MetLogix

M¹

Optical Edge and Crosshair Software

User's Guide

M1 Optical Edge and Crosshair Software User's Guide

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.

Introduction

The M1 software user guide describes the operation of the M1 precision measuring software. The M1 software 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 M1 system, the concepts explained here are applicable to all M1 systems. For example, M1 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 axis system.

M1 Part Inspection Software

The M1 software is advanced metrology software for performing two and three axis measurements at very high levels of precision and accuracy. 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 a color touchscreen.

Part feature points are entered manually using a simple crosshair probe, or automatically using optical edge detection. The probes include:

- **Simple crosshair**
  Used for manual point entry.
- **Manual optical edge detection**
  Identifies the location of a point as the optical crosshair probe crosses an edge, the point is then entered manually by the user.
- **Auto edge detection**
  Identifies the location of the point as the optical crosshair probe crosses an edge, and then enters the point automatically.

Feature Detail screens display point cloud distribution, number of probed points and form error.

Prerequisites

Operators are assumed to understand dimensional metrology and have a good working knowledge of the Android operating system.

Getting Help

Help is available:

- In this guide
- In the electronic version of this guide accessed from the Help menu in the bottom toolbar of the About screen (M1 menu button)
- 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 M1 software version number
- Information describing the system hardware
- A detailed description of the problem and the steps that you've taken to resolve it

User Interface

The M1 Software interface consists of color touchscreens that include a feature list, function buttons and toolbars for performing and displaying measurements.

Screens

Primary screens of the software interface are:

- DRO (Home screen)
- Measure Feature
- Feature Detail
- Nominal Value Entry

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

Screen contents include:

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

DRO (Home Screen)

The DRO screen displays the current stage position and probe menu button. The Home screen is the default startup screen. To obtain this view from another screen, press the Home button.
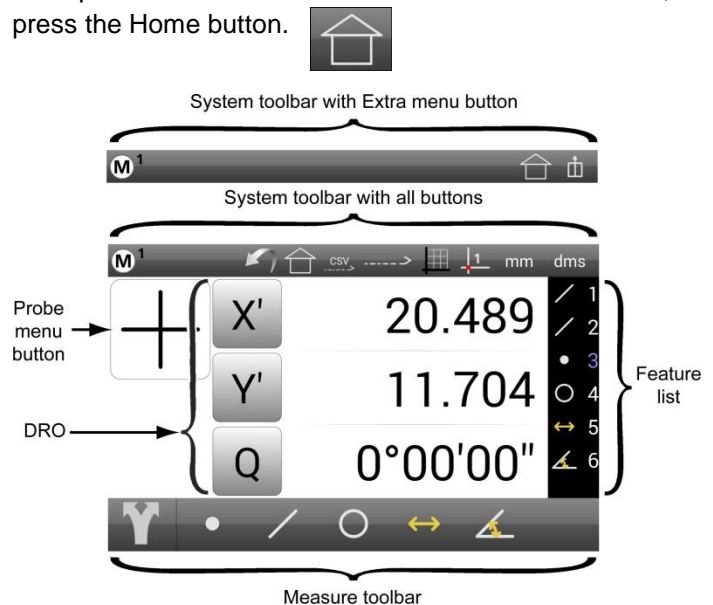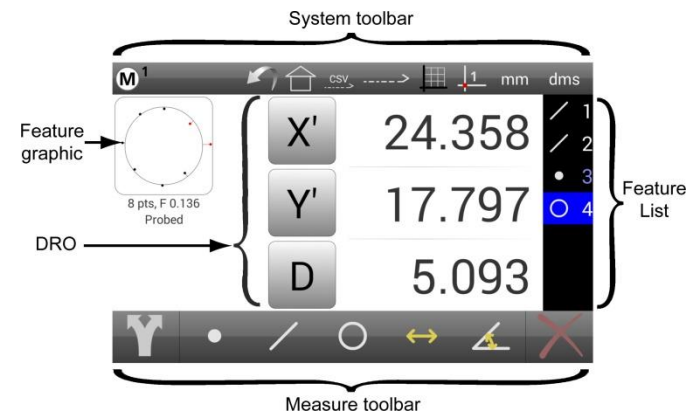
Measure Feature Screen

The Measure Feature screen displays the number of points probed, the Delete Point and Finish Measurement buttons and the current stage position. The screen is displayed when a feature measurement is initiated by pressing a Measure Feature button in the Measure toolbar.
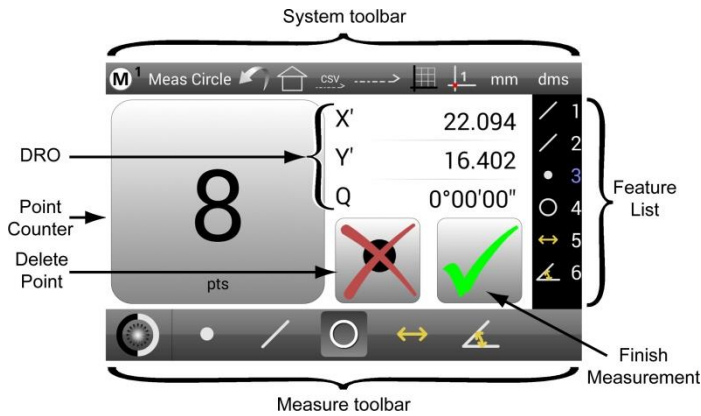

Feature Detail Screen

The Feature Detail screen displays the selected feature, the number of points probed, the form error, a graphic of the points probed and the feature position and dimension parameters. The screen is displayed when a feature is selected in the Feature list or a measurement is finished.

Nominal Value Entry Screen

The Nominal Value Entry screen displays the Actual (measured), nominal and deviation values for the selected feature. Nominal values can be entered from this screen. The screen is displayed when a feature graphic is pressed in the Feature Detail screen.
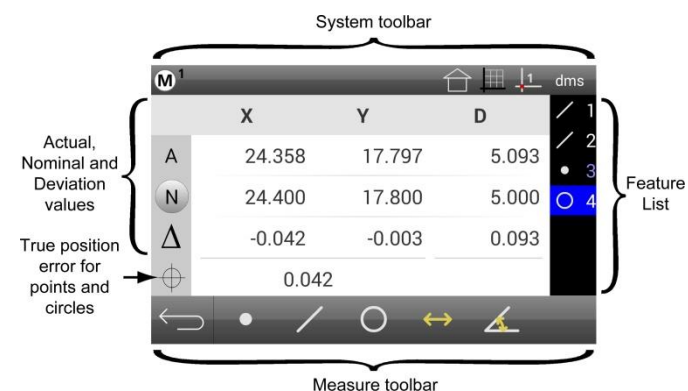

Toolbars, Menus and Function buttons

Toolbars contain buttons that either perform an operation directly or display a menu of other buttons that belong to a specific category of operation. Toolbars include:

- System toolbar
- Measure toolbar

Toolbar contents change slightly depending on the operations being performed. A few function buttons are also included on screens.

System Toolbar Functions

The System toolbar is located across the top of screens and contains functions that change to support the current activity. All available functions include:
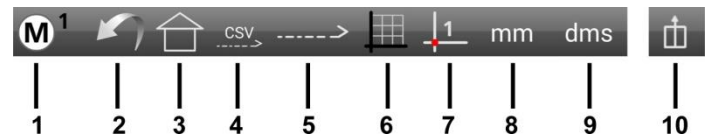
1 **System menu:** provides access to system information and settings functions
2 **Undo:** erases the last operation
3 **Home:** returns to Home screen view
4 **Send all features (Toolbar or Extra menu):** transmits all feature values in the Feature list as a comma separated variable (CSV) file when the RS232 function is enabled
5 **Send selected feature:** transmits values of the selected feature when the RS232 function is enabled
6 **Coordinate system (Toolbar or Extra menu):** toggles between Cartesian and polar coordinate systems
7 **Datum selection (Toolbar or Extra menu):**
   - toggles between datum 1 and datum 2 when pressed
   - clears the datums when long-pressed
8 **Units of measure (Toolbar or Extra menu):** toggles between inches and millimeters
9 **Angular units (Toolbar or Extra menu**): toggles between degrees, minutes, seconds and decimal degrees
10 **Extra menu:** simplifies the System and Measure toolbars by collecting some of the items listed above into a separate on-screen menu

Measure Toolbar Functions

The Measure toolbar is located across the bottom of screens and contains feature measurement and other functions that change to support the current activity. These functions are discussed in detail later in this guide. All available functions include:
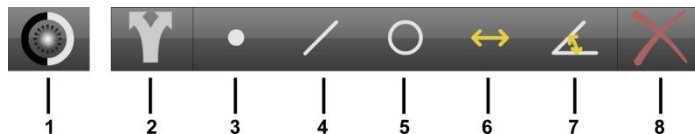
1   **Probe menu:** provides access to the on-screen menu of measuring probes and appears when a Measure Feature button is pressed
2   **Export menu (Toolbar or Extra menu):** provides access to the on-screen Export menu of data export functions
3 through 7 Measure Feature: Measure Feature buttons are identical in function and:
- Initiate a feature measurement for the selected feature type when pressed
- Initiate a series of feature measurements for the selected feature type when long-pressed
8 Delete:
- deletes a selected feature from the Feature list when pressed
- clears the Feature list, skew and datums when long-pressed

Probes

Features are measured by probing points along the edge of the feature. Points are probed explicitly or automatically using the simple crosshair or an optical edge crosshair probe. The optical edge detection characteristics can easily be calibrated by the user.

Probe Types

There are two main categories of probes:
- Simple crosshair
- Optical edge detection crosshairs
  - Manual edge detection
  - Auto edge detection

The M1 Probe menu provides access to (left to right):
- Simple crosshair probe
- Manual edge detection probe
- Auto edge detection probe
- Probe Teach (optical edge calibration)

Simple Crosshair Probe

The simple crosshair probe used to measure a single point at a time by manually lining up the crosshair center with a point on the feature edge and then pressing the Point Counter. The DRO stage position is continually updated when probing.

Manual Edge Detection Probe

The manual edge detection crosshair center is swept across an edge by the user but incorporates an edge detection area that will detect a point on the feature edge automatically generating a tone as the crosshair 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. 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.

Auto Edge Detection Probe

The auto edge detection crosshair must also be aligned by the user and detects feature edges as explained above, but the detected point is entered automatically 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.

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

Using Probes

The procedures for using the three probe types are simple and are identical for all feature types.

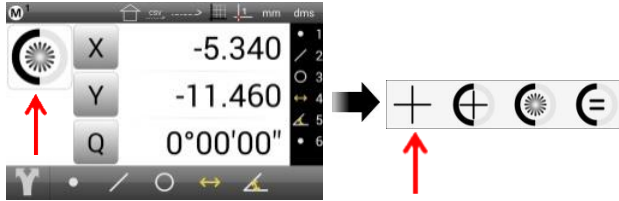### Simple Crosshair Probe

To use the simple crosshair probe:
1   Press the Home button to return to the Home screen if necessary.

2   Press the Probe Menu button if the crosshair is not already selected, and then press the Crosshair symbol.

3   Press the desired Measure Feature button in the Measure toolbar (circle in this example).
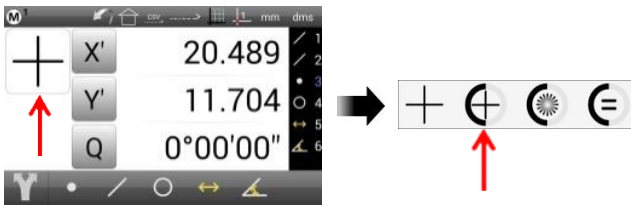4   Position the crosshair Probe over a feature edge.

5   Press the Point Counter to enter the point.
6   Probe the remaining points necessary to define the feature.
7   Press the Finish Measurement button to complete the feature measurement. The feature will be shown in the Feature list and Feature Detail screen.

Manual Edge Detection Probe

To use the manual edge detection crosshair probe:
1   Press the Home button to return to the Home screen if necessary.
2   Press the Probe Menu button if the manual edge detection probe is not already selected, and then press the Manual Edge symbol.

3   Press the desired Measure Feature button in the Measure toolbar (circle in this example).
4   Sweep the manual edge probe over a feature edge. The probe will fire and a tone will be produced.
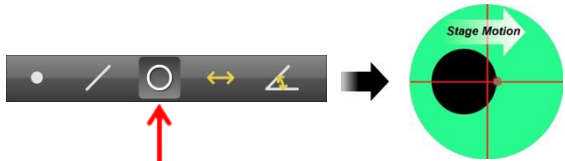
5   Press the Point Counter to enter the point.
6   Probe the remaining points necessary to define the feature.
7   Press the Finish Measurement button to complete the feature measurement. The feature will be shown in the Feature list and Feature Detail screen.

Auto Edge Detection Probe

To use the auto edge detection crosshair probe:
1   Press the Home button to return to the Home screen if necessary.
2   Press the Probe Menu button if the auto edge detection probe is not already selected, and then press the Auto Edge symbol.

3   Press the desired Measure Feature button in the Measure toolbar (circle in this example).
4   Sweep the manual edge probe over a feature edge. The probe will fire and a tone will be produced, and the point will be entered.

5   Probe the remaining points necessary to define the feature.
6   Press the Finish Measurement button to complete the feature measurement. The feature will be shown in the Feature list and Feature Detail screen.
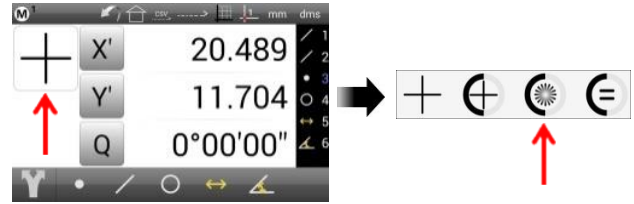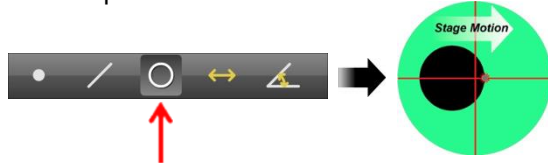
Probe Teach (Optical Edge Calibration)

Probe Teach is the basic optical edge calibration required by the M1 optical edge detector system. The probe teach calibration should be performed when lighting, magnification, lens or other system conditions change. To perform the Probe teach calibration:
1   Select Probe Teach from the Probe menu.

2   The Teach wizard will display screens that guide you through the teach calibration process. Follow the on-screen instructions for positioning your optical probe and performing the calibration.
3   At the completion of the teach calibration a message will be displayed indicating success or failure. In the event of a failure, confirm that the stage surface, calibration artifact and lens are clean and that the system is in focus, and then try another calibration. If the failure persists seek help as outlined at the beginning of this guide.

After a successful teach calibration, the optical edge probes can be used to perform feature measurements. It is unnecessary to perform an optical edge calibration when the comparator magnification is changed during routine measurement activities.

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 lines, circles and distances.

To use the Edge Logic function:
1   Select the Auto Edge probe from the Probe menu.
2   Cross a feature edge at the same starting point twice in opposite directions to start the measurement. The feature measurement will be initiated.
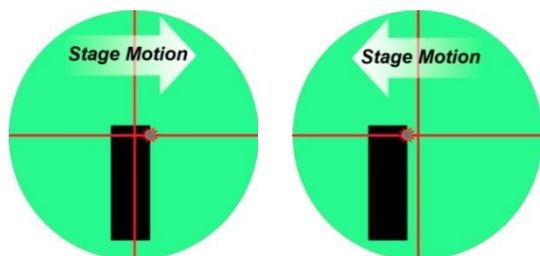
3   Probe the desired sequence of points to define the feature.
4   Cross a feature edge at the same stopping point twice in opposite directions to finish the measurement and enter the feature into the Feature list.
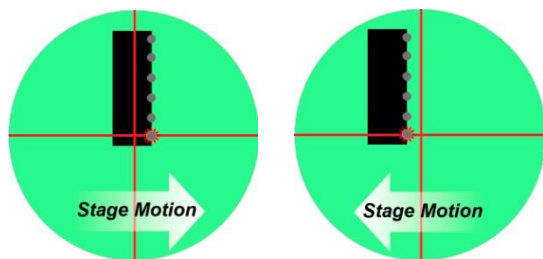
Auto Finish (Forward Annotation)

Measurements can be finished automatically once a user-defined number of required points have been collected, eliminating the need to press the Finish Measurement button. To use the Auto Finish function:
1   Press the M1 menu button to display the About screen.
2   Press Setup to display the Setup menu.
3   Press Measure to display the Measure screen.

4   Press annotation to display the Annotation setup dialog.
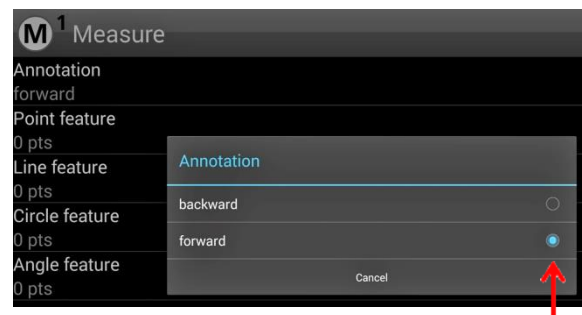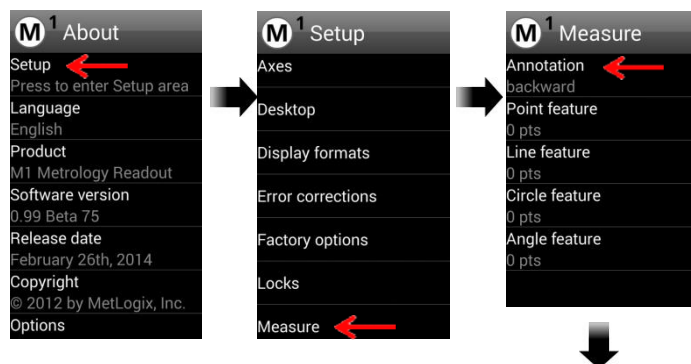
5   Press Forward to display the Measure configuration screen.
6   Press each feature type in turn and enter the number of points required to finish the measurement of that type, and then press OK. The example screen shown here configures the measurement of a circle to finish after the collection of 8 points.
7   Press the Checkmark symbol repeatedly to return to the main user interface screens.
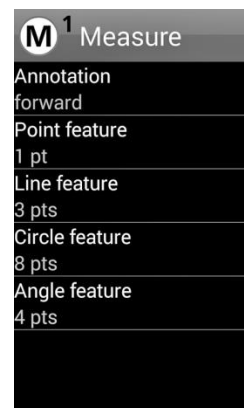
NOTE
Select backward annotation to retain the flexibility of probing any desired number of points for each feature type. In either case, the number of points required for each feature type must be equal to or greater than the minimums specified earlier in Points Required for Feature Measurements.

Measuring, Constructing and Creating Features

Measurement activities can include:

- Measuring features by probing
- Constructing new features from parent features
- Creating new features from data provided by the user

Explicit measurements are performed by pressing a Measure Feature button and then probing points on a feature's edge. Points can be probed using the simple crosshair, the manual optical edge probe or the auto optical edge probe as explained earlier in Probes. Measurements can be cancelled at any time by pressing the Measure Feature button again or by pressing the Home button. Gesture driven Edge Logic measurements automatically start and stop the probing sequence, determine the feature type and enter the measurement results for lines, circles and distances. Measurements can be finished and results entered automatically by enabling Forward Annotation (Auto Finish).

Feature constructions are performed by pressing a Measure Feature button, selecting the desired parent features from the Feature List and pressing the Finish Measurement button. Constructions can be cancelled by pressing the Measure Feature button again or by pressing the Home button.

Features are created by selecting the desired feature type and entering the desired feature parameter data into the fields provided. Feature creation can be cancelled by pressing the Cancel button.

Measured, constructed and created features are shown in the Feature list and Feature Detail screen.

Measurement Preparations

To prepare for measurement activities:
1 Verify that the part, stage and lens are clean.
2 Confirm that the part lighting is adequate.
3 Select the desired magnification.
4 Optimize the part focus.
5 Perform an optical edge teach calibration if necessary (explained in Probes).
6 Select the desired feature measurement type.
7 Select the desired probe.

Measurement References

Measurement references are not always necessary to perform measurements. For example, a circle diameter can be measured without a reference. However, when measurement references are required, they can be as simple as a zeroed or preset stage position, or can include a part skew alignment and one or two datums.

The Q-protractor can also be zeroed or preset as an angular measurement reference in systems equipped with a Q-axis.

Zeroing and Presetting the Stage Position

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

Zeroing the Stage Position

To zero a stage position:
1 Move the stage to the desired measurement reference position.
2 Press the Home button to display the DRO if necessary.
3 Press the stage coordinate buttons to zero the stage position (X and Y in this example).
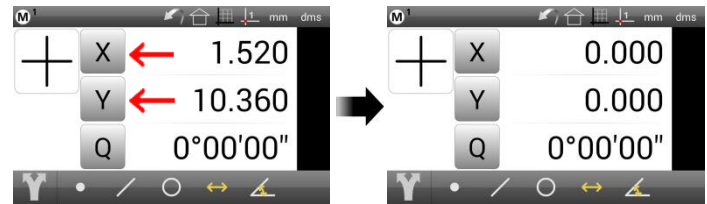
Presetting the Stage Position to Specific Coordinates

To preset a stage position:
1 Move the stage to the desired measurement reference position.
2 Press the Home button to display the DRO if necessary.
3 Long-press a coordinate field to display the Preset screen.
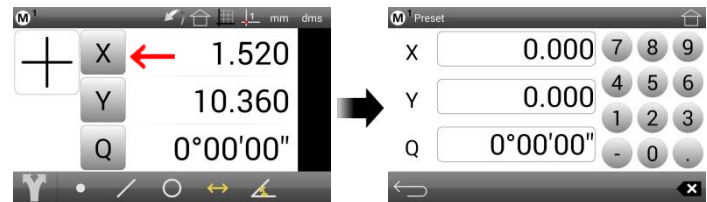
4 Press each desired stage coordinate field to select it (highlighted in blue).
5 Use the keypad to enter the desired reference coordinate values. Press the Remove Last entry button to correct entry mistakes.
6 Press the Return arrow to display the Home screen again. The preset values will be displayed (X and Y in this example).
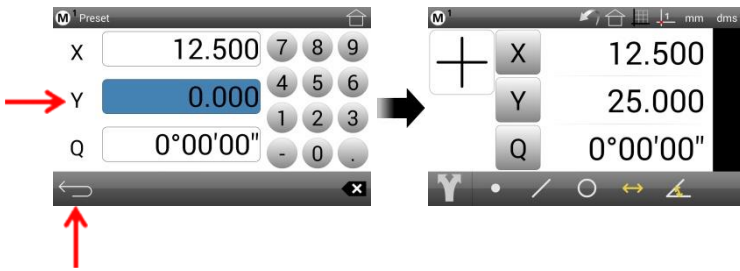
Skew Alignment

When a part is misaligned (twisted) in the XY plane, small cosine errors can be generated during the measurement process. These errors can be eliminated by creating a skew alignment for the part. The skew alignment is a measurement of the part misalignment in the XY plane. Once the misalignment is known to the system, subsequent feature measurements are automatically compensated to eliminate cosine errors. Measurement data in the Feature Detail and other screens will reflect measurements of a perfectly aligned part. Skew alignments can be performed using probed or constructed features.

Probing a Skew Alignment

To probe a skew alignment line:
1   Press the Measure Line button and select the desired probe from the Probe Menu.
2   Probe points well distributed along the entire length of the desired part alignment edge (X axis in this example). More points on the reference edge will increase measurement accuracy.
3   Press the Finish Measurement 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.
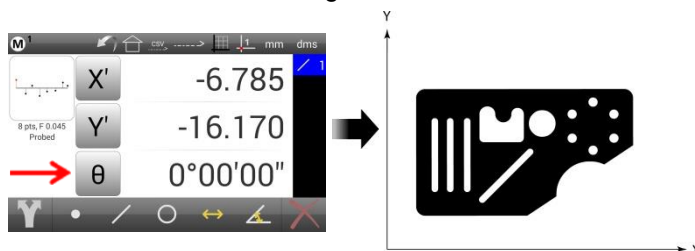
Constructing a skew alignment

A skew alignment line can be constructed from one or more parent features when simply probing a line is not possible. Supported line constructions are specified in Constructing Features later in this section. To construct a skew alignment line:
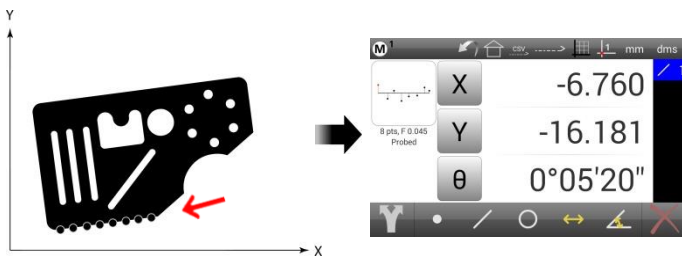1   Press the Measure Line button.
2   Select (press) the desired parent features in the Feature list (two circles in this example).
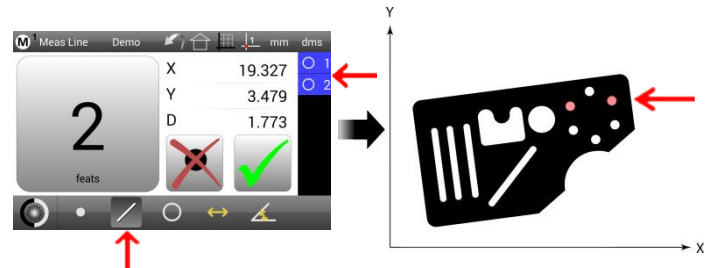
3   Press the Finish Measurement button to complete the line construction. The line will be entered into the Feature list and shown in the Feature Detail screen.
4   Zero the line angle by pressing the Angle value button to align the part to the X axis. The X and Y value button images will change from X and Y to X' and Y' to indicate that a skew alignment exists.
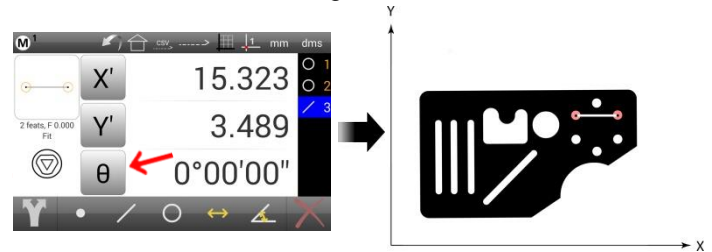
5   The constructed line can now be deleted if desired. Select the line and press the Delete button. The line will be deleted but the skew alignment will be retained and used in future measurements.

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.

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:

1 Select the desired positional feature from the Feature list (a circle in this example).
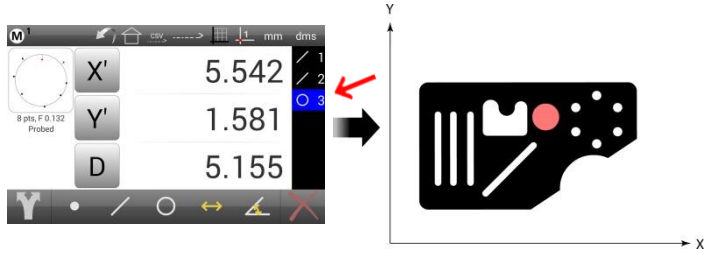
2 Press the Datum Selection button to choose a datum (datum 1 in this example).

3 Press the X' and Y' value buttons to zero the center point of the selected feature as a datum.
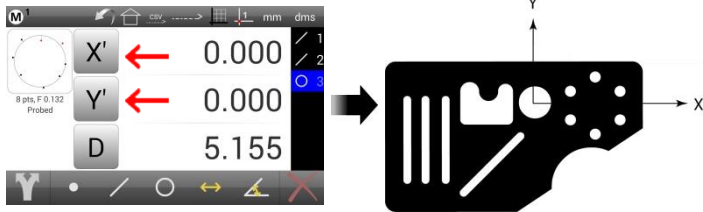
Presetting a feature Location

A part datum can be established directly by presetting any positional feature's X and Y coordinates to specific values. To preset part coordinates:

1 Select the desired feature from the Feature list. In this example, a point constructed from a circular pattern of six bolt holes was selected.

2 Press the Datum Selection button to choose a datum (datum 1 in this example).

3 Long-press any Value field to display the Preset screen.
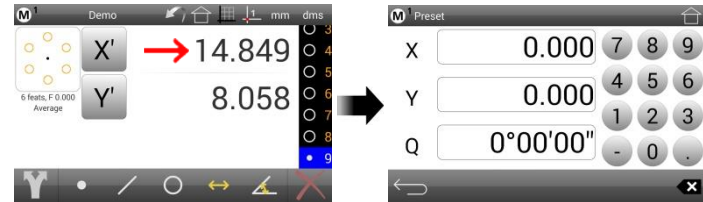
4 Press each desired coordinate field to select it (highlighted in blue).

5 Use the keypad to enter the desired reference coordinate values. Press the Remove Last entry button to correct entry mistakes.

6 Press the Return arrow to display the Home screen. The preset datum coordinates will be displayed.

Preset Datum 10,10
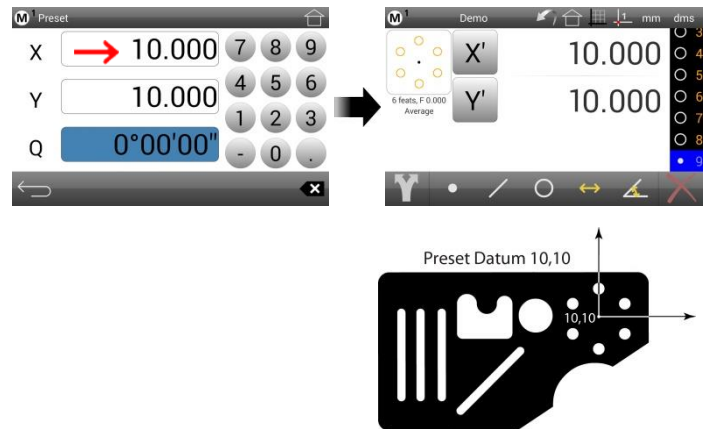
Using Two Datums

Two datums can be used when it is convenient to make relative measurements of features referred to an independent datum. Datum 1 and Datum 2 can be used interchangeably as a first or second datum. The skew alignment established in one datum will also be applied to the other. An example of using two datums is outlined below:

- A skew alignment is performed and a 0,0 datum (part origin) is created using Datum 1
- Eight bolt holes are measured
- A point is constructed at the center of the bolt hole pattern
- The user switches to datum 2
- Datum 2 is zeroed

The locations of bolt holes relative to the pattern center can be shown using datum 2. The location of the pattern center relative to the origin can be shown using datum 1.
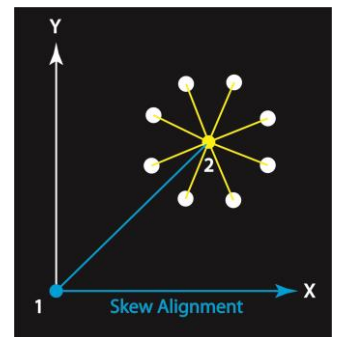
Q-Protractor Angular Measurement References

The Q-protractor can be zeroed or preset to specific angles in systems equipped with a Q axis.

The method used to zero or preset a datum and described on the previous page in Part Datums can also be used to zero or preset a Q axis angle as a reference for angular measurements.

Angle values entered into the Preset screen should be in the form:

- DD.MM.SS for dms (degrees, minutes, seconds) display

Or

- DD.XXX for dd (decimal degrees) display

Clearing Skews and Datums and the Feature List

Skew alignments, datums and the contents of the feature list can be cleared at any time in preparation for new feature measurements.

Clearing the Skew and Datums
1   Long-press the X, Y, Z or Q buttons on the Home or Feature Detail screen.

Or

1   Long-press the Datum 1 or Datum 2 button.

The contents of the Feature list will be retained.

Clearing the Skew, Datums and Feature List
1   Select any feature in the Feature list.
2   Long press the Delete button.

Probing and Measuring Features

Features can be probed manually or automatically using the simple crosshair, the manual optical edge probe or the auto optical edge probe. Probed features are shown in the Feature list and Feature Detail screen.

The following feature measurements are supported by the M1 system:

• Points
• Lines
• Circles
• Distances
• Angles

Detailed feature information including coefficients, form error, and number of points probed is always available in the Feature Detail screen. A graphic of the feature and the data cloud of points probed are also shown in the Feature Detail screen. The deviation from user defined nominal values can be found for feature parameters and are discussed later in Nominal Values and Deviations.

Probing Features

Features are measured by probing one point at a time as the user aligns the crosshair probe on the feature edge or sweeps an optical edge probe across and edge. Points are probed until at least the minimum required number of points has been probed. The number of points required for

each feature type is shown in the table below. The accuracy of feature measurements increases as the number of points probed increases beyond the minimum number required.

NOTE
The number of points is fixed by the user when Forward Annotation is enabled for auto-finishing measurements. Use Backward Annotation if flexibility regarding the number of points probed is desired. This topic was discussed earlier in Auto Finish (Forward Annotation).

Feature Type	Probed Points
Points	One or more
Lines	Two or more evenly distributed
Circles	Three or more evenly distributed
Distances	Two (only)
Angles	Two on each leg minimum
Skew	Two or more evenly distributed
Datum	One (only)

The process of probing a feature with a given probe is identical for all features. Since the use of probes has been discussed thoroughly in Probes, brief instructions for probing a feature with each probe type are provided here and should be sufficient.

Probing Features with the Simple Crosshair Probe

To probe features with the simple crosshair probe:
1   Select the simple crosshair from the probe menu.
    Home screen > Probe button > Simple crosshair
2   Press the desired Measure Feature button.
    Measure toolbar > Measure Feature button
3   Position the center of the crosshair over an edge.
4   Press the Point Counter
    Measure screen > Point Counter
5   Probe the desired number of points and then press the Finish Measurement button.
    Measure screen > Finish Measurement

Probing Features with the Manual Optical Edge Crosshair

To probe features with the manual optical edge crosshair probe:
1   Select the manual optical edge crosshair probe from the probe menu.
    Home screen > Probe button > Manual optical edge crosshair
2   Press the desired Measure Feature button.
    Measure toolbar > Measure Feature button
3   Sweep the center of the probe over an edge. A tone will indicate that the edge was detected.

4   Press the Point Counter prior to another edge crossing.
    Measure screen > Point Counter
5   Probe the desired number of points and then press the Finish Measurement button.
    Measure screen > Finish Measurement

Probing Features with the Auto Optical Edge Crosshair Probe

To probe features with the auto optical edge crosshair probe:
1   Select the auto optical edge crosshair probe from the probe menu.
    Home screen > Probe button > Auto optical edge crosshair
2   Press the desired Measure Feature button.
    Measure toolbar > Measure Feature button
3   Sweep the center of the probe over an edge. A tone will indicate that the edge was detected and the point will be entered.
4   Probe the desired number of points and then press the Finish Measurement button.
    Measure screen > Finish Measurement

Repeat Mode Feature Measurements

When measuring in the repeat mode, the Measure Feature button does not need to be pressed to initiate each new measurement of identical feature types. The system prepares the next feature measurement automatically at the completion of each feature measurement. The repeat mode facilitates the measurement of a large number of like features sequentially. The repeat mode is available for all feature types. To auto repeat the measurement of a feature type:
1   Long-press the Measure Feature button for the desired feature type. The Measure Feature button will change to indicate multiple feature measurements (a circle is shown in this example).
    Measure toolbar > Long Measure Feature button

2   Probe the desired number of points and then press the Finish Measurement button.
    Measure screen > Finish Measurement
3   Continue measuring like features and then press the Finish Measurement button to exit the repeat mode.
    Measure screen > Finish Measurement

Repeat Mode with Auto Finish Measurements

When the Repeat Mode is combined with Auto Finish (Forward Annotation), Measurements of like features:
•   Can be made in a sequence without pressing the Measure Feature button between measurements

•   Each feature measurement finishes without pressing the Finish Measure button

This combination is the fastest way to measure like features. To perform repeat mode/auto finish measurements of like features:
1   Configure the Auto Finish function as described earlier in Auto Finish (Forward Annotation).
2   Perform repeat mode feature measurements as described earlier in Repeat Mode Feature Measurements.

Constructing Features

Part features are constructed from one or more parent features selected in the Feature List. The following feature constructions are supported by the M1 system:
• Points
• Lines
• Circles
• Distances
• Angles

Features can be constructed from positional and non-positional parents. For the purposes of constructing features, the center points of positional features are used as points. The minimum number of points required for the feature construction is identical to the minimum number required for feature measurement and is discussed in detail in Points Required for Feature Measurements In Probes.

Positional Features	Non-positional Features
Points	Lines
Circles	Distances
	Angles

Point Constructions

Point constructions include:
•   Average point from any combination of positional features
•   Center point of circle
•   Start point, Center point, endpoint, or anchor point of a line. The anchor point is the point on the line closest to the datum.
•   Start point and endpoint of a distance
•   Apex point of an angle
•   Midpoint between two positional features
•   Intersection of two lines
•   Intersection 1 or 2 between two circles
•   Intersection 1 or 2 between line and circle
•   Point on line perpendicular to a positional feature
•   Tangent point 1 or 2 on circle from a point

Line Constructions

- Line constructions include:
- Duplicate line
- Perpendicular line from another line
- Gauge line from two parent lines and a created line (discussed later)
- Average of multiple lines
- Bisector line and perpendicular bisector
- Line from 2 or more positional features
- Tangent line 1 and 2 between two circles
- Tangent line 1 or 2 between point and circle
- Line from a distance
- Perpendicular line to a line through a positional feature
- Line parallel to a line through a positional feature
- Line tangent 1 or 2 to a circle and perpendicular to a line
- Line from a line and angle (rotated by the angle)

Circle Constructions

Circle constructions include:

- Gauge circle between parent lines and created circle (discussed later)
- Gauge circle between three lines with circle tangent to each line
- Bolt circle from three or more circles
- Average circle from three or more circles
- Circle from three or more positional features
- Duplicate circle

Angle Constructions

Angle constructions include:
Duplicate angle
Angle of a line starting at + X direction
Angle between lines: included, 180-, 180+ and 360-

Distance Constructions

- Distance constructions include:
- Duplicate distance
- Circumference of a circle
- Links of a line
- Distance between two angle apexes
- Minimum, center or maximum between circles
- Minimum, center or maximum between point and circle
- Minimum, center or maximum between line and circle (perpendicular distance)
- Minimum, center or maximum between lines
- Perpendicular from point to line
- Sum of two distances

Feature Construction Procedures

There are two procedures for feature construction:

- Gauge circle and gauge line constructions
- All other feature constructions

Constructing Gauge Circles and Gauge Lines

Gauge circle and gauge line constructions include:

- Gauge circle between 2 lines
- Gauge line between 2 lines
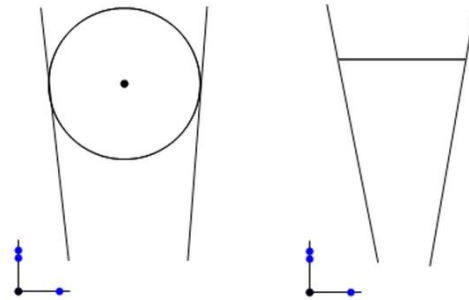
Gauge circle between two lines

To construct a gauge circle between two lines:

1 Create a circle of the desired diameter (creating features is discussed immediately after this section). The diameter of the created circle must be larger than the minimum distance between the two lines.
2 Press the Measure Circle button.
   Measure toolbar > Measure Circle button
3 Select two parent lines and the created circle from the Feature List.
4 Press the Finish Measurement button to complete the construction. The gauge circle will be shown between the two parent lines in the Feature Detail screen and will be added to the Feature List.
   Measure toolbar > Finish Measurement button

Gauge line between two lines

To construct a gauge line between two lines:

1 Create a line of the desired length (creating features is discussed immediately after this section). The length of the created line must be longer than the minimum distance between the two parent lines and must be horizontal or vertical.
2 Press the Measure Line button.
   Measure toolbar > Measure Line button
3 Select two parent lines and the created line from the Feature List.
4 Press the Finish Measurement button to complete the construction. The gauge line will be shown between the two parent lines in the Feature Detail screen and will be added to the Feature List.
   Measure toolbar > Finish Measurement button

Constructing All Other Feature Types

All feature constructions (except for gauge circles and gauge lines described earlier) use the following procedure:

1. Press the Measure Feature button of the feature type that you wish to construct.
   Measure toolbar > Measure Feature button
2. Select the desired parent features from the Feature List.
3. Press the Finish Measurement button to complete the construction. The constructed feature will be shown in the Feature Detail screen and entered into the Feature List.
   Measure toolbar > Finish Measurement button

Changing Constructed Feature Types

Probed or constructed angles and some other constructed features can have more than one feature type. For example, an angle constructed between two lines can be any one of 4 types: included, 180-, 180+ and 360-. To change the feature type of a constructed feature:

1. Select the constructed feature in the Feature List.
2. Press the Change Type button in the Feature Detail screen to cycle through the feature types.
   Feature Detail screen > Change Feature Type button

NOTE
The Change Feature Type button is shown in the Feature Detail screen when feature type alternatives exist. If the button is not present, only one type of feature exists.

Creating Features

Features can be created by entering the desired position, size and other parameters that describe the feature. The M1 system supports the creation of the following features:

- Points
- Lines
- Circles
- Distances
- Angles

The basic procedure for creating features is identical for all feature types, only the required feature parameters change depending on the feature type being created. To create a feature:

1. Press the Measure Feature button of the feature type that you wish to create. The Measure Feature screen will be displayed. In this example, a circle will be created.
   Measure toolbar > Measure Feature button
2. Long-press the Point Counter. The Create Feature screen will be displayed.

3. Enter the first required feature parameter and then press the Next button to advance to the next required parameter.
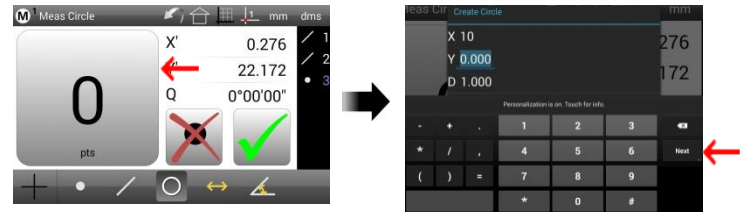
4. When all parameters are entered, press the Done button and then the OK button.
5. The new feature will be shown in the Feature list and Feature Detail screen.
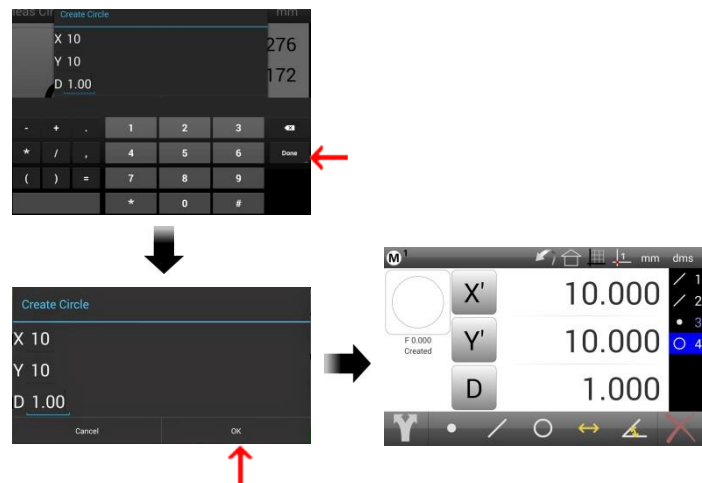
Feature List and Feature Detail Screen

Results of measurement activities are shown in the Feature list and Feature Detail screen. The Feature List facilitates feature construction, provides access to the Feature Detail screen and provides a means of selecting and deleting features.

The Feature Detail screen displays feature measurement results when a measurement is finished or when the feature is selected in the Feature List.

The Feature List

The Feature List always appears at the right side of the screen and changes slightly to support the current user activities. The primary functions of the Feature List include:

- Displaying features
- Selecting features
- Deleting features

All features that have been measured, constructed or created are displayed in the Feature List numbered in

chronological order. Datum points are shown in blue. Parent features used in the construction of a feature are shown in orange when the constructed feature is selected.

Scrolling the Feature List

When the Feature List contains too many features to be displayed simultaneously on the screen, press and drag the Feature List up or down to display features that are beyond the field of view.

Selecting features

Features are selected and deselected individually or in groups by pressing features.

Selecting single features

To select a single feature:
1   Press the feature in the list. It will be highlighted in blue.

Selecting multiple features

To select multiple features for constructions:
1   Initiate the construction process and then press each parent feature.

To select multiple features for export or deletion:
1   Long-press the first feature
2   Press any additional features for selection

Deselecting single Features

To deselect a single feature:
1   Press the feature in the list.

Deselecting multiple features

To deselect multiple features for constructions:
1   Press the feature(s).

To deselect multiple features for export or deletion:
1   Press any feature within the group to deselect that individual feature.
Or
1   Long-press any feature within the group to deselect the entire group.

Deleting Features from the Feature List

When one or more features are selected and highlighted in the Feature List, the Delete button is shown in the Measure toolbar. To delete one or more individual features:
1   Select the desired features.
2   Press the Delete (red X) button. The Remaining features will not be renumbered.

To delete all the features in the Feature List:
1   Select all the features.
2   Press the Delete button.
Or
1   Long-Press the Delete button.

NOTE
Long-pressing the Delete button also clears the skew alignment and datums.

Feature Detail screen

The Feature Detail screen displays feature dimension, position and form error information. A feature graphic is also displayed that shows the data cloud of probed points or parent features and indicates whether the feature was probed, constructed or created. The Feature Detail screen also provides the means to change feature type for angles some constructed features.

Probed features

This example shows the two Feature Detail screens for a probed circle. Press the Feature Dimension button to toggle between diameter (D) and radius (R).
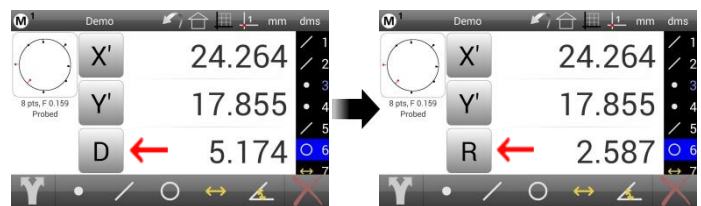
Constructed Features

This example shows the two Feature Detail screens for a constructed line between two circles. Press the Change Feature Type button to cycle through the types of lines that can be constructed between two circles. In this example, the line is changed from a center line to a tangent line.
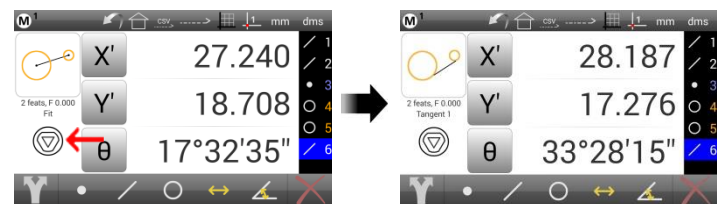
Nominal Values and Deviations

The deviations between the actual (measured) feature values and nominal values specified by the user can be calculated for features in the Feature list. True position errors can also be calculated for points and circles. The process for specifying nominal values and displaying deviations is identical for all feature types.

13

Entering Nominal Values

Nominal values can be entered manually or existing data can be auto rounded when the existing values are close to the nominal.

Manual Data entry

Nominal values will be entered for a circle in this example. To specify the nominal values for a feature:

1 Select the desired feature in the Feature list.
2 Press the graphic image of the point data cloud to display the Nominal Value Entry screen. The actual (A) values will be displayed.

3 Press anywhere in the horizontal nominal (N) row to display the Adjust Nominals screens.
4 Press any field to select it for editing.

5 Enter the nominal value for the selected field using the keypad. Press the Remove Last entry button to correct entry mistakes.
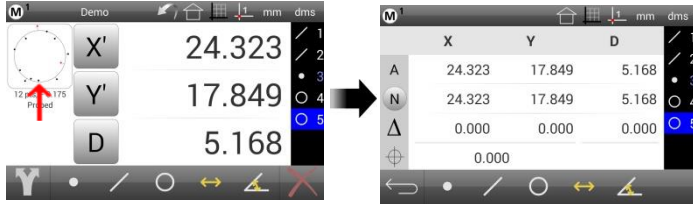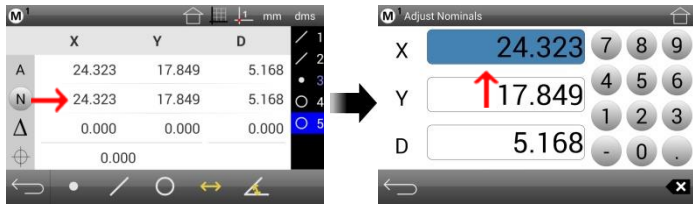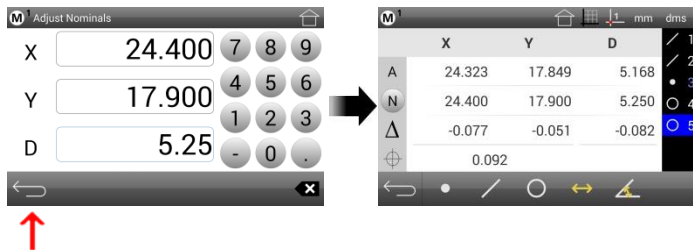6 Edit other fields if desired and press the Return arrow to return to the Nominal Value Entry screen. Deviations will be displayed in the Delta row. True position errors will be shown for points and circles.

Auto Rounding Existing Values

Auto-rounding can save time when repetitively entering nominal feature data. Often measured values are close to blueprint nominal values. Using Auto-rounding, the nominal values for each coefficient of a feature can quickly be rounded up or down to match the nominal values on engineering drawings. To enter nominal values using Auto-rounding:

1 Press any field to select it for editing. In this example, the Y coordinate value was selected.
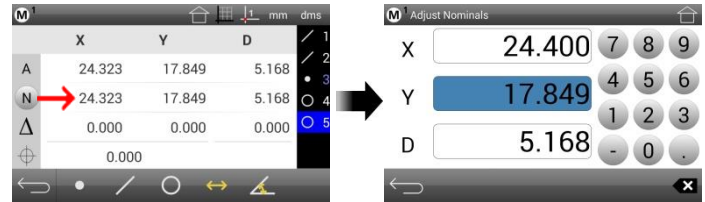
2 Press the digit that you would like to round. In this example, the second digit to the right of the decimal point was pressed which rounded the last two digits from 49 to 50. The digit selected will cause rounding either up or down based on the value of the digit to its immediate right.
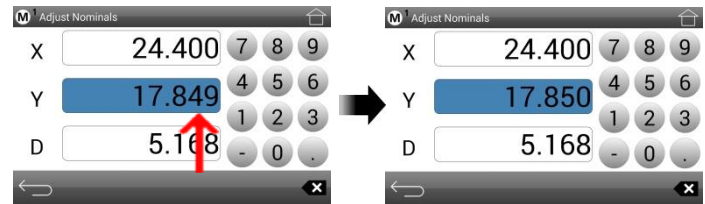
Auto Incrementing and Decrementing Adjustments

Value adjustments to entire data fields can quickly be auto incremented or decremented by pressing and sliding on a data field.

To make auto incrementing or decrementing adjustments to a digit or entire data field:

1 Press and hold a digit and then slide your finger to the right or left. Do not release your finger until the desired value is shown. Sliding to the right decreases the value, sliding left increases it. The rate of value change will increase as your finger moves further away from the digit.
2 Release your finger when the desired value is reached.

Exporting Data

Feature data can be:
- Exported to email accounts or Google Drive account locations
- Printed
- Sent (transmitted) to RS232 devices

Exported, and printed data files include all feature data for features contained in the feature list. RS232 transmissions can include selected feature data or all feature data.

Exporting to Email or Google Drive Accounts

To export feature data:
1. Press the Export button in the Measure toolbar or in the Extra menu.
2. Press the Export symbol in the Export menu.

3. Select:
   - Drive for a Google Drive account location
   - Email for an email account
   - Gmail for a gmail account
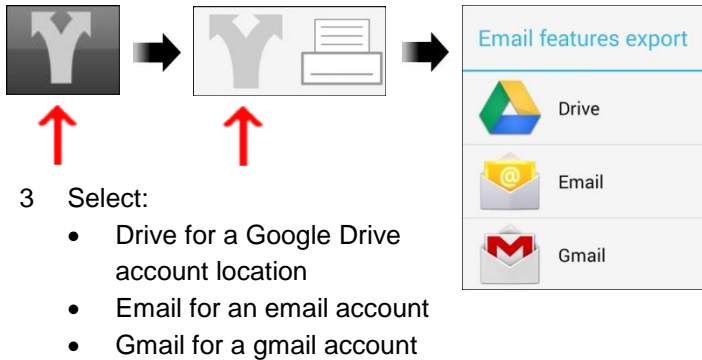
Printing Feature Data

Feature data can be printed or saved as a pdf document.
To print or save feature data:
1. Press the Export button in the Measure toolbar or in the Extra menu.
2. Press the Export symbol in the Export menu.
3. Press the Printer symbol to display the Print dialog.

4. Press the top line to select :
   - Save as PDF (in tablet's Download folder).
   - Print (on selected network printer).
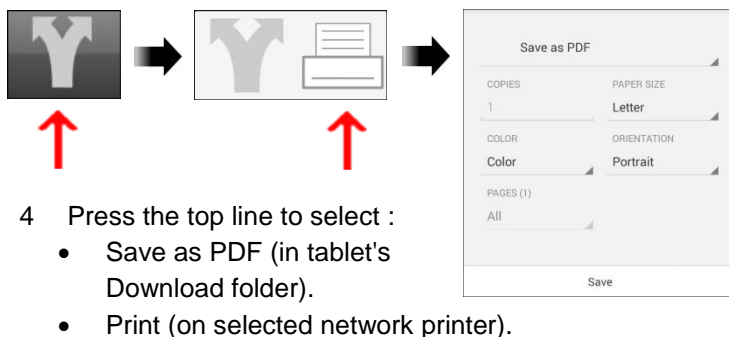
Sending (transmitting) RS232 Data

Measurement results for all features or for selected features can be transmitted to RS232 devices from RS232 enabled M1 systems.

Transmitting All Features

To send RS232 data for all features:
1. Press the Send All Features button in the System toolbar. Data for all features will be transmitted in a comma separated variable (CSV) file.

Transmitting Selected Features

To send RS232 data for selected features:
1. Select a feature in the Feature list.
2. Press the Send Selected Features button in the System toolbar. The feature coordinate and dimension buttons will contain Send RS232 symbols.
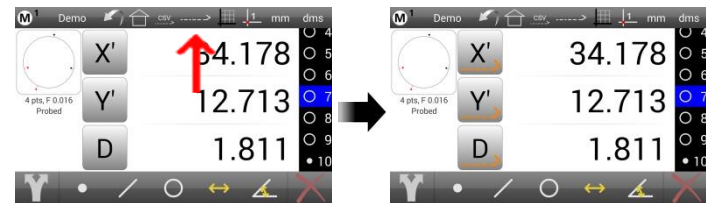
3. Press individual coordinate or dimension buttons to send only the desired data.
4. The RS232 Send function will continue to be enabled until explicitly disabled, and will be retained if a different feature is measured or selected from the Feature list. Press the Send Selected feature button again in the System toolbar to disable the Send RS232 function.

Product Warranty

This product is warranted against defects in workmanship, material and design for two (2) years from date of delivery to the extent that METLOGIX will, at its sole option, repair or replace the product or any part thereof which is defective, provided, however, that this warranty shall not apply to products subjected to tampering or, abuse, or exposed to highly corrosive conditions.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES WHETHER EXPRESS OR IMPLIED AND METLOGIX HEREBY DISCLAIMS ALL OTHER WARRANTIES, INCLUDING, WITHOUT LIMITATION, ANY WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE OR MERCHANTABILITY. METLOGIX SHALL NOT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING, BUT NOT LIMITED TO, ANY ANTICIPATED OR LOST PROFITS.

This warranty is voidable if the purchaser fails to follow any and all instructions, warnings or cautions in the product's Instruction Manual.

If a manufacturing defect is found, METLOGIX will replace or repair the product or replace any defective part thereof without charge; however, METLOGIX's obligation hereunder does not include the cost of transportation which must be borne by the customer. METLOGIX assumes no responsibility for damage in transit, and any claims for such damage should be presented to the carrier by the purchaser.

SOFTWARE LICENSE AGREEMENT

NOTICE TO USER: PLEASE READ THIS AGREEMENT CAREFULLY. BY COPYING, INSTALLING, OR USING ALL OR ANY PORTION OF THE SOFTWARE, YOU ACCEPT ALL TERMS AND CONDITIONS OF THIS AGREEMENT, INCLUDING, IN PARTICULAR THE PROVISIONS ON: TRANSFERABILITY IN SECTION 4; WARRANTY IN SECTIONS 6 AND 7; AND LIABILITY IN SECTION 8. YOU AGREE THAT THIS AGREEMENT IS LIKE ANY WRITTEN NEGOTIATED AGREEMENT SIGNED BY YOU. THIS AGREEMENT IS ENFORCEABLE AGAINST YOU AND ANY LEGAL ENTITY THAT OBTAINED THE SOFTWARE AND ON WHOSE BEHALF IT IS USED; FOR EXAMPLE, IF APPLICABLE, YOUR EMPLOYER. IF YOU DO NOT AGREE TO THE TERMS OF THIS AGREEMENT, DO NOT USE THIS SOFTWARE.

METLOGIX AND ITS SUPPLIERS OWN ALL INTELLECTUAL PROPERTY IN THE SOFTWARE. THE SOFTWARE IS LICENSED, NOT SOLD. METLOGIX PERMITS YOU TO COPY, DOWNLOAD, INSTALL, USE, OR OTHERWISE BENEFIT FROM THE FUNCTIONALITY OR INTELLECTUAL PROPERTY OF THE SOFTWARE ONLY IN ACCORDANCE WITH THE TERMS OF THIS AGREEMENT. USE OF SOME METLOGIX AND SOME NON-METLOGIX MATERIALS AND SERVICES INCLUDED IN OR ACCESSED THROUGH THE SOFTWARE MAY BE SUBJECT TO OTHER TERMS AND CONDITIONS TYPICALLY FOUND IN A SEPARATE LICENSE AGREEMENT, TERM OF USE OR "READ ME" FILE LOCATED WITHIN OR NEAR SUCH MATERIALS AND SERVICES.

THE SOFTWARE MAY INCLUDE TECHNOLOGY DESIGNED TO PREVENT UNAUTHORIZED USE AND COPYING. THIS TECHNOLOGY MAY CAUSE YOUR COMPUTER TO CONNECT TO THE INTERNET WITHOUT NOTICE ON INSTALL, LAUNCH, AND ON AN INTERMITTENT OR REGULAR BASIS THEREAFTER. ONCE CONNECTED, THE SOFTWARE WILL TRANSMIT INFORMATION TO METLOGIX VIA AN INTERNET CONNECTION. METLOGIX MAY USE THE TRANSMITTED INFORMATION, AS WELL AS OTHER INFORMATION YOU OUR THIRD PARTIES MAY PROVIDE TO US, TO DETECT OR PREVENT USE OF METLOGIX SOFTWARE THIS IS FRAUDULENT, NOT VALIDLY LICENSED, OR NOT USED IN ACCORDANCE WITH A VALID LICENSE. SOFTWARE THAT FAILS TO CONNECTO TO METLOGIX AND SOFTWARE THAT CONNECTS TO METLOGIX WHOSE USE IS FOUND TO NOT TO BE PERMITTED MAY OFFER ONLY LIMITED FUNCTIONALITY OR MAY NOT OPERATE AT ALL.

1. Definitions

"MetLogix" means MetLogix, Incorporated, a Delaware corporation, 175 Canal Street, Manchester, New Hampshire 03101.

"MetLogix Runtime(s)" means MetLogix M1, MetLogix M1, MetLogix M1, MetLogix L3, MetLogix L2, MetLogix L1, MetLogix Test Builder, or MetLogix CFR21.

"Computer" means a virtual or physical computer device that accepts information in digital or similar form and manipulates it for a specific result based on a sequence of instructions.

"Internal Network" means a private, proprietary network resource accessible only by employees and individual contractors (i.e., temporary employees) or a specific corporation or similar business entity. Internal Network does not include portions of the Internet or any other network community open to the public, such as membership or subscription driven groups, associations, and similar organizations.

"Output File" means an output file you created with the Software.

"Permitted Number" means one (1) unless otherwise indicated under a valid license (e.g., volume license) granted by MetLogix.

"Software" means (a) all of the information with which this agreement is provided, including but not limited to: (i) all software files and other computer information.

2. Software License

If you obtained the Software and any required serial number(s) from MetLogix or one of its authorized licensees (resellers) and as long as you comply with the terms of this Agreement, MetLogix grants you a non-exclusive license to install and use the Software in a manner consistent with its design and Documentation and as further set forth below.

2.1 Limited Use

2.1.1

The Software, or portions of the Software, may allow installation and use without a serial number. If so, you may install but not use such non-serialized Software on any number of Computers as part of an organizational deployment plan. Further, you may install and use such non-serialized Software on any number of Computers for demonstration, evaluation, and training purposes only and only if any Output Files or other material produced through such use are used only for internal, non-commercial, and non-production purposes. You may not use such non-serialized Software after any applicable timeout period has ended, unless you input a valid serial number. ACCESS TO AND USE OF ANY OUTPUT FILES CREATED WITH SUCH NON-SERIALIZED SOFTWARE IS ENTIRELY AT YOUR OWN RISK.

2.1.2

The Software, or portions of the Software, that are provided with a serial number designated for "evaluation purposes" or other similar designation (such as Software or a serial number supplied as "EVAL" under a separate ordering document) and that includes an expiration date ("Evaluation Software") may only be installed and used on Computers for demonstration, evaluation, and training purposes only and only if Output Files or other materials produced through such use are used only for internal, non-commercial, and non-production purposes. The Evaluation Software will automatically time out with or without prior notice. You may not use such Evaluation Software after any applicable time-out period has ended, unless you input a valid serial number. USE OF ANY OUTPUT FILES CREATED WITH SUCH NON-SERIALIZED SOFTWARE IS ENTIRELY AT YOUR OWN RISK.

2.1.3 General Use

Except as described otherwise herein, you may install and use one (1) copy of the Software in accordance with the Documentation only on the Permitted Number of your compatible Computers into which you enter a valid serial number.

2.1.4 Distribution from a Server

The Software may not be distributed from a Server or an Internal Network.

2.1.5 Dual Boot Platform

The Software is licensed for use on a specific operating system platform. You must purchase a separate license for use of the Software on each operating system platform.

2.1.6 Documentation

You may make copies of the Documentation for your own internal use in connection with use of the Software in accordance with this Agreement but no more than the amount reasonably necessary. Any permitted copy of the Documentation that you make must contain the same copyright and other proprietary notices that appear on or in the Documentation.

3. Intellectual Property Ownership

The Software and any authorized copies that you make are the intellectual property of and are owned by MetLogix Incorporated. The structure, organization, and source code of the Software are the valuable trade secrets and confidential information of MetLogix Incorporated. The Software is protected by law, including but not limited to the copyright laws of the United States and other countries, and by international treaty provisions. Except as expressly stated herein, this Agreement does not grant you any intellectual property rights in the Software and all rights not expressly granted are reserved by MetLogix Incorporated.

4. Restrictions and Requirements

4.1 Notices

Any permitted copy of the Software that you make must contain the same copyright and other proprietary notices that appear on or in the Software.

4.2 Use Obligations

You agree that you will not use the Software other than as permitted by this Agreement and that you will not use the Software in a manner inconsistent with its design or Documentation.

4.3 No Modifications

You may not modify, port, adapt, or translate the Software.

4.4 No Reverse Engineering

You will not reverse engineer, decompile, disassemble, or otherwise attempt to discover the source code of the Software.

4.5 No Unbundling

The Software may include various applications, utilities, and components, may support multiple platforms and languages, and may be provided to you on multiple media or in multiple copies. Nonetheless, the Software is designed and provided to you as a single product to be used as a single produce on Computers permitted by Section 2. You are not required to install all component parts of the Software, but you may not unbundle the component parts of the Software for use on different Computers. You may not unbundle or repackage Software for distribution, transfer, or resale.

4.6 No Transfer

YOU WILL NOT RENT, LEASE, SELL, SUBLICENSE, ASSIGN OR TRANSFER YOUR RIGHTS IN THE SOFTWARE, OR AUTHORIZE ANY PORTION OF THE SOFTWARE TO BE COPIED ONTO ANOTHER INDIVIDUAL OR LEGAL ENTITY'S COMPUTER EXCEPT AS MAY BE EXPRESSLY PERMITTED HEREIN. You may, however, permanently transfer all your rights to use the Software to another individual or legal entity provided that: (a) you also transfer (i) this agreement, (ii) the serial number(s), the Software affixed to medial provided by MetLogix or its authorized distributor, and all other software or hardware bundled, packaged, or pre-installed with the Software, including all copies, Updates, and Prior Versions (as defined in Section 5); (b) you retain no Updates, Prior Versions, or copies, including backups and copies stored on a Computer; and (c) the receiving party accepts the terms and conditions of this agreement and any other terms and conditions under which you purchased a valid license to the Software. NOTWITHSTANDING THE FOREGOING, YOU MAY NOT TRANSFER EDUCATION, PRE-RELEASE, EVALUATION SOFTWARE, OR NOT FOR RESALE COPIES OF THE SOFTWARE OR SOFTWARE OBTAINS UNDER A METLOGIX VOLUME LICENSE PROGRAM EXCEPT AS MAY BE EXPRESSLY PERMITTED BY METLOGIX WITH THE TERMS OF A VOLUME LICENSE PROGRAM.

4.7 No Service Bureau

You will not use or offer the Software on a service bureau basis.

4.8 MetLogix M Series Restrictions

You may not use MetLogix M Series software on any non-PC device or with any embedded or device version of any operating system.

5. Updates

If the Software is an Update to a prior version of MetLogix software (the "Prior Version"), the following apply:

Your use of this Update is conditional upon your retention of the Prior Version. Therefore, if you validly transfer this Update pursuant to Section 4.6, you must transfer the Prior Version along with it. If you wish to use this Update in addition to the Prior Version, you may only do so on the same computer on which you have installed and are using the Prior Version. Any obligation that MetLogix may have to support Prior Versions may end upon the availability of this Update. No other use of the Update is permitted. Additional Updates may be licensed to you by MetLogix with additional or different items.

6. Limited Warranty

MetLogix warrants to the individual or entity that first purchases a license for the Software for use pursuant to the terms of this agreement that the Software will perform substantially in accordance with the Documentation for the

ninety (90) day period following receipt of the Software when used on the recommended operating system and hardware configuration. Non-substantial variation of performance from the Documentation does not establish a warranty right. This limited warranty does not apply to the following which are made available "AS-IS" and without warranty from MetLogix: patches, font software; pre-release (beta), trial, starter, evaluation, product sampler, and not for resale (NFR) copies of the Software including but not limited to Evaluation Software. All warranty claims must be made, along with proof of purchase, to MetLogix within such ninety (90) day period. If the Software does not perform substantially in accordance with the Documentation, the entire liability of MetLogix and its affiliates and your exclusive remedy will be limited to either, at MetLogix' option, replacement of the Software or refund of the license fee you paid for the Software (if any). THE LIMITED WARRANTY SET FORTH IN THIS SECTION GIVES YOU SPECIFIC LEGAL RIGHTS. YOU MAY HAVE ADDITIONAL RIGHTS UNDER LAW WHICH VARY FROM JURISDICTION TO JURISDICTION. METLOGIX DOES NOT SEEK TO LIMIT YOUR WARRANTY RIGHTS TO ANY EXTENT NOT PERMITTED BY LAW.

7. Disclaimer

THE LIMITED WARRANTY IN SECTION 6 IS THE ONLY WARRANTY OFFERED BY METLOGIX, ITS AFFILIATES, AND SUPPLIERS AND IT STATES THE SOLE AND EXCLUSIVE REMEDIES FOR METLOGIX', ITS AFFILIATES', OR SUPPLIERS' BREACH OF THAT OFFERED WARRANTY. THE LIMITED WARRANTY IN SECTION 6 AND ANY STATUTORY WARRANTY AND REMEDY THAT CANNOT BE EXCLUDED OR LIMITED UNDER LAW ARE THE ONLY WARRANTIES APPLICBLE TO THE SOFTWARE. OTHER THAN THOSE OFFERED AND STATUTORY WARRANTIES APPLICABLE TO THE SOFTWARE, METLOGIX, ITS AFFILIATES, SUPPLIERS, AND CERTIFICATE AUTHORITIES DISCLAIM ALL WARRANTIES, CONDITIONS, REPRESENTATIONS, AND TERMS, EXPRESSED OR IMPLIED, WHETHER BY STATUTE, COMMON LAW, CUSTOM, USAGE, OR OTHERWISE AS TO ANY MATTER, INCLUDING BUT NOT LIMITED TO PERFORMANCE, SECURITY, NON-INFRINGEMENT OF THIRD PARTY RIGHTS, INTEGRATION, MERCHANTABILITY, SATISFACTORY QUALITY, AND FITNESS FOR ANY PARTICULAR PURPOSE. OTHER THAN SUCH OFFERED AND STATUTORY WARRANTIES AND REMEDIES, METLOGIX, ITS AFFILIATES, SUPPLIERS, AND CERTIFICATE AUTHORITIES PROVIDE THE SOFTWARE AND ACCESS TO ANY WEBSITES, METLOGIX OR THIRD PARTY ONLINE SERVICES, AND CERTIFICATE AUTHORITY SERVICES AS-IS AND WITH ALL FAULTS. THIS DISCLAIMER OF WARRANTY MAY NOT BE VALID IN SOME JURISDICTIONS. YOU MAY HAVE ADDITIONAL WARRANTY RIGHTS UNDER LAW WHICH MAY NOT BE WAIVED OR DISCLAIMED. METLOGIX DOES NOT SEEK TO LIMIT YOUR WARRANTY RIGHTS TO ANY EXTENT NOT PERMITTED BY LAW.

8. Limitation of Liability

EXCEPT FOR THE EXCLUSIVE REMEDY OFFERED BY METLOGIX ABOVE AND ANY REMEDIES THAT CANNOT BE EXLCUDED OR LIMITED UNDER LAW, METLOGIX, ITS AFFILIATES, SUPPLIERS AND CERTIFICATE AUTHORITIES WILL NOT BE LIABLE TO YOU FOR ANY LOSS, DAMAGES, CLAIMS, OR COSTS WHATSOEVER INCLUDING ANY CONSEQUENTIAL, INDIRECT OR INCIDENTAL DAMAGES, ANY LOST PROFITS OR LOST SAVINGS, ANY DAMAGES RESULTING FROM BUSINESS INTERRUPTION, PERSONAL INJURY OR FAILURE TO MEET ANY DUTY OF CARE, OR CLAIMS BY THIRD PARTY, EVEN IF ANY METLOGIX REPRESENTATIVE HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH LOSS, DAMAGES, CLAIMS, OR COSTS. IN ANY EVENT, METLOGIX' AGGREGATE LIABILITY AND THAT OF ITS AFFILIATES, SUPPLIERS, AND CERTIFICATE AUTHORITIES UNDER OR IN CONNECTION WITH THIS AGREEMENT WILL BE LIMITED TO THE AMOUNT PAID FOR THE SOFTWARE, IF ANY. THIS LIMITATION WILL APPLY EVENT IN THE EVENT OF A FUNDAMENTAL OR MATERIAL BREACH OR A BREACH OF THE FUNDAMENTAL OR MATERIAL TERMS OF THIS AGREEMENT

THE FORECOING LIMITATIONS AND EXCLUSIONS APPLY TO THE EXTENT PERMITTED BY APPLICABLE LAW IN YOUR JURISDICTION. THIS LIMITATION OF LIABILITY MAY NOT BE VALID IN SOME JURISDICTIONS. YOU MAY HAVE RIGHTS THAT CANNOT BE WAIVED UNDER CONSUMER PROTECTION AND OTHER LAWS. METLOGIX DOES NOT SEEK TO LIMIT YHOUR WARRANTY OR REMEDIES TO ANY EXTENT NOT PERMITTED BY LAW.

9. Export Rules

You acknowledge that the Software is subject to the U.S. Export Administration Regulations and other export laws, restrictions, and regulations (collectively the "Export Laws") and that you will comply with the Export Laws. You will

not ship, transfer, export, or re-export the Software, directly or indirectly, to: (a) any countries that are subject to US export restrictions (currently including, but not necessarily limited to, Cuba, Iran, North Korea, Sudan, and Syria) (each, an "Embargoed Country"), (b) any end user who you know or have reason to know will utilize them in design, development or production of nuclear, chemical or biological weapons, or rocket systems, space launch vehicles, and sounding rockets, or unmanned air vehicle systems (each, a "Prohibited Use"), or (c) any end user who has been prohibited from participating in U.S. export transactions by any federal agency of the U.S. government (each, a "Sanctioned Party"). In addition, you are responsible for complying with any local laws in your jurisdiction which may impact your right to import, export or use the Software. You represent and warranty that (i) you are not a citizen of, or located within, an Embargoed Country, (ii) you will not use the Software for a Prohibited Use, and (iii) you are not a Sanctioned Party. All rights to use the Software are granted on condition that such rights are forfeited if you fail to comply with the terms of this agreement.

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.

11. Notice to U.S. Government End Users

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 Vietnam Era Veterans Readjustment Assistance Act of 1974 (38 USC 4212), and Section 503 of the Rehabilitation Act of 1973, as amended, and the regulations at 41 CFR Parts 60-1 through 60-60, 60-250, and 60-741. The affirmative action clause and regulations contained in the preceding sentence will be incorporated by reference in this Agreement.

12. Compliance with Licenses

If you are a business, company, or organization, you agree that, in addition to any license compliance checking performed by the Software, MetLogix or its authorized representative have the right, no more than once every twelve (12) months, upon ten (10) days' prior notice to you, to inspect your records, systems, and facilities to verify that your use of any and all MetLogix software is in conformity with your valid licenses from MetLogix. For example, MetLogix has the right to those of your records useful to determine whether installations of the Software have, or have not, been serialized, and you shall provide such records to MetLogix promptly upon request by MetLogix. Additionally, you shall provide MetLogix with all records and information requested by MetLogix in order to verify that your use of any and all MetLogix software is in conformity with your valid licenses from MetLogix within thirty (30) days of MetLogix' request.

13. Peer to Peer Communications

The Software may use your connection to a local area network, without additional notice, automatically connect to other MetLogix software and, in doing so, may indicate on the local area network that it is available for communication with other MetLogix software. These connections may transmit the IP Address of your connection to the local network but no personally identifiable information is ever transmitted or received through such network connections (except to the extent that IP addresses may be considered personally identifiable in some jurisdictions).