Mx200

Setup Guide

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1 Getting Started

The following sections will describe the package contents, readout specifications, mounting options, and basic machine hardware connections for the Mx200 readout.

1.1 Shipping Contents

The following components are part of your Mx200 digital Readout kit:

-Mx200 Device

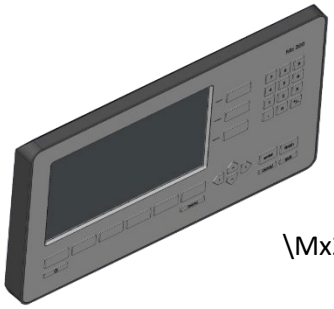
-Machine mounting option(Ball, Block, or Stand)

-Power supply module and Line Cord(US 2-LINE)

-Fiber optic accessories(optional)

-Encoder adapter cables(optional)

Note: It may be helpful to save the Mx200 packaging in the event the device needs to be returned to the manufacturer for repair or requires transport to a new location.



\Mx200 Device

\Fiber Optic Accessories

\Adapter Cables

\Mounting Option

\Power Supply

1.2 Mx200 Specifications

Display: 7" Color 1024 X 600 LCD, with an LED backlit capacitive touch screen.

Power: Power supply(included): 100-240VAC, 50/60Hz, 3.0A. Power Input to Mx200: 12V.

Agency Approvals: CE

DRO Dimensions: 286mm wide x 51mm deep x 162 mm high

DRO Baseplate Dimensions: 120mm wide x 125mm deep x 9.5mm high

Mounting Options:

OEM mount: Two *Riser Blocks* providing up to 4 distinct viewing angles, using (2) M6 threaded holes, spaced 38mm.

RAM ball mount: One *Riser Block* with 1.5" RAM Ball.

Base plate: Base Plate with two *Riser Blocks* providing up to 4 distinct viewing angles from the base.

1.3 Hardware Installation and Connections

The following section describes how to connect;

Mounting hardware(A)

Power Connection(B)

Encoder Connections(C)

Optical Edge Cabling(D)

A. Mounting hardware installation:

Note: It is important that the Mx200 device is operated from a secure and rigid mounting location. While the supplied Metlogix mounting hardware may serve as an adapter piece toward that installation, it is the installation technicians' responsibility to ensure complete and safe installation of the device.

- Select the appropriate mounting method from the 3 options below.

OEM Mount Installation:

Using a 3MM Allen wrench and the supplied M6 screw, connect the riser block to the opening on the rear panel of the Mx200. The hole spacing is 38MM with a ¼"-20 thread pattern. Screws required to connect the OEM mount to the machine mount are not included in the Mx200 mounting kit.

Ball Mount Installation(1.5" Ball):

Using a 3MM Allen wrench and the supplied M6 screw, connect the riser block/ball mount module to the opening on the rear panel of the Mx200.

Base Mount Installation:

Using a 3MM Allen wrench and the supplied M6 screw, connect the riser block to the opening on the rear panel of the Mx200.

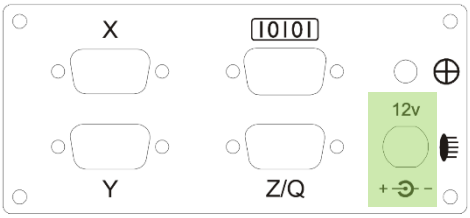
Using a 4MM Allen wrench and the (2) supplied M6 screws, connect the supplied stand to the riser block.

- Complete the Mx200 readout installation according to the recommended mounting technique for the measuring system being used.

- For standard “benchtop” installations place the Mx200 readout on a flat stable surface within reasonable operating distance from the measuring system.

B. Power Connection:

- Attach the supplied 12V(Positive Tip)power supply connector to the power input port on the Mx200 readout.



- Connect the supplies 2-wire line cord cable to a stable 110/220 AC power source.

- **IMPORTANT**: The Mx200 digital readout is **NOT** designed to be powered off instantaneously by removal of the power supplied to the unit. As such the power supply to the Mx200 should be connected directly to a power source, and not to an intermediary power switch. To power off the Mx200 correctly long press the power button on the front keypad and press the "Power Off" button displayed at the right side of the main Mx200 screen.

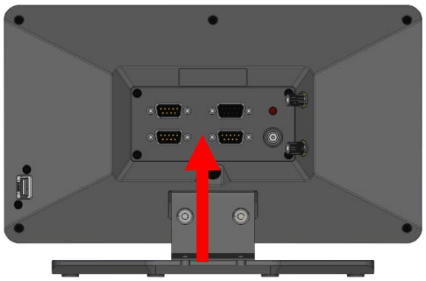
C. Encoder connections:

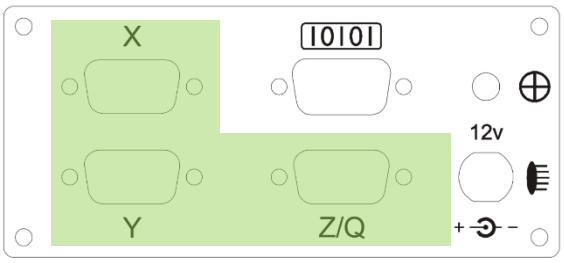
The Mx200 is designed to accept input from 1, 2, or 3 analog or TTL encoders. These encoders are typically arranged according to the major axis of the measuring system in which they are mounted; X, Y, and Z(or Q Rotary/Protractor).

IMPORTANT: All Mx200 readouts are designed to accept either TTL or Analog input from the connected encoder. It is however critical that the correct signals be connected between the encoder and the Mx200 to avoid damage to the MX200 and/or the encoder. Please ensure that the encoder connections to the Mx200 have been verified as compatible by an authorized Metlogix OEM prior to installation.

- Ensure that the Mx200 is powered off prior to connecting any encoders.

- Locate encoder terminations from the measuring system and connect them to the X, Y and Z(Q) encoder inputs on the back of the Mx200 as seen below.





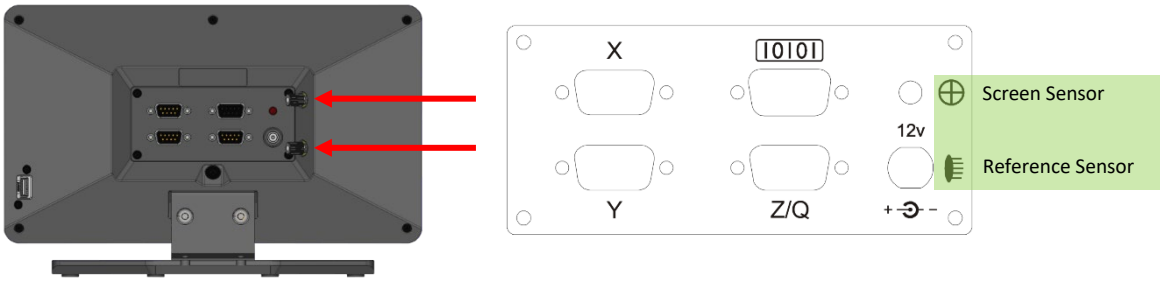
NOTE: Secure all encoder connections tightly to the standoffs at the input connector to ensure complete communication between the encoder and the Mx200.

D. Optical Edge Cables

Optical Comparator Systems can be equipped with or without Optical Edge Sensor capability. The Mx200 is available either with or without the required electronics to support these sensors. This can be determined by inspecting the rear panel of the readout chassis and checking whether the (2) fiber optic terminals are present.

NOTE: Please contact your Metlogix OEM or representative in the event you require optical edge support but your Mx200 Readout is not equipped with the required optical edge interface.

- The Mx200 is equipped with (2) optical inputs for receiving light levels from the Optical Comparator. Connect the Screen and Reference channel from the optical comparator to the Mx200 Optical Inputs.

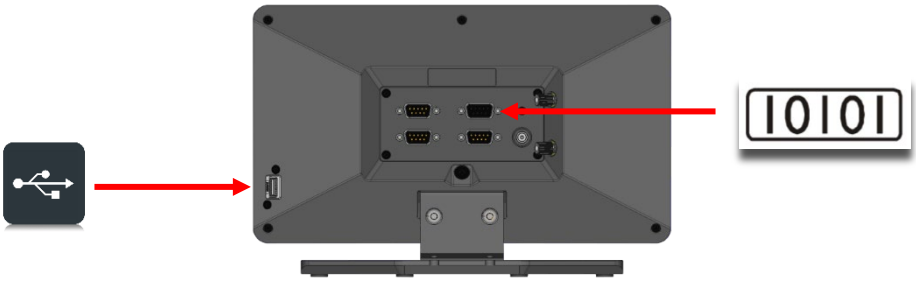


<u>Reference Channel:</u> The reference channel should be connected from the Comparators' lamp housing light source to the lower connector on the back of the readout.

<u>Screen Channel:</u> The screen channel should be connected from the fiber optic termination at the Comparators' measuring screen to the upper connector on the back of the readout.

A. USB and RS232 Port Connections

- The Mx200 is equipped with both a USB port and a 9 pin general purpose IO port to support data transfer to external storage drives, and PC systems(RS232). These connections will be described later in this document within the setup sections for Printing, and Data and Settings transfer to USB.



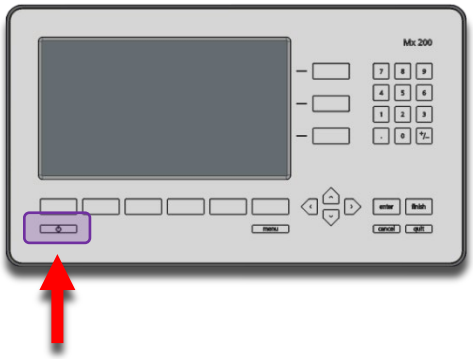
2 Mx200 Software Setup

The following section will describe the basic setup parameters for configuring the Mx200. Not all setup screen items will be addressed in this section. Additional setup screen settings and procedures will be described in Section 4, “Additional Setup Screens”.

QUICK START: Follow the Green Ribbons through this document for the steps to Quick Start Basic Setup of the Mx200 readout. While these steps can help quickly achieve initial machine setup, the additional settings and features described below can always be configured alongside these basic setup steps.

2.1 “Power On” the Mx200 readout.

Press the “Power Button” located in the bottom left corner of the Mx200 keypad.

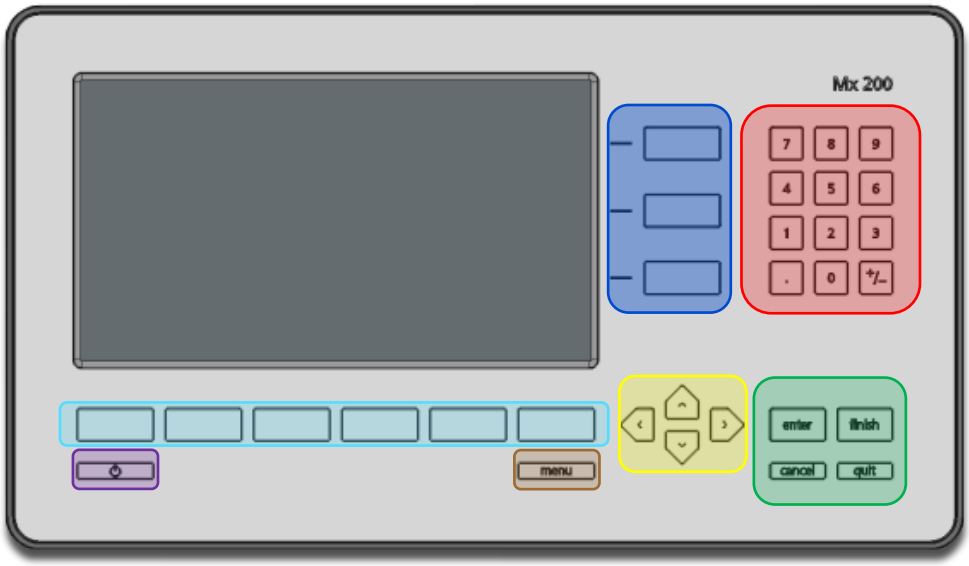


Allow Mx200 boot sequence to complete. Once the Mx200’s main DRO view is displayed you can continue with the setup procedure.

2.2 Navigating the Mx200 with Keypad and Touchscreen Controls

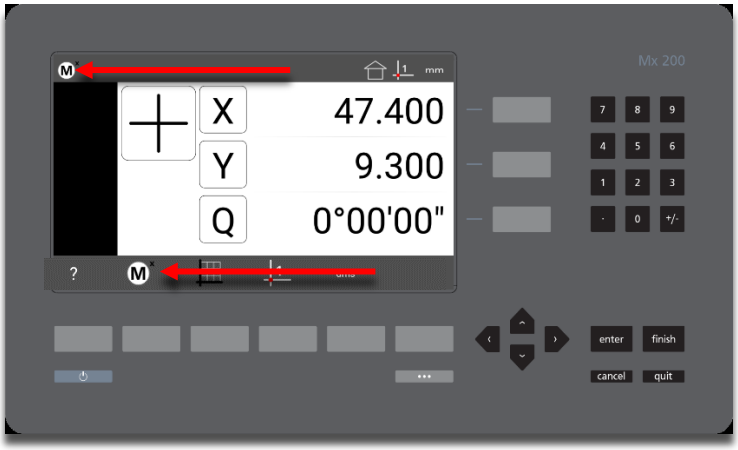
The Mx200 User Interface can be navigated by touchscreen control, by keypad button control, or a combination of both. This dual input mode support applies to both the setup screen menu’s as well as the main measuring modes of the readout

Description of keypad button functions can be seen below;

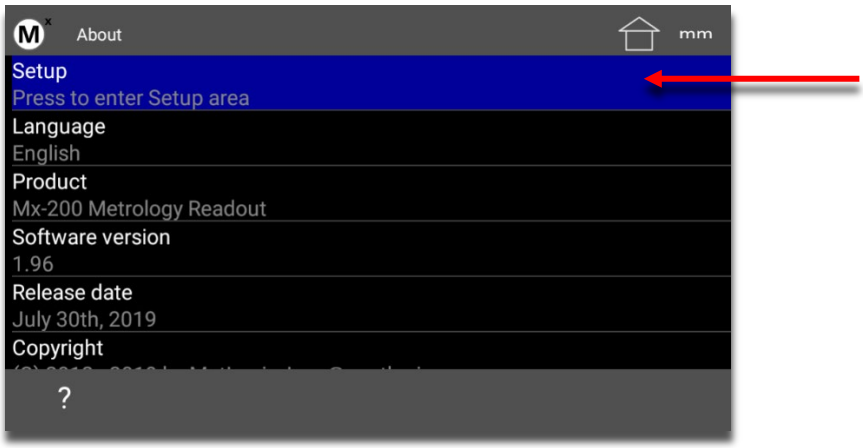


Keys	Function
Number Pad	Enter numeric digits, decimal points, and sign(+/-)into the current field.
Command Keys	Enter - Select data entry field or setup menu item. Finish - Confirm selected function or setup menu item. Cancel -Navigate up one level from current setting menu. Quit – Exit the current 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.

ENTERING SETUP: Enter the Mx200 Information and Setup Screens by pressing either the touchscreen "Mx" button in the top left corner of the screen, or by pressing the "Menu Button" and then choosing the "Mx" softkey button.



Once in the Information screen, the first menu item called "Setup" will grant access to the setup menu items. The remaining items listed provide information about the Mx200 readout itself, including;



Menu Item	Description
Setup	Press to access the main Setup Menu.

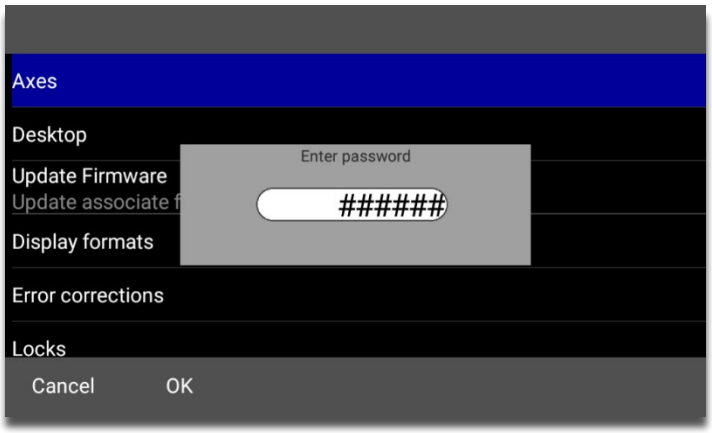
Language	Press to select desired display language.
Product	Displays the Product Description.
Software Version	Displays the Mx100/Mx200 software version.
Release Date	Displays the Release Date of the Mx200 software currently running.
Copyright	Displays Metlogix Copywrite Information.
Options	Displays the currently enabled software/hardware options in the system.
Hardware version	Displays version numbers for installed hardware code. App, Boot, FPGA, MB, and Edge.
Serial Number	Displays the serial number of the Mx200 unit in the format[XXXX-XXXX-XXXX].
Exit Settings	Press to Exit the Mx200 Readout Application.

2.3 Supervisor Password Protection

IMPORTANT: Many of the settings configured in the Mx200 require password authentication in order to modify them. In general, settings relating to the initial configuration and calibration of the readout will be password protected. Settings that behave more like User Preferences are typically not password protected.

Settings in the setup menu that appear with a blue "lock" icon require password entry prior to modification. Most important machine configuration settings fall into this category. Use the procedure below to enter the Supervisor Password and unlock the system setup screens.

1



To enter the Mx200 password;

- Navigate to the Setup Menu and Scroll to the Password menu item.
- Press Enter and then key in “XXXXXX” using the numeric keypad.
- Press “Finish” to confirm the entered password.
- A small message should appear briefly indicating “supervisor mode”.
- To Remove the password, simply highlight the “Password” settings item and press the “Right Arrow” key. A small message should appear indicating “user mode”.

2.4 The Setup Menu

Most setup parameters in the Mx200 are configured using screens and data entry fields accessed via the setup menu items. Highlighting a setup menu items and pressing “Enter” grants access to that menu items’ submenu or displays a numeric entry field(or softkey option) for modification of that particular parameter.

The Mx200 setup menu is easily navigated using the following step;

- Press the MENU key(Mx Button).
- Highlight the Setup Menu item and press “Enter”.
- Scroll to the desired setup screen and press “Enter”.
- Highlight the desired setup parameter and press “Enter”.
- Use the keypad for numeric entry, or the softkeys to select setting for that parameter.
- Press the “Finish” key until the Setup Menu is fully exited.

2.5 System Settings Import/Export

The Mx200 readout has the ability to Import or Export a System Settings file from an attached USB drive. This allows for quick and convenient loading of previously configured setup parameters to an un-configured Mx200 readout. This also allows backups of existing parameter sets to be stored for use on another device, or as a settings backup for the current device.

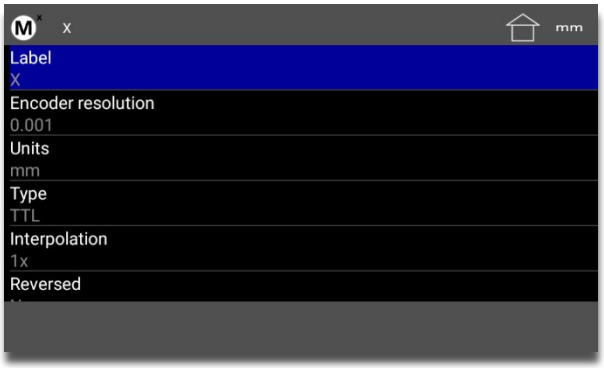
To Import or Export an Mx200 settings file from the USB port;

- Put a USB storage device into the USB port of the device. If Importing a settings file, ensure the Mx200 settings file is at the root of the USB device.
- Press the MENU key(Mx Button).
- Highlight the Setup Menu item and press “Enter”.
- Scroll to the “System” setup screen and press “Enter”.
- Select the “Import Settings” softkey to Load a settings file from USB, or the “Export Settings” softkey to store your current settings to the USB device
- Confirm your selection by Pressing the OK or Cancel softkey

2.6 Encoder Settings

Proper configuration of the encoders in the Mx200 setup is critical for achieving accurate measuring results from your machine. Encoder Resolution and Encoder Count Direction are the two most important settings for achieving this accuracy. Additionally, systems requiring advanced Stage Error Correction methods such as SLEC or NLEC will require that Reference Marks also be configured, to ensure reliable identification of the machine coordinate zero position each time the machine is used.

NOTE: All settings described below apply to the X, Y, and Z axis setup in the Mx200. The descriptions below may reference a particular axis but are intended to apply to each axis, X, Y, or Z. **The Q(Rotary) Axis Encoder Resolution** contains an additional teach function which will be referenced separately below.



Specify the signal type, encoder resolution, and direction for the encoder being configured. Verify that the encoder displacement and direction of travel are correct using some know standard of size and observing the major directions for part coordinates relative to the measuring image of the system.

2

(X)Axes Menu	Description
Label	Press Enter to specify a new single character Axes Label for the selected axis.
Encoder Resolution	Press Enter to display the encoder resolution entry field for the selected axis. Enter the desired encoder resolution and press “OK” to confirm.
Units	Select the IN or MM softkey to specify the Unit type for the entered encoder resolution(specified above).
(Signal)Type	Select the softkey for the encoder type you are interfacing to the Mx200. -TTL/1VPP/11uA/Nikon/Mitutoyo
Interpolation	Select the softkey that corresponds to the desired Interpolation Factor for your Analog encoder. Consult the encoder specification for information on what Resolution and Interpolation combination to use. The Mx200 supports 1X, 5X, 10X and 16X Interpolations Settings.
Reversed	Select the Yes or No softkey to invert the counting direction of your encoder. To reverse the direction from “current”, simply invert the Yes/No settings.
Startup Zero	Select the desired Startup Zeroing method based on the encoder reference mark technology and machine configuration requirements for the installation. -None/Hardstop/One Ref/2 Ref(Distance Encoded)
Ref Mark Direction	Select the Positive or Negative Pulse softkey to invert the reference mark active state for detection. To reverse the direction from “current”, simply invert the Positive/Negative settings.

Ref Mark Source	Only relavent when “Distance Encoded(2Ref)” startup zeroing method is configured. Specifies whether the Standard or Acurite Algorithm is used.
Ref Mark is Angular	Select the Yes or No softkey to specify a ref mark configuration for rotary encoded axes. Set to “No” for typical linear encoders.
Ref Mark Pitch	Press Enter to set the Reference Mark Pitch as indicated by the specification for your encoders.
Ref Mark Fixed Increment	Press Enter to set the Reference Mark Fixed Increment as indicated by the specification for your encoders.
Machine Zero Offset	Press Enter to display the Use Stage Position softkey or dialog option. Press Enter to calculate the offset(in counts) between the startup zero postion and the current stage position.
Report Scale Errors	Select the “Yes” or “No” softkey to enable or disable scale error reporting.

To teach Q Axis Rotary Encoder Resolution:

- Access Setup and enter the Supervisor Password.
- Navigate to the Axes setup screen.
- Select the Q Axis menu item.
- Select the Encoder Resolution menu item.
- Press the Softkey labeled "Teach".
- Follow the on-screen prompts to teach Q.

A NOTE ABOUT STAGE CORRECTION AND REFERENCE MARKS: The SLEC and NLEC stage calibration functions require that a repeatable startup zero position be established prior to calibration and each time the Mx200 readout is started. This position can be established by configuring either Single, or Dual Reference marks in the Encoder Setup Screen. When configured the operator will be prompted to cross the reference marks for each enabled axis at startup.

Configure Machine Zero Offset and Verify Reference Mark Startup Position

- Configure and verify the correct encoder resolution and count direction for all axes.
- Set the Reference Mark type correctly for each encoder being configured.
- At the Main Mx200 Settings screen press the “Set Home Position” button located at softkey 1. Pic
- Cross the reference marks for each enabled axis, as prompted.
- Position the stage at the desired startup zero position in each axis being configured. Place some artifact within the measuring view and align it with the center crosshair position.
- Enter Setup, Axis Setup, Choose X Axis, and then select the Menu item called “Machine zero offset”
- Press the “Use Current Position” button to set the offset(in counts) from the detected startup encoder position to the current stage position.
- Repeat the previous (2) steps for each axis configured for reference marks.
- Restart the Mx200 and cross reference marks at startup. Position the crosshair at you comparison artifact location and verify that the stage position reports zero in the readout for each enabled axis.
- Drive to a new stage location and repeat the step above, again verifying machine zero at startup.

2.7 Optical Edge Sensor Setup and Calibration

Note: Systems not equipped with an Optical Edge Sensor support can skip this section and proceed to section 2.8. Systems equipped with Optical Edge support must have the Factory Option enabled prior to proceeding. Verify using the following setup screen sequence;

Mx Button-->Setup-->Enter Password-->Factory Options-->Verify the Optical Edge item is set to “Yes”

Verify that the Screen and Reference Fiber Optic cables are mounted on the measuring machine according to the manufacturer specification and connected to the correct fiber optic inputs on the Mx200 readout. See section 1.3 D for more information. Perform the reference fiber adjustment and optical edge sensor calibration steps below.

3

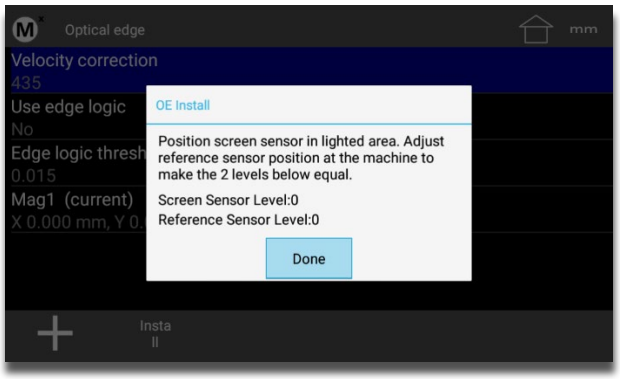
Adjusting reference fiber positioning

- Access the Optical Edge setup screen at;

  Mx Button-->Setup-->Optical Edge

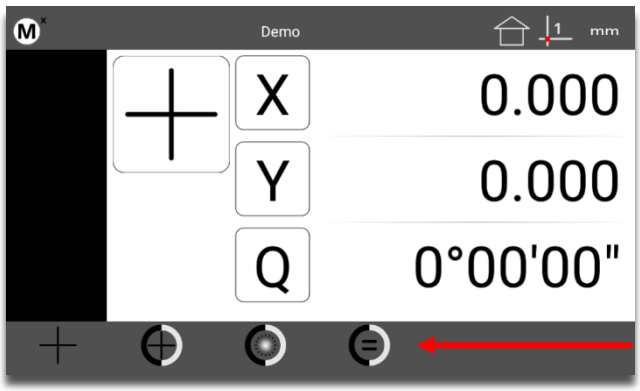
- Press soft key 2 to access the light level "Install" screen.
- Follow the instructions in the prompt, adjusting the position of the reference fiber in the machine lamphouse until the Screen Sensor Level and Reference Sensor Level are "nearly" equal. These two values do not need to be exactly the same but should be close.

Important: Both the Screen Sensor Level and Reference Sensor Level should be below a value of "1000". If the Reference Sensor Level is at 1000 you made need to position the lamphouse fiber pointing further away from the light source or add an additional attenuation device at the fiber optic termination.



Calibrating the Optical Edge Sensor

- Select the Optical Edge teach button from the Probe Menu(softkey 4).



- Follow the instructions displayed in the teach dialog, positioning your sensor in the light, the dark, and finally in the light again.
- Once the teach is complete press the Done button to finish the edge sensor calibration procedure.

The system should not be prepared to enter edge positions with the Auto Enter and Manual Edge probe mode.

Adding Additional Magnifications

In some cases more than one lens(magnification) will be used with a given measuring system. Each one of these lenses can be calibrated independently for the storage and recall of taught edge values, lens to crosshair offsets, and distance calibration(edge correction).

New magnifications are added and configured via the Optical Edge setup screen

Mx Button-->Setup-->Optical Edge

Add a new magnification by pressing "+" button(softkey 1).

Screenshot

Name the new magnification and press OK. You should now be viewing the settings for the new magnification.

Mag Menu Item	Description
Name	Displays the name assigned to the current magnification. Press to rename the magnification.
(X/Y)Edge to Xhair Offset	Press to Enter the X and Y offset between the current optical edge sensor position and the current position of the screen crosshair.

Distance Calibration Offset	Enter the edge error correction offset value for the current magnification. The reported position for an edge crossing will be offset by the amount entered, in either in the direction of “light” or in the direction of “dark”, depending on the sign of the entered value.
Edge Parameters	Displays the current gain and pot values for the screen and reference channels as well as the screen offset value. These values are the result of the most recent optical edge calibration.

There are also two softkey functions available from the Mag setup screen.

- Use the “Red X” button at softkey 1 to delete the current magnification from the system.
- Use the “Import Crosscal” button at softkey 2 to import circle measurements for automatic calculation of the X and Y “Edge to Xhair offsets” for the current magnification. Prior to executing ensure that there are only 2 circle measurements in the feature list, one measured with the optical edge probe and one measured with the crosshair.

2.8 Setting Display Resolution and Format

The Mx200’s default display resolution is .001 millimeters and .0001 inches. This display resolution value applies to both the current DRO position and to the coefficient results of measured and constructed features. The display resolution can be changed for MM, Inch, DD(Decimal Degrees), and DMS(Degrees Minutes Seconds) unit types using the Display Formats setup screen.

4

- Access the “Display formats” setup screen at;

  Mx Button-->Setup-->Display Formats

- Select the Unit Format item you would like to modify.
- Enter the desired display resolution into the entry field and press OK.

Display formats menu	Description
Display Res for Inch	Press Enter to specify the Display Resolution for Inch Units.
Display Res for MM	Press Enter to specify the Display Resolution for MM Units.
Display Res for DMS	Press Enter to specify the Display Resolution for Degrees Minutes Seconds(DMS) Units of measurement results.
Display Res for DD	Press Enter to specify the Display Resolution for Decimal Degrees(DD) Units of measurement results.
Display Res for Q Axis DMS	Press Enter to specify the Display Resolution for Degrees Minutes Seconds(DMS) Units for connected Q encoders.
Display Res for Q Axis DD	Press Enter to specify the Display Resolution for Decimal Degrees(DD) Units for connected Q encoders.
Q Display Range	Press Enter to select Q Axis angle display format. Use softkey 1 or softkey 2 to select the desired output format. **+/- 180 deg or 0-360 display mode**

3 Error Correction

Stage Error Correction can be entered into the Mx200 systems by two different methods. Either the error correction data is entered(imported) directly through the error correction interface, or the correction data is imported from an existing correction file.

The following section will describe the process of entering stage calibration data into the Mx200. Squareness, LEC, and SLEC corrections are all executed by collecting actual measurement results(observed) from the measuring system, and then entering the results directly into the appropriate calibration screen. The nominal, or certified, geometries(actual) for the calibration artifact being used are also entered into the system.

Note: There are multiple methods and procedures by which the error correction data for Squareness, LEC, SLEC, and NLEC can be collected. While some sample procedures for calibrations have been provided below, these sections are intended more to provide the procedure by which the correction data is entered in the Mx200, not necessarily how it is collected.

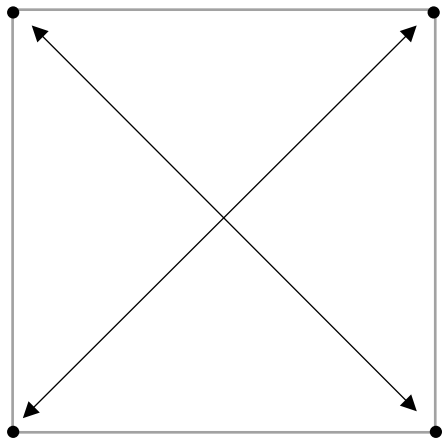
3.1 Entering Squareness Correction

The squareness calibration in the Mx200 applies a linear correction coefficient based on a calculated correction angle. This calculated correction angle should reflect the actual amount of mechanical squareness error in the system.

The squareness error of a system can be measured by using a large calibrated square artifact that covers as much of the machines valid measuring area as possible.

- Measure the four sides of the squareness calibration artifact as line features.
- Construct a point intersect at each corner.

- Construct a distance between each diagonal point pair as seen below.



- Take note of the Length(L) coefficient result for each constructed distance.
- Access the Squareness error correction setup screen.
  Mx Button-->Setup-->Error corrections-->Squareness-->XY Squareness
- Enter the (2) recorded Length(L) results into the Tangent and Radial Length fields. After entering the Lengths into the fields the “Squareness angle” field should get updated to reflect the current squareness correction angle.
- Set the Enable flag to Yes to activate the squareness correction.

Note: Squareness correction will provide no improvement to the overall calibration of the system if Non-linear Error Correction(NLEC) will also be applied in the system.

3.2 Entering Linear Error Correction(LEC)

Linear Error Correction(LEC) in the Mx200 applies a linear correction coefficient to the DRO position reading for any single axis of travel. This calculated correction should reflect the actual amount of machine/encoder error in a single axis, across the full range of travel of the machine.

LEC is entered into the Mx200 as 2 distinct values, “Standard” and “Observed”. The standard value is the nominal or certified length of the increment to be used from your calibration artifact, and the observed value is the actual measurement that the Mx200 produces from that same increment.

- Align the calibration artifact to be used along the axis to be calibrated.
- Measure a feature at each end of the calibration artifact and execute a “skew” alignment between the features. You can also directly probe a skew feature along the artifact.
- Using the simple crosshair, probe a point at the start of the segment to be used for correction.
- Travel the distance of the machine axis and calibration artifact and take a point with the crosshair precisely at the end of the known segment of your artifact.
- Construct a distance between the two points and take note of the X or Y component of the distance result (depending on the axis being calibrated).
- Navigate to the LEC correction setup page for the axis you are calibrating.
  Mx Button-->Setup-->Error corrections-->LEC-->X or Y LEC

- Enter the (2) values into the “Standard” and “Observed” menu items. The standard value will be the nominal or certified length of the segment used from your calibration artifact. The observed value will be the measured X or Y distance from noted from step 5 above.
- Set the Enable flag to Yes to activate the LEC correction for that axis.

3.3 Entering Segmented Linear Error Correction(SLEC)

Segmented Linear Error Correction(SLEC) applies a linear correction coefficient to a the DRO position reading for a specific segment of travel within the full range of a given machine axis. This calculated correction should reflect the actual amount of machine/encoder, for a particular segment within the range of travel of a machine axis.

SLEC is entered into the Mx200 as 2 distinct values, “Standard” and “Observed” for each segment being corrected. The standard value is the nominal or certified length of the segment from your calibration artifact, and the observed value is the actual measurement that the Mx200 produces from that particular segment.

- Align the calibration artifact to be used along the axis to be calibrated.
- Measure a feature at each end of the calibration artifact and execute a “skew” alignment between the features. You can also directly probe a skew feature along the artifact.
- Zero the X or Y position of the first feature in your string of correction segments.

- Starting at zero, measure a point(or feature) at the start and end of each of the segments to be used in the SLEC correction.
- Construct distances between each of the feature pairs that make up the segments of your correction length. Take note of the X or Y component of each distance result.
- Navigate to the SLEC correction setup page for the axis you are calibrating.
  Mx Button-->Setup-->Error corrections-->SLEC-->X or Y SLEC.

Note: The supervisor password is required in order to add SLEC segments to the system. If the "+" key is not displayed within the X or Y SLEC screen, please verify that the supervisor password has been correctly entered into the system.

- Press the "+" softkey button to add your first segment.

- Enter the "Standard" and "Observed" values into the fields for Segment 1. The standard value will be the nominal or certified length of the segment being calibrated. The observed value will be the actual measured X or Y distance for that same segment.
- Repeat the previous 2 steps for each segment to be calibrated.
- Enter the "Mapping offset" for the axis being calibrated into the "Mapping offset" field. The Mapping offset should be set to the distance between the startup machine zero position and the zero position of the calibration artifact that was used to collect the correction data.
- Set the Enable flag to Yes to activate the SLEC correction for that axis.

The procedure above can be repeated for each axis that needs to be calibrated.

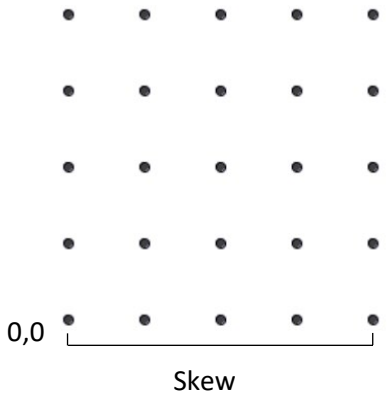
3.4 Entering Non-Linear Error Correction(NLEC)

Non-Linear Error Correction(NLEC) corrects for non-linear stage inaccuracies that may be present in a system. This error correction method compares the positions of a series of measurements, collected across the XY measuring range, to a matching list of certified or nominal positions for those measured features. The result is an XY "error map" that reflects the non-linear errors of the system. In general, the higher the density of calibration features(row and column count), the more resolute your "error map" will be.

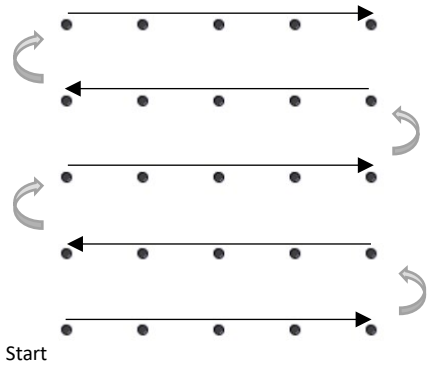
NLEC data can be collected and entered interactively, performing measurements and recording results manually, or by running a part program that has been authored to guide the collection of NLEC data through the Mx200 programming system. In either case the NLEC correction is entered into the system by importing features from the feature list.

The steps below can be used to collect feature measurements for NLEC import;

- Position the NLEC calibration artifact to be used on the measuring stage, ensuring approximate alignment of the grid to the travel of the X and Y axis.
- Measure a feature at each end of the bottom row of features on your calibration artifact and execute a “skew” alignment between the features. You can also directly probe a skew feature along the artifact.
- Zero the X and Y position of the feature at the bottom left corner of your calibration grid.
- The established skew and zero should appear as follows;



- Delete the skew and circle features from the feature list, and then proceed to measure all of the grid features in serpentine order starting from the bottom left, as seen below;



- Using the Mx200 tolerancing screens, set the nominal(or certified) X and Y position for each feature in your grid, starting with (0,0).
- Navigate to the NLEC correction setup page.
  Mx Button-->Setup-->Error corrections-->NLEC.
- Press the Import softkey to import your NLEC features.
- After the “NLEC Import Successful” message the correction should become enabled automatically.

The Mx200 can also configured to guide the user in the creation of an NLEC program. To enable the **NLEC Program Assist mode** navigate to the NLEC correction setup page and press the “Generate program” menu item.

Mx Button-->Setup-->Error corrections-->NLEC-->Generate program

Enter the following information about your NLEC calibration program.

Generate NLEC Program Menu	Description
Program Name	Assign a program number for the NLEC program to be generated.
Feature Type	Select whether point features or circle features will be probed for the calibration.
Probe Type	Select which probe will be used to measure the calibration features.
Number of Rows	Enter the number of rows that will be measured from your calibration grid.
Number of Columns	Enter the number of Columns that will be measured from your calibration grid.
Row Spacing	Enter the spacing between each row in your calibration grid.
Column Spacing	Enter the spacing between each column in your calibration grid.

4 Additional Setup Screens

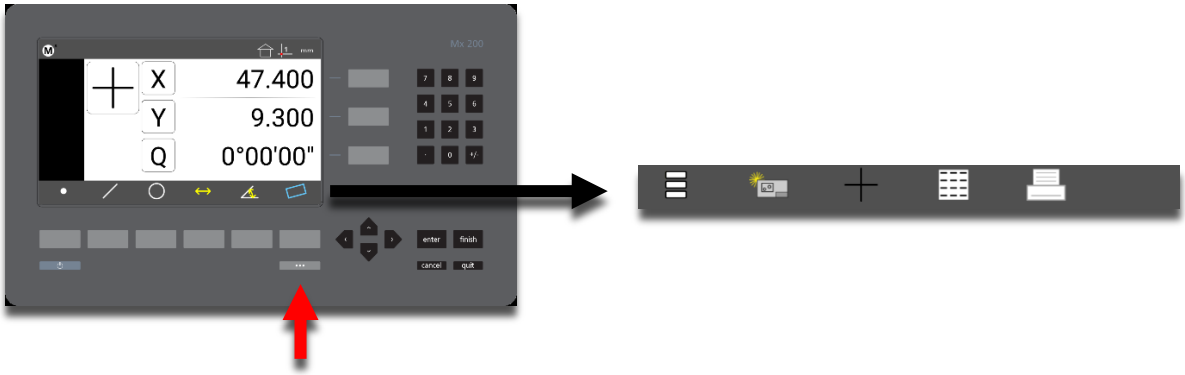
Additional Mx200 configuration can be completed using the setup items found in the setup screens described in this section.

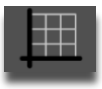
Additional Setup Menus	Description
Desktop	Contains settings that format the look of the main measuring interface, in particular the settings to display or hide button functions from the toolbars.
Locks	Contains “lock” settings for restricting access and functionality in the system.
Measure	Contains settings for Forward and Backward Annotation modes as well as the crosshair autostart measure functionality(xHair Mode).
Printouts	Contains settings for formatting the printing of measuring results.
Programs	Contains settings pertaining to part program playback.
Quick Keys	Contains settings for configuring hotkey assignments for the number pad and Footswitch input buttons.
RS232	Contains settings for configuring the RS232 port for communication with another device.
Sounds	Contains settings to effect the Mx200’s internal beep tone.
Tolerances	Contains settings related to feature tolerancing.

4.1 Desktop Settings

The Desktop settings screen primarily consists of toggles for “showing” or “hiding” various function buttons from the top and bottom toolbars and “Extra Functions” menu. Most of the items can be set to Top, Bottom, or Both referring to which toolbar the button will be displayed in.

Note: 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	Mag1	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	1	The Ref Frame button toggles the Abs/Inc datum frame.
DMS/DD Button	dms dd	The DMS/DD button toggles between Degrees Minutes Seconds and Decimal Degrees mode.
Setup Button		The Setup button navigates to the Mx200 setup screen.

The Switch to Home Movement Threshold configures the number of encoder counts required to switch the readout view back to “Live DRO”. For cases where the view is switching without moving the stage intentionally the Threshold value should be increased.

The Touchscreen Enable flag will enable or disable touchscreen functionality in the Mx200 readout.

4.2 Locks

Locks Function	Description
Android Navigation Locked	Locks out access to the Mx200 Operating System.
Exit Application Locked	Locks out the ability to exit the Mx200 readout application.
Full Setup Locked	Locks out access to the Mx200 setup screens.
Program Editing Locked	When enabled part programs cannot be edited without the supervisor password.

4.3 Measure

Forward/Backward Annotation mode

The Measure settings screen contains the Annotation Mode settings for Mx200 measurement. By default the Mx200 is in “Backward” annotation mode.

-In “Backward” annotation mode measurements are completed when the operator presses the Finish key.

-In “Forward” annotation mode measurements will be automatically finished or completed, when the specified number of points have been probed for a given feature type.

- Set the desired mode, Forward or Back, by selecting the softkey menu button.
- Specify the number of points, by feature type, where the measurement should be completed automatically. Highlight a feature type, press “Enter”, and then specify the number of points for that feature.

Using the xLogic function for crosshair measurements

xLogic mode is disabled by default. When enabled the “Enter” key will automatically start a measurement. As points are added to the measurement the Mx200 will actively determine the intended feature type, based on the positions of the points entered. Double press “Enter”, or press “Finish” to complete the measurement.

To enable the xLogic function, highlight the menu items and press the softkey menu item labelled “Yes”.

4.4 Printouts

The “Printouts” settings screen contains settings that format the report view printout that is generated from the Mx200 Print function.

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.

4.5 Programs

The “Programs” settings screen contains settings that impact program playback in the Mx200.

User Recorded Edge Mode

Part programs in the Mx200 will automatically select the Manual Edge Probe for the first feature of playback. This is done as a convenience to help prevent unintentional entering of edge positions, while positioning your sensor to begin playback.

Note: Throughout program playback the current probe can always be changed by selecting it from the probe menu.

- To prevent the Mx200 from setting the startup probe, and to instead always use the recorded probe type, set the “User Recorded Edge Mode” setting to “Yes”

Probe Active Threshold

The “Probe Active Threshold” defines the zone(as a diameter)around a target edge position in playback, where the probe becomes active. The probe active state is identified by a green “playback position dot”. When green the Mx200 playback system will freely accept entered edges to the system. When the playback position dot is red, edge points will not be entered into the system.

- Set the threshold value by selecting the menu item, entering the numeric value for your size of your playback active zone, and then pressing the “OK” softkey

4.6 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;

- Select the “Number Pad” item from the Quick Keys settings menu.
- Choose the number pad number you would like to assign your program to. “0” through “9” will be available for assignment.
- Press the “Assign” softkey.
- At the next prompt enter the desired program number that you would like to assign the keypad number to.
- 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;

- Select the “Footswitch” item from the Quick Keys settings menu.
- Choose the Footswitch button number you would like to assign.
- Press the “Assign” softkey.
- 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.
- The same procedure can be repeated to configure footswitch button #2.

4.7 RS232

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

4.8 Sounds

The “Sound” settings screen contains setup parameter for the Mx200’s internal beeper mechanism.

Sound Function	Description
Enable Sound	Set to Yes or No using the corresponding sofkey to enable or disable the Mx200 beep sound.

Keypress Beep Length	Configures the beep length of the Mx200 beeper. Set to 50, 100, 150, or 200 milliseconds using the appropriate softkey.
Long keypress beep length	Configures the long press beep length of the Mx200 beeper. Set to 50, 100, 150, or 200 milliseconds using the appropriate softkey.
Invalid keypress beep length	Configures the invalid press beep length of the Mx200 beeper. Set to 50, 100, 150, or 200 milliseconds using the appropriate softkey.

4.9 Tolerances

The “Tolerances” settings screen contains setup parameter for configuring the tolerance capability in the Mx 200.

Use ++/-- Tolerance Mode

The Mx200 supports the alternate tolerance mode, ++/-- tolerancing. To enable the ++/-- mode press the “Yes” softkey. Tolerances will now be specified as ++ or --.

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10. General Provisions

If any part of this Agreement is found void and unenforceable, it will not affect the validity of the balance of this Agreement, which will remain valid and enforceable according to its terms. This Agreement may only be modified in writing, signed by an officer of MetLogix, Inc. The English version of this Agreement will be the version used when interpreting or construing this Agreement. This is the entire Agreement between MetLogix and you relating to the Software and it supersedes any prior representations, discussion, undertakings, communications, or advertising relating to the Software.

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For U.S. Government End Users, MetLogix agrees to comply with all applicable equal opportunity laws including, if appropriate, the provisions of Executive Order 11246, as amended, Section 402 of the

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