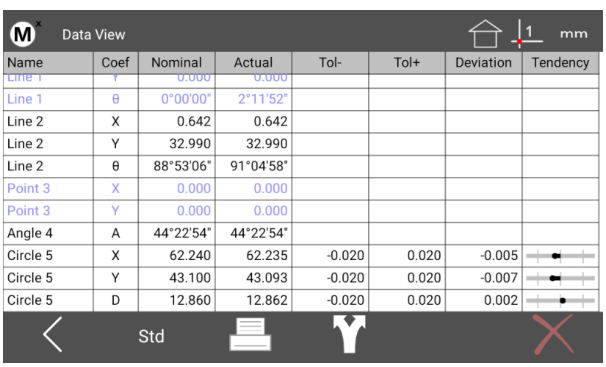
Report Title

- Select the “Report Title” menu item and press “Enter”. An alpha-numeric entry dialog and keyboard will be displayed. Enter the desired new report title and press “Ok” to confirm. This new report title will be displayed in the header for all report printouts.

Include Date and Time

- Select the “Include Date and Time” menu item. Set to Yes or No using the softkeys to include or hide the date and time stamp from the report header.

To view measuring results press the “Menu” button( ), then press the “Report View” button( ). Measuring results can be displayed in one of three views; CSV, Standard, and Tolerance. Each has a different layout for measurement data, select the one that best suits your needs.



Name	Coef	Nominal	Actual	Tol-	Tol+	Deviation	Tendency
Line 1	Y	0.000	0.000				
Line 1	θ	0°00'00"	2°11'52"				
Line 2	X	0.642	0.642				
Line 2	Y	32.990	32.990				
Line 2	θ	88°53'06"	91°04'58"				
Point 3	X	0.000	0.000				
Point 3	Y	0.000	0.000				
Angle 4	A	44°22'54"	44°22'54"				
Circle 5	X	62.240	62.235	-0.020	0.020	-0.005	
Circle 5	Y	43.100	43.093	-0.020	0.020	-0.007	
Circle 5	D	12.860	12.862	-0.020	0.020	0.002	

You can Print, Export, or Send(RS232) your data from the Mx200, to a printer, USB storage device, or external data collection system.

7.1 Printing report data

Before printing you must first configure the printer to be used. Once set up is complete, pressing the “Print” button( ). from the report view menu will execute a print of the current report view you have selected.

- **Step 1:** Press the Mx menu button, enter Setup, and then scroll to the setting screen called “Printouts”.
- **Step 2:** Select the menu item called “Printer Setup”. Use the touch screen to specify your printer device from the dropdown menu in the top left corner. NOTE: If you are printing to a wireless printer, make sure that you have Wifi/Bluetooth enabled in the unit, and that you are connected to the correct network or device.

- **Step 3:** Set any additional parameters for your printout in this same printer setup screen and then press the "Print" button( ) to execute a test print, and to save your settings.

7.2 Exporting report data(to USB)

Measurement results can also be exported to a USB storage drive, in either CSV or TSV format. To export data to a USB drive;

- **Step 1:** Put a USB drive into the Mx200 USB port.
- **Step 2:** Produce some feature measurements so that the Data view contains some contents to export.
- **Step 3:** Select the desired report view format(CSV/Standard/Tol).
- **Step 4:** Press the "Export" button( ) from the bottom softkey toolbar.
- **Step 5:** Select the desired file format for your export from the softkey toolbar.(CSV or TSV).
- **Step 6:** Wait for the on-screen message indicating that the export is complete.

7.3 Exporting report data via RS232

The Mx200 can send either the current stage position(XYZQ), or a selected features coefficients out of the RS232 port. The port needs to be properly configured, and the correct cable needs to be used in order to successfully send the data.

The "RS232" settings screen contains setup parameters for configuring the general-purpose IO port for on the Mx200 readout for serial data output. The port parameters configured on the Mx200 should match that of the connected device (PC).

Note: The general purpose IO port on the Mx200 is used for both serial data transfer and button input. As such the wiring for the connection cable must be specific to the connection modes being used. Please see the signal assignment diagram at the end of this section for reference.

RS232 Function	Description
Baud Rate	Configure Baud rate for connection. 110 through 115,200 can be chosen using the appropriate softkey.
Parity	Configure the correct parity mode for the connection. Even/Odd/No can be selected using the appropriate softkey.
Stop Bits	Configure the correct number of Stop Bits for the connection. 1 or 2 can be chosen using the appropriate softkey.
Send Labels	Specifies whether or not the coefficient label will be sent along with the value. Set to Yes or No using the appropriate softkey.

Send Units	Specifies whether or not the unit type for a given value is sent along with the value. Set to Yes or No using the appropriate softkey.
Send Eol(End of Line)	Configures the desired character to be sent at the end of an output line. CR(Carriage Return), Line Feed(LF) or CR &LF can be selected using the appropriate softkey. EOL can also be set to None.
Field Delimiter	Configures the desired field delimiter(separator) to Comma or Tab. Set to desired delimiter using the appropriate softkey.

MLX200 9 Pin Dsub(F)	Description	Switch Device(Footswitch/Buttons/ETC)	RS232 9 Pin Dsub(M)
1	TRIG_2_IN	SW2 Common	NC
2	RX_IN		2
3	TX_OUT		3
4	TRIG_1_OUT		NC
5	GND	SW1 & SW2 (Normally Open) & Earth Ground	5
6	TRIG_1_IN	SW1 Common	NC
7	TRIG_3_IN		NC
8	TRIG_2_OUT		NC
9	TRIG_3_OUT		NC

NOTE: If you do not see the Send button( )in your top or softkey toolbar, you may need to enable the display of the Send button in Desktop settings.

To send measurement data out of the RS232 port.

- **Step 1:** Produce some feature measurements for sending out of the RS232 port.
- **Step 2:** Press the Send button to access the position/coefficient selection screen.
- **Step 3:** Press the desired softkey, or use the touch screen, to choose what to send out of the RS232 port. The selections you make will be displayed in orange to indicate their selection state.
- **Step 4:** Press the green check-mark button in the sofkey toolbar to confirm the selection and transmit the data.

8 Optical Edge Detection

Your Mx200 system may be equipped with optional optical edge detection capability. With optical edge detection features are measured by probing points along the edge of the feature. Points are probed either explicitly, or automatically using the simple crosshair or an optical edge crosshair probe. The optical edge detection parameters can easily be calibrated by the user using the Edge Teach routine.

8.1 Probe Types

There are two main categories of probes:

- Simple crosshair
- Optical edge detection probes
  - Manual Edge probe
  - Auto Edge probe

The Mx200 Probe menu provides access to (left to right):

- Simple crosshair probe
- Manual edge detection probe
- Auto edge detection probe
- Probe Teach (optical edge calibration)

8.2 Simple Crosshair Probe

The simple crosshair probe is used to measure a single point at a time by manually lining up the crosshair center with a location on the feature edge and then pressing the Point Counter button or the keypad “Enter” button. The DRO current stage position is continually updated while probing with the Simple Crosshair..

8.3 Manual Edge Detection Probe

The Manual Edge detection probe is used by crossing an edge with eh fiber optic probe, but incorporates an edge detection area that will detect a point on the feature edge automatically, generating a tone as the fiber optic probe passes over the light/dark transition of the edge. The point location is retained by the system and must then be entered by pressing the Point Counter button or by pressing the “Enter” key. The point location is retained by the system until the next edge is crossed. The DRO stage position is updated only when a new edge is detected.

8.4 Auto Edge Detection Probe

The Auto Edge detection probe must also be aligned by the user and detects feature edges as explained above, but the detected point is entered automatically into the current measurements when the probe crosses an edge eliminating the need for user interaction. The DRO stage position is updated only when a new edge is detected.

8.5 Points Required for Feature Measurements

The minimum number of points required for each feature type is shown in the table below. Probing more than the minimum number of required points increases measurement accuracy.

Feature Type	**Minimum Number of Points**
Points	One
Lines	Two
Circles	Three
Distances	Two (only)
Angles	Two on each leg
Skew	Two
Datum	One

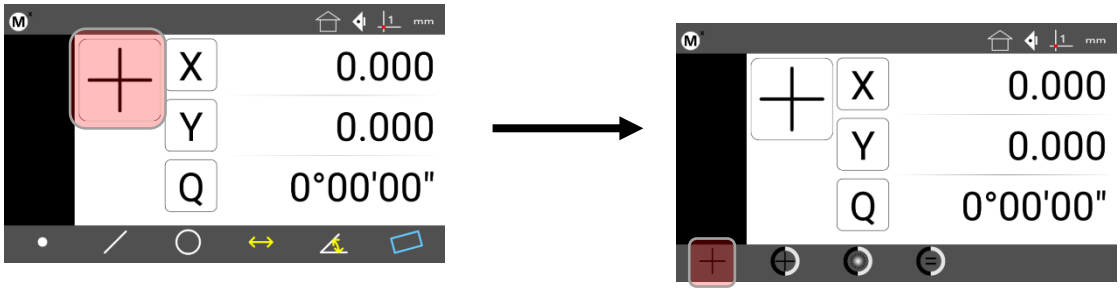
8.6 Using the Probes

The procedure for using the three probe types is simple, and is identical for all feature types.

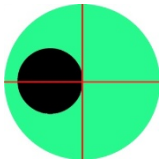
8.7 Simple Crosshair Probe

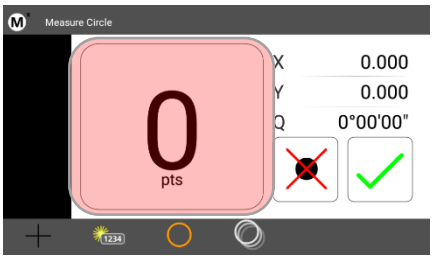
To use the simple crosshair probe:

- **Step 1:** Press the Home button to return to the main measuring view(if necessary).
- **Step 2:** Press the Probe Menu button and select the Simple Crosshair probe.



- **Step 3:** Press the desired Measure Feature button in the Measure toolbar (circle in the example below).
- **Step 4:** Position the crosshair Probe over a feature edge.
- **Step 5:** Press the Point Counter to enter the point.

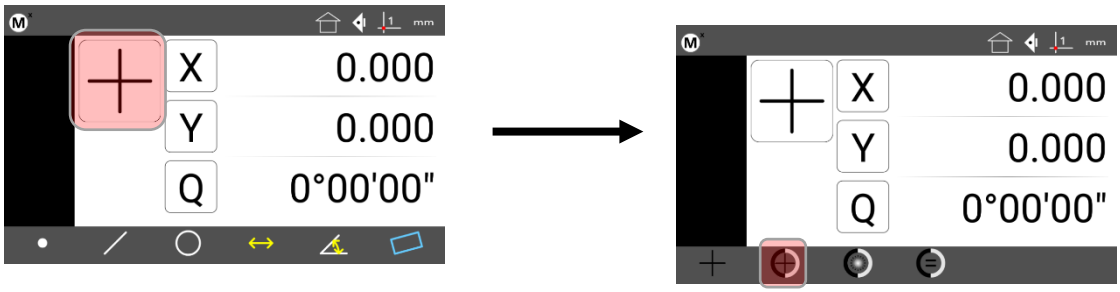




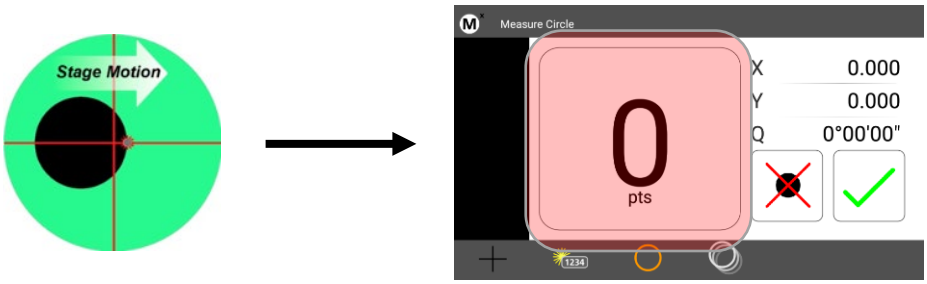
- **Step 6:** Probe the remaining points necessary to define the feature.
- **Step 7:** Press the "Finish" keypad button, or the green check-mark touchscreen button to complete the feature measurement. The feature will be shown in the Feature list and Feature Detail screen.

8.8 Manual Edge Detection Probe

- **Step 1:** Press the Home button to return to the main measuring view(if necessary).
- **Step 2:** Press the Probe Menu button and select the Manual Edge probe.



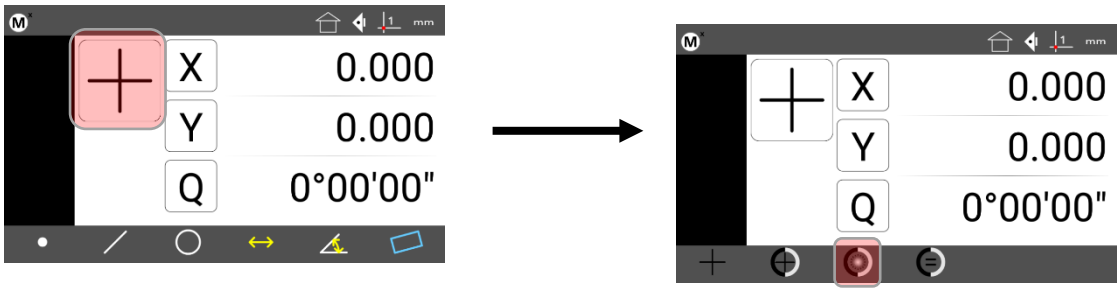
- **Step 3:** Press the desired Measure Feature button in the Measure toolbar (circle in the example below).
- **Step 4:** Sweep the optical edge sensor over a feature edge. The probe will fire and a tone will be produced.
- **Step 5:** Press the point counter button to confirm entry of the edge crossing into the measurement.
- **Step 6:** Probe the remaining points necessary to define the feature.



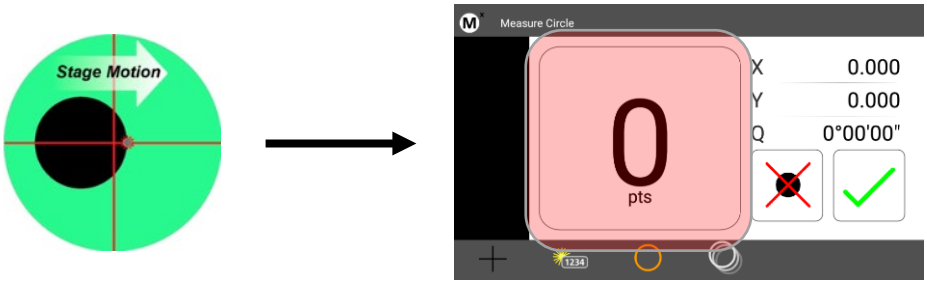
- **Step 7:** Press the "Finish" keypad button, or the green check-mark touchscreen button to complete the feature measurement. The feature will be shown in the Feature list and Feature Detail screen.

8.9 Auto Edge Detection Probe

- **Step 1:** Press the Home button to return to the main measuring view(if necessary).
- **Step 2:** Press the Probe Menu button and select the Auto Edge probe.



- **Step 3:** Press the desired Measure Feature button in the Measure toolbar (circle in the example below).
- **Step 4:** Sweep the optical edge sensor over a feature edge. The probe will fire, and a point will be entered into the measurement.
- **Step 6:** Probe the remaining points necessary to define the feature in the same way.

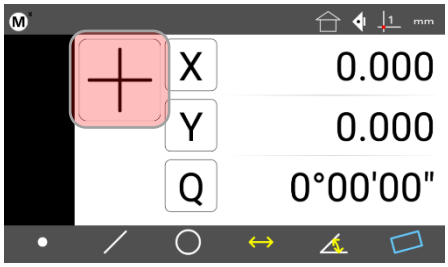


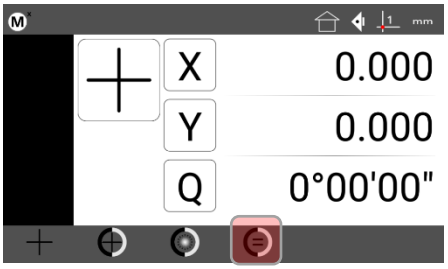
- **Step 7:** Press the “Finish” keypad button, or the green check-mark touchscreen button to complete the feature measurement. The feature will be shown in the Feature list and Feature Detail screen.

8.10 Optical Edge Sensor Teach

Probe Teach is the basic optical edge calibration required by the Mx200 optical edge detection system. The probe teach calibration should be performed when lighting or magnification conditions change. To perform the Probe teach calibration:

- **Step 1:** Select “Edge Teach” button from the probe menu.





- **Step 2:** Instructions will be displayed on screen to guide you through the edge teach procedure. Follow the on-screen instructions for positioning your optical probe and performing the calibration.
- **Step 3:** At the completion of the teach calibration a message will be displayed indicating success or failure. In the event of teach failure please refer to the section of the Mx200 setup guide on Optical Edge setup.

After a successful teach calibration, the optical edge probes can be used to perform feature measurements.

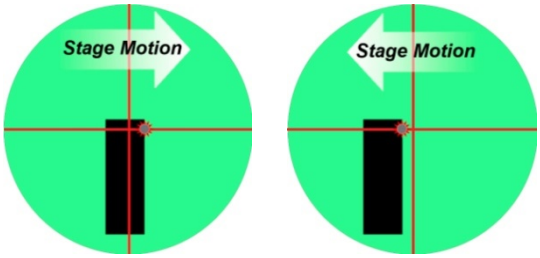
8.11 Edge Logic

Edge Logic is an optical edge measurement function that reduces measurement time by enabling the gesture-driven control of start and stop measure commands and by automatically determining and entering the feature type for line and circle features.

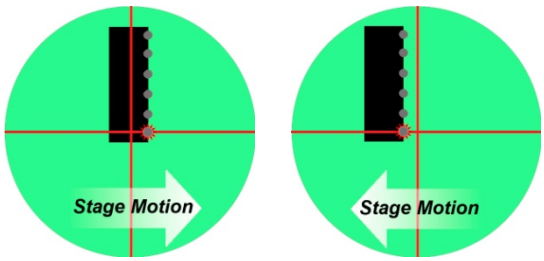
Note: It may be necessary to enable the Edge Logic function in the Mx200 setup menus. To enable EdgeLogic navigate to the Mx200 Settings, then access the setup screen called “Optical Edge” and set the enable flag for EdgeLogic to “Yes”.

To use the Edge Logic function:

- **Step 1:** Select the Auto Edge probe from the Probe menu.
- **Step 2:** Cross the same feature edge twice, once in each direction to start the measurement. The feature measurement will be initiated.



- **Step 3:** Probe the desired sequence of points to define the feature.
- **Step 4:** After probing the desired points for the feature, cross the same point twice in each direction to finish the measurement. The feature will be added to the feature list.



9 Additional Measurement Functions

9.1 Measuring an Angle from a Q axis(protractor)

Your Optical Compartor system may be equipped Q Axis protractor feature. This protractor can be used for simple angle measurement in the Mx200. Line up a leg of the screen crosshair with a line of an angle, then zero the Q axis on the readout, rotate the Q axis to the second leg of the angle. The Q axis of the readout will display the angle. To measure an angle using the Q axis and have it entered on to the feature list, follow the steps above, then press the angle key, then select the “Q” icon, the Angle feature will be added to the feature list.

9.2 Gage Circle Construction

Some measurements require inserting a theoretical diameter between two line features. To do this:

- **Step 1:** Measure the two line features. These line features should span a major axis of the measuring system.
- **Step 2:** Press the “Measure Circle” button and select the two lines from the feature list and then press “Enter”.
- **Step 3:** A prompt will be displayed where the diameter of the gage ball can be entered. Enter the desired Gage Diameter and press “Enter”. The newly constructed Gage Circle will be added to the feature list.

9.3 Gage Line Construction

Some measurements require inserting a theoretical distance(line) between two line features. To do this:

- **Step 1:** Measure the two line features. These line features should span a major axis of the measuring system.
- **Step 2:** Press the “Measure Line” button and select the two lines from the feature list and then press “Enter”.
- **Step 3:** Press the Change type button until the feature construction sub-type shows “Gage Line ?”.
- **Step 4:** Press the “Enter Key” and then enter the desired Gage Length into the field. Press “Enter”. The newly constructed Gage Line will be added to the feature list.

10 Additional Readout Settings

10.1 Configuring a footswitch and "Quick Keys"

The "Quick Keys" settings screen is where the mapping of Mx200 functions to keypad keys and footswitch buttons can be configured.

Number Pad

Use the Number Pad quick key page to assign a specific part program to a number key on the keypad. When assigned, that number pad key will automatically load and play the corresponding part program number. To assign a number from the keypad to a part program;

- **Step 1:** Select the "Number Pad" item from the Quick Keys settings menu.
- **Step 2:** Choose the number pad number you would like to assign your program to. "0" through "9" will be available for assignment.
- **Step 3: Pr**ess the "Assign" softkey.
- **Step 4:** At the next prompt enter the desired program number that you would like to assign the keypad number to.
- **Step 5:** Press the "Ok" softkey to confirm the selection.

Note: The Number Pad Quick Key loading of part programs will only be permitted while in the main DRO view. This is to prevent undesired calling of a program while using other Mx200 screen. While in the main DRO view press the number pad key associated with your program, it will be loaded and run.

Footswitch

Use the Footswitch quick key page to assign keypad button commands to button #1, button #2, or button #3 of the attached footswitch. To assign a footswitch button to a keypad button;

- **Step 1:** Select the "Footswitch" item from the Quick Keys settings menu.
- **Step 2:** Choose the Footswitch button number you would like to assign.
- **Step 3:** Press the "Assign" softkey.
- **Step 4:** A dialog will be displayed, "Press front panel key to assign.". Press the keypad key that you would like to assign to this footswitch button.
- **Step 5:** The same procedure can be repeated to configure footswitch button #2, and #3.

Automation and Metrology International, LLC
1-888-354-2525
auto-met.com