MetLogix

M3

Video Inspection Software

Setup Guide

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M3 Software Installation

The Metlogix M-Series software should only be installed on computer systems running the Microsoft® Windows® 7 Operating System (32 or 64 bit).

Target systems for the M-Series software packages should be approved for use by Metlogix. Please contact Metlogix to validate PC specifications for the chosen PC model, if it is being used for the first time.

Install from disc:

1. Insert the Mx software installation disc.
2. From the install menu, select “Run Setup”.
3. Follow the installation screen instructions to install the software on your PC system.
4. A shortcut to launch your M-Series software will be added to your desktop.

Install from file:

1. Locate the Setup executable file for the M-Series software you intend to install.
2. Double click the Setup executable to launch the installation utility.
3. Follow the installation screen instructions to install the software on your PC system.
4. A shortcut to launch your M-Series software will be added to your desktop.

The M2 Horizontal, and M3 software will launch as a standard program window in Win 7. These windows can be resized, minimized, or maximized in the usual fashion, and according to Windows 7 window convention.

The M2 Vertical software is designed specifically for ~10 inch tablet PC’s with the display properties configured for portrait(vertical) display. This software does not use a standard Windows application dialog. The M2 Vertical software will always launch to full screen.

The Metlogix installation folder

By default, the M-Series software installation program will install your M3 software to a folder in your “Program Files (x86)” directory. The files in this folder are critical to the functionality of your M3 software. Files in this folder should not be removed. In addition no files should be added to this folder unless specifically outlined in this document, or under the direction of a Metlogix representative.

Note: Settings files, Calibration files, Part Program files and Data and Image export files will all be stored in a separate location called the Metlogix File Output directory. These files should never be stored within the M-Series Program Files directory. The Metlogix File Output directory is discussed in the next section.

Metlogix File Output directory

After the first launch of the M3 software a folder, named “Metlogix”, will be created at the following path:

Drive Letter:\Users\Public\Public Documents\

This folder can also be reached through the Win7 libraries folder in Documents\Public Documents.

The Metlogix file output folder will contain the following sub-folders:

- **Activity**: NA

- **Backups**: Will contain settings, and error correction backup files. Backups are generated every 7 days by default however this backup interval can be configured within a Metlogix configuration file. Please contact your Metlogix representative for assistance with making this change.

- **Diagnostics:** May contain Metlogix “stderr” and “stdout” files. These files are for the purpose of M3 software maintainance.

- **Exports:** This folder will contain measurement data export files. Files containing measurement data will be exported from the M3 software’s data view to this folder location in either .txt or .csv format.

- **Images:** This folder will contain images saved from the Image Archive feature of the M3 software.

- **Parts:** This folder will contain saved part program files from the M3 series software. Files saved to this directory will have the extension “.mlxpart”.

- **Settings:** This folder will contain the core settings files of your M3 software installation. The setup file “SettingsM3.xml” will be stored in this folder. This file contains all major file settings parameters for your M series software installation. This folder may also contain additional configuration files(metlogix.ini), camera settings files(LastDeviceDetected.xml), or error correction files(NLECnew.txt).

**The Backup, Export, Images, and Parts folders can be assigned to custom output locations or folders using the “File Locations” settings screen, located within in the main settings screen.

All setup menu items referenced in this document can be accessed through the settings screen. Access this screen by pressing the settings button found in the M3 file menu**.**

Note: Access to some settings screen may be restricted. If you do not see a setup screen mentioned in this document, confirm that your user login has the proper privileges granted for the setup screen you are trying to access.

M3 System Security and User Account setup

Security

The “Security” setup screen provides a means of configuring the M3 user accounts. Each user account can be configured with a custom password, and access rights for defining the setup screens that can be accessed by a given user. The hierarchy for defining an account’s privileges is as follows:

1) Super Administrator

2) Supervisor

3) User1…..User5

To create a user, select an existing display name using the user selector. Change the Display Name to the desired login name, and set the “Account Enabled” setting to “Yes”.

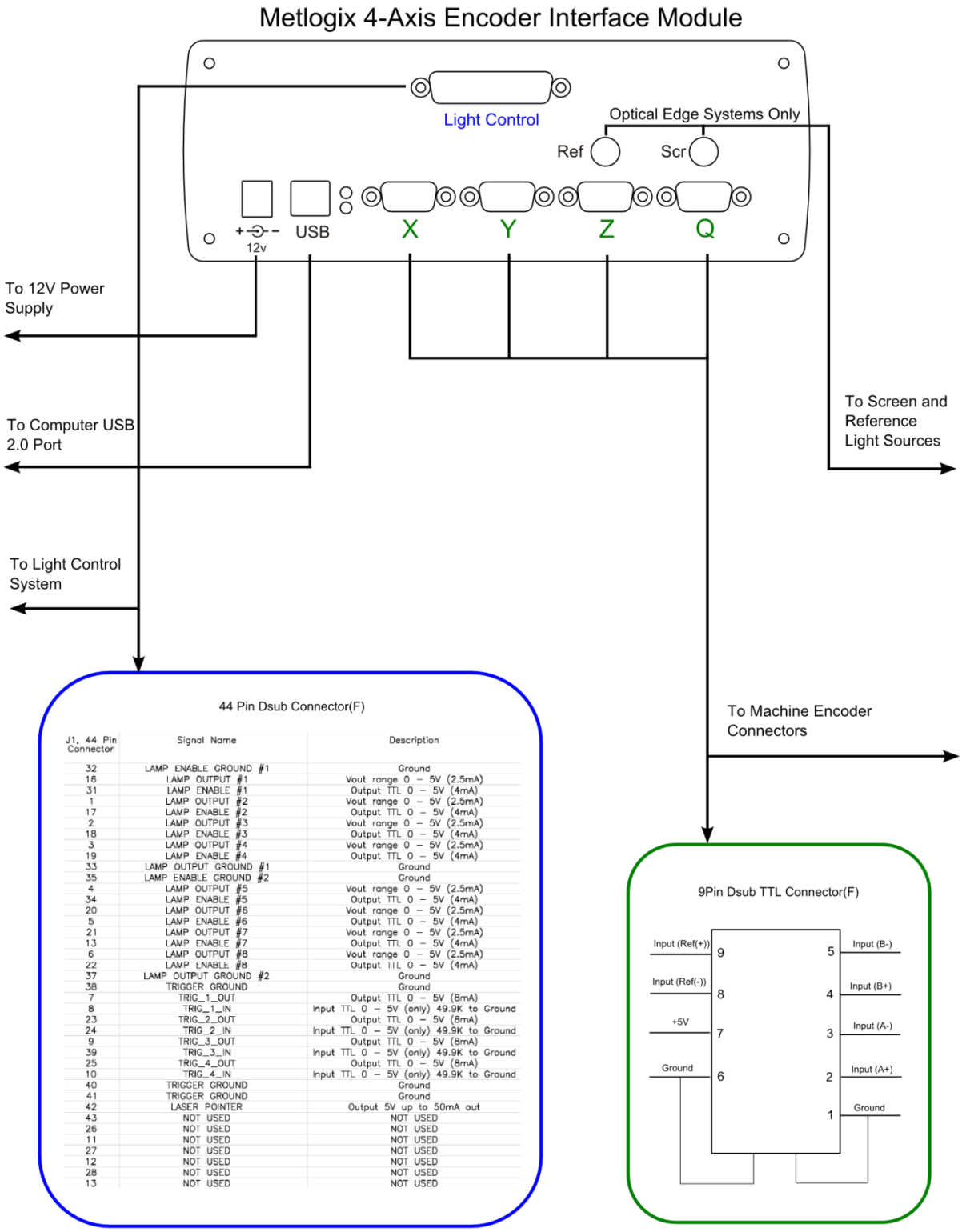
The password for the selected user is entered into the password field. If desired, set an expiration date for the password by entering a value, in days, into the “Max Days Password is Usable” field.

To configure the software to bypass the user login screen and load the selected user automatically at startup, set the “Automatically Login as This User” field to “Yes”.

To configure Access Rights for a given user, first select the user you would like to configure. Set the given Access Right to either “Yes” or ”No” to configure which Setup Screens will be available for a given user to access.

Note: Only account types with a higher security priority, than that of the target account, will be able to configure account parameters. (see hierarchy above)

Encoder Interface Setup



44 Pin Dsub Connector(F)

J1, 44 Pin Connector	Signal Name	Description
32	LAMP ENABLE GROUND #1	Ground
16	LAMP OUTPUT #1	Vout range 0 – 5V (2.5mA)
31	LAMP ENABLE #1	Output TTL 0 – 5V (4mA)
1	LAMP OUTPUT #2	Vout range 0 – 5V (2.5mA)
17	LAMP ENABLE #2	Output TTL 0 – 5V (4mA)
2	LAMP OUTPUT #3	Vout range 0 – 5V (2.5mA)
18	LAMP ENABLE #3	Output TTL 0 – 5V (4mA)
3	LAMP OUTPUT #4	Vout range 0 – 5V (2.5mA)
19	LAMP ENABLE #4	Output TTL 0 – 5V (4mA)
33	LAMP OUTPUT GROUND #1	Ground
35	LAMP ENABLE GROUND #2	Ground
4	LAMP OUTPUT #5	Vout range 0 – 5V (2.5mA)
34	LAMP ENABLE #5	Output TTL 0 – 5V (4mA)
20	LAMP OUTPUT #6	Vout range 0 – 5V (2.5mA)
5	LAMP ENABLE #6	Output TTL 0 – 5V (4mA)
21	LAMP OUTPUT #7	Vout range 0 – 5V (2.5mA)
13	LAMP ENABLE #7	Output TTL 0 – 5V (4mA)
6	LAMP OUTPUT #8	Vout range 0 – 5V (2.5mA)
22	LAMP ENABLE #8	Output TTL 0 – 5V (4mA)
37	LAMP OUTPUT GROUND #2	Ground
38	TRIGGER GROUND	Ground
7	TRIG_1_OUT	Output TTL 0 – 5V (8mA)
8	TRIG_1_IN	Input TTL 0 – 5V (only) 49.9K to Ground
23	TRIG_2_OUT	Output TTL 0 – 5V (8mA)
24	TRIG_2_IN	Input TTL 0 – 5V (only) 49.9K to Ground
9	TRIG_3_OUT	Output TTL 0 – 5V (8mA)
39	TRIG_3_IN	Input TTL 0 – 5V (only) 49.9K to Ground
25	TRIG_4_OUT	Output TTL 0 – 5V (8mA)
10	TRIG_4_IN	Input TTL 0 – 5V (only) 49.9K to Ground
40	TRIGGER GROUND	Ground
41	TRIGGER GROUND	Ground
42	LASER POINTER	Output 5V up to 50mA out
43	NOT USED	NOT USED
26	NOT USED	NOT USED
11	NOT USED	NOT USED
27	NOT USED	NOT USED
12	NOT USED	NOT USED
28	NOT USED	NOT USED
13	NOT USED	NOT USED

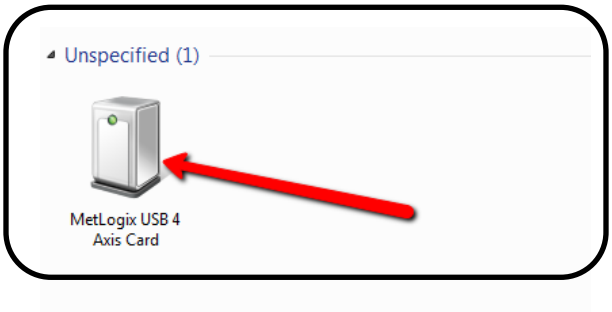
The Metlogix USB Encoder Interface hardware is required to interface encoders to a system running an M3 software package. The following driver installation procedure must be performed prior to achieving successful communication with the Metlogix USB Encoder Interface Hardware.

Driver Installation Procedure for the Metlogix USB Encoder Interface

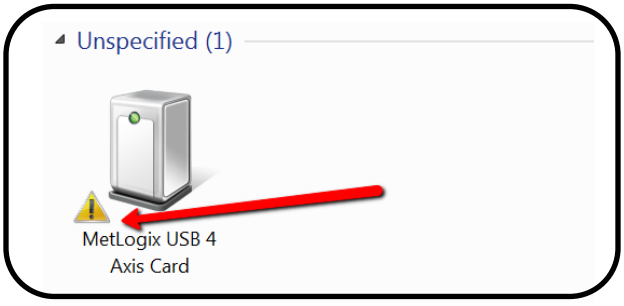
The following procedure applies to 32 and 64 bit versions of the Microsoft Windows 7 Operating System.

1. Boot the target PC to the Windows 7 desktop.
2. Connect the AC power supply to the Metlogix Interface Hardware.
3. Connect the Metlogix Interface Hardware to the target PC using the supplied USB cable. A device detect sound should be generated by windows indicating a powered device has been detected by windows.
4. If the target PC is connected to the internet, the FTDI interface drivers should be installed automatically from the internet using the Windows 7 driver search mechanism. Otherwise, install manually as described below.
5. Confirm successful installation of the Metlogix interface driver by viewing the Printers and Devices screen, from the start menu in Windows 7. If the device displays with a yellow alert icon, continue to the next step for manual installation of the interface driver. If the device display screen shows the “Metlogix USB 4 Axis Card” device, as seen below, you have successfully completed the Metlogix Interface hardware installation.

Successful Installation



Failed or Incomplete Installation



Manual Metlogix Driver Installation

6. In the device screen, or the device manager, right click on the device “Metlogix” and select Update Driver Software.
7. At the next screen select, “Browse my computer for driver software.
8. At the next screen click, “Browse” and point the windows Browse Window to the “FTDI” folder located in your M3 software installation directory.
9. Click OK, and then Next to proceed with loading the driver from the FTDI driver folder.
10. A warning message may appear indicating that Windows is unable to verify the publisher of the driver software. Click on “Install this driver software anyway”.
11. When the installation is complete Windows should indicate that the driver was successfully installed. Click Close.
12. The device should now appear in the Devices and Printers screen under the “Unspecified” category, and should be labeled “Metlogix USB 4 Axis Card”. The device is now installed and can be used with the M3 software.

Once the Encoder Interface is successfully installed, the measuring machine’s encoders can be connected to the Metlogix Interface Box. The encoders can then be configured in the M3 software “Axis” settings screen.

Axes Setup settings screen

1. Signal Type
2. Encoder Reference Marks/Startup Zero
3. Encoder Type and Encoder Parameters
4. Encoder Resolution
5. Encoder Direction

Encoder Signal Type is configured in the Axis screen of the M3 settings menu.

Select the encoder signal type that corresponds to the scales you are connecting to the M3 encoder interface box and M3 software. Each axis encoder is configured individually, confirm that the signal type is set correctly for each encoder connected to the system.

Note: Metlogix interface hardware may be configured for use exclusively with TTL or Analog type scale signals. In the event that no scale counts are received in the M3 software, please confirm that the Metlogix hardware support your scale type. Analog interface hardware may be configures for TTL, but not the reverse.

Encoder Resolution is configured in the Axis screen of the M3 settings menu.

Enter the correct encoder resolution for the scales you are connecting to the M3 system. Confirm that the unit type is set correctly for the encoder resolution value you are entering. The encoder resolution for each axis encoder is configured individually. While typically the encoder resolution for a given system is the same for each axis, confirm that the resolution is set correctly for each encoder connected to the system.

For Analog Scale types, confirm the desired interpolation factor for your system. Interpolation factors of 1X, 5X, 10X, and 16X are supported in your Metlogix hardware.

Note: Confirm that the "Units" field, below the encoder resolution field, is configured for the correct unit type for the resolution you have entered. The display resolution in the system has no bearing on the entered resolution value. This value is governed by the setting within this "Units" field.

***Correct encoder resolution settings can be confirmed by placing a "standard size" artifact on the measuring stage and comparing the observed measured value to the stated size of the distance traveled for the encoder axis being checked. The standard and observe values should approximately match. The "simple crosshair" can be positioned on the edge, the axis value in the software "zeroed", and the encoder displacement observed for the known distance travelled.

The following formula can be used to calculate the correct encoder resolution: **(Current Encoder Resolution) X (Stated Size/Observed Size) = Correct Encoder Res.**

Encoder Direction is configured in the Axis screen of the M3 settings menu.

Set the correct scale direction for each encoder axis on the machine by setting the "Reversed" flag to either Yes or No. Scale direction may be different for each axis. Confirm by observing the DRO count direction relative to the stage displacement of your measuring machine. If the count direction is incorrect, toggle the "Reversed" setting from No to Yes, or Yes to No.

Encoder Reference Marks are configured in the Axis screen of the M3 settings menu.

Reference marks may be used to establish a repeatable machine zero needed for NLEC or SLEC error correction, see those sections for details.

If reference marks are used:

For encoders equipped with reference marks, the correct reference mark type must be selected in the “Startup Zero” setup item. If you do not want to use them, select “None” from the “Startup Zero” list.

Encoders equipped with a single reference mark, or (exactly) two reference marks, should select the “One Reference Mark” item in the “Startup Zero” list.

For scales with “Distance coded reference marks” (multiple reference marks), select the “Two Reference Marks” item in the “Startup Zero” list.

For systems being configured for use with Acurite Encoders, with distance coded reference marks, the “Acurite Encoder” field should be set to “Yes”. This will ensure that the proper reference mark algorithm is applied for your scales.

Important: Any system being configured for use with distance coded reference marks requires that the correct pitch, fixed increment, and encoder parameters be configured for the scales being used. The manufacturer’s scale specifications should indicate these scale characteristic. Please contact your Metlogix representative for any additional assistance required in configuring these scale parameters.

Hard Stop machine zero

For systems with or without references marks, a Hard Stop machine zero, or “Home”, position can be established at startup by selecting “Stop” from the “Startup Zero” list.

**When the M3 software loads, any system configured for reference marks, or set for “Stop”, will automatically prompt the user to cross reference marks or to position at machine zero. Additionally, pressing the “Set Machine Zero” button, found in the main settings screen, will initiate a homing sequence, and prompt according to the parameter that is chosen in “Startup zero”.

Setting machine zero to a specific position

Once reference marks have been configured, a Machine Zero offset can be calculated by pressing the “Use stage position” button from within the Axis setup screen. The Machine Zero offset value will be calculated based on the current stage position and will be displayed in the “Machine offset” field in Encoder Counts.

Camera Setup

■ Digital camera's used must be properly installed and configured for use with the M3 software. This requires that all drivers and utilities for the camera being used are installed successfully.

■ All cameras interfaced to VED enabled M3 systems must be fully Direct Show(DX9) compliant camera devices. This can be achieved by connecting Direct Show digital cameras direct to the system or by converting analog camera sources(NTSC/PAL) to digital streams using a third party video conversion device. Video signals should be capable of being rendered in the Operating System using a Direct Show supported preview application such as Microsoft AmCap.

■ Confirm valid image by ensuring that the aspect ratio for the video image is correct. Features that have a circular shape should appear as such in the field of view. Circular features appearing "oval-shaped" or "stretched" are typically the result of improper camera frame size or incorrect aspect ratio setting for the display device being used.

Set the Video Capture Source

■ Identify your Camera as the specified "Image Source" device in the M3 Video Setup screen, located in the main M3 settings menu.

■ Select the name of your camera manufacturer to load the appropriate SDK, or select "Direct Show" for a generic Windows DX9 device type.

■ A software restart is required to apply the Image Source setting.

■ The "Config" button in Video Setup will display the selected Image Source's properties page. Image settings can be adjusted for the selected camera from these screens.

Camera and FOV calibration can begin once the M3 software displays a valid video image.

Camera and FOV calibration Order Operation Protocol (OOP)

The following calibration hierarchy is listed in the order in which it should be performed. The procedural detail for each Calibration step is detailed following the chart below.

The “calibration” items below refer to the particular M3 software calibration to be used, from within Setup. The “proof” column represents the machine test used to confirm settings selection or calibration effectiveness.

Calibration	Proof
Encoder setup	Confirm encoder count and direction using the “simple crosshair” and a calibration standard, adjust encoder settings as needed.
Magnifications/Pixel Sizes	Measure a “calibrated” circle diameter and observe for accuracy for all magnifications. Confirm pixel squareness in Video Setup, by observing X and Y pixel size.
Camera Skew (@low magnification)	Mechanical camera adjustment should precede the Cam Skew procedure. Measure the same small circle at the extreme left and right side of the FOV. Check the Y axis offsets between the measurements.
Parcentricity/Parfocality	“Circle Overlap Test” Measure the same circle, in focus, at each magnification level. Confirm by observing the position offset between mag levels and across the mag range. Each magnification level should appear in focus across magnification range.
Field of View (FOV)	Quick test: Measure a small circle in the center of the FOV. Move the stage such that the same circle can be measured in each of the four corners of the FOV. Offsets are caused by FOV errors in the optics, such as spherical aberration. Confirm correction by evaluating pre and post correction results.
Shape (circle and square)	OEM specific test method.

The “Video” settings screen (Camera calibration items)

1. Magnification Setup
2. Pixel Calibration
3. Camera Skew Calibration
4. Optical Settings(Parcentricity/Parfocality)
5. Field of View(FOV) Calibration

Video Settings:

6. Part View/Markup Overlay
7. VED Stitch Spacing
8. Display pixel resolution in corner
9. Auto Name Archive Images
10. Auto Focus Configuration

1) Magnification Setup

The M3 software supports multiple magnification levels. When more than one magnification is used, each needs to be identified, by a user specified name, and calibrated for pixel size independently. Starting from the highest magnification, perform a pixel calibration(see below), switch to the next lowest magnification, calibrate, and so on..

Magnifications are created and named in the “Magnification” setup screen. The “Magnification” setup screen button is located in the main M3 settings menu. The on screen keyboard (or USB keyboard) may be used for alpha entry.

Note: One default magnification(M1) is always created for the M3 system. This magnification can be renamed. Magnifications may only be deleted if there are more than one.

Use the “New” button on the right side of the screen to add new magnifications to the system.

Use the magnification selector in the top right corner of the screen to toggle existing magnifications, and to rename them if desired.

Use the “Delete” button on the right side of the screen to delete existing magnifications. One magnification will always exist.

Once magnifications have been created and named, all magnifications will be available for selection from all magnification dependent setup screens. (e.g pixel cal, FOV cal, etc..)

2) Pixel Calibration

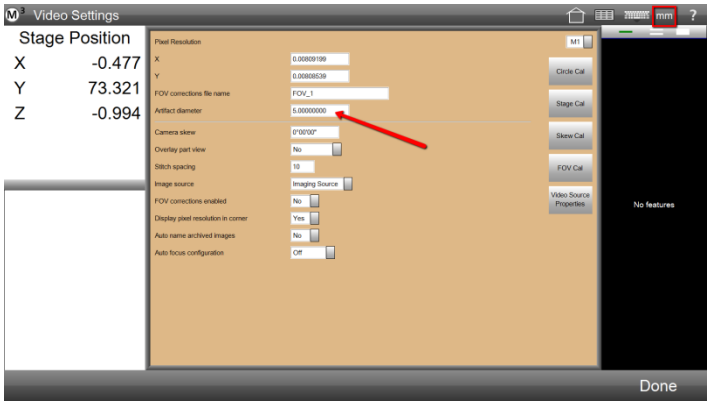
Pixel size may be determined for each magnification through the use of one of two possible methods: Circle based or Stage based calibration, as described below.

2a) Circle-based Pixel Calibration

Circle-based pixel calibration is performed in the Video Setup screen of the M3 settings menu.

For systems with multiple magnifications, set your machine and software to the highest magnification to be used. The “magnification selector” is located in the top right corner of the Video setup screen.

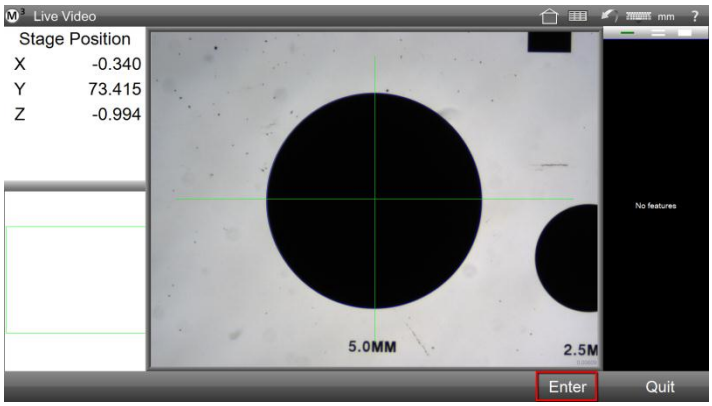
Enter the calibration artifact diameter into the “Artifact diameter” field. The entered value should be in the unit type of the currently selected display unit type. For systems set to display in inch, the artifact value should be entered in inch.



-Press the “Circle cal” button, located on the right side of the screen.

-The M3 software will exit to Live Video and display a target crosshair in the center of the field of view.

-Position the crosshair at the center of the target calibration artifact. A blue active measure circle should appear around the edge of the target artifact.



-Press the “Enter” button to confirm calibration.

-The M3 will return to the Video setup screen, indicating the calculated X and Y pixel size for the currently selected magnification level.

The currently selected magnification has been calibrated.

Repeat the above procedure for each magnification to be calibrated in the system.

2b) Stage-based Pixel Calibration

Stage-based pixel calibration is performed in the Video Setup screen of the M3 settings menu.

Note: X and Y stage based Pixel calibration requires that the Encoders have been properly configured in the M3 software. Resolution and Count Direction should both be confirmed prior to proceeding with the pixel calibration.

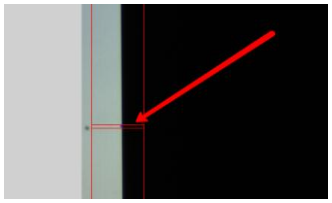
The M3 software supports multiple magnification levels. When more than one magnification level is used, each magnification level needs to be identified, by label name, and calibrated independently. Starting from the highest magnification, perform a pixel calibration, switch to the next lowest magnification, calibrate, and so on..

-Set your machine and software to the highest magnification to be used.

-Select the “Stage cal” button from the Video setup screen to begin pixel calibration routine.

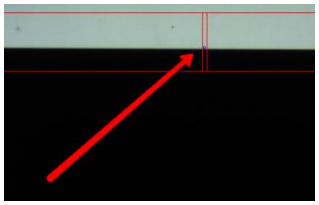
-The system will exit to the live video view, and place the x axis teach tool along the left side of your field of view.

-Position the stage so that an in-focus, sharp, vertical edge crosses through the opening in the center of the pixel calibration tool. A small, blue, candidate point indicator will appear when the edge is properly in position. Press the “Enter” button, or the screen, to enter the calibration point.

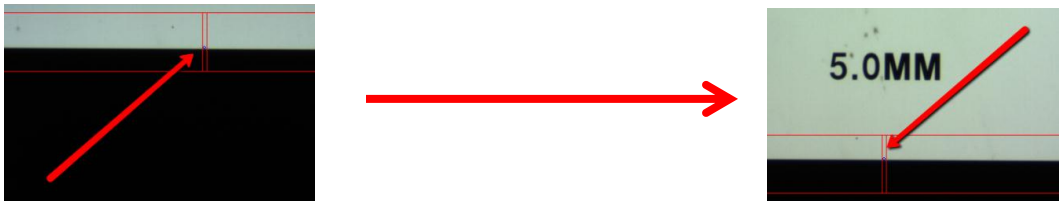


-The calibration tool will then move to the right side of the field of view. Drive the stage in the x-axis, taking care not to move the y-axis, until the calibration tool rests over the same vertical edge. Press “Enter”, or the screen, to capture the second x-axis calibration point.

-The calibration tool will now move to the top of the field of view. Position the stage so that an in-focus, high contrast, horizontal edge crosses through the opening in the center of the pixel calibration tool. A small, blue, candidate point indicator will appear when the edge is properly in position. Press the “Enter” button, or the screen, to enter the calibration point.



-The calibration tool will move to the bottom of the field of view. Drive the stage in the y-axis, taking care not to move the x-axis if possible, until the calibration tool rests over the same horizontal edge. Press “Enter”, or the screen, to capture the second x-axis calibration point.



This completes the current magnifications pixel teach routine. If more magnifications are to be used, select the next (lower) magnification, and repeat the pixel calibration process until all mag levels are successfully taught.

3) Camera Skew Calibration

Camera skew calibration is performed in the Video Setup screen of the M3 setup menu.

Camera Skew Calibration should be performed for systems that exhibit rotational error due to misalignment in the camera mounting system of the machine.

-Select the “Skew Cal” button from the Video setup screen.

-Position an in-focus, high-contrast, horizontal edge within the circular skew calibration video tool at the left of the field of view. The tool will turn green, and a yellow candidate point indicator will appear when positioned correctly. Press the “Enter” button, or the screen, to enter the skew calibration point.

-The skew calibration video tool will move to the right side of the field of view. Drive the machine stage in the x-axis until the calibration tool is positioned over the previously acquired calibration point on the horizontal edge. Press the “Enter” button, or the screen, to enter the second, and final, skew calibration point.

The resulting camera skew offset value will populate the Camera Skew field in the Video setup screen.

3) Parcentricity and Parfocality Calibration (Optical Setting)

Parcentricity and parfocality calibration is performed by measuring a sample of reference features, and then importing them into the M3 system. This feature data is then used to calculate the appropriate offset values for maintaining parcentricity and parfocality in a given system.

***Note**:* This calibration requires that the pixel size, for each magnification, be successfully established.

-Set the measuring machine, and the M3 mag selector, to the highest magnification.

-Position, in the middle of the field of view, the largest circle calibration artifact, that can be imaged completely within the screen.

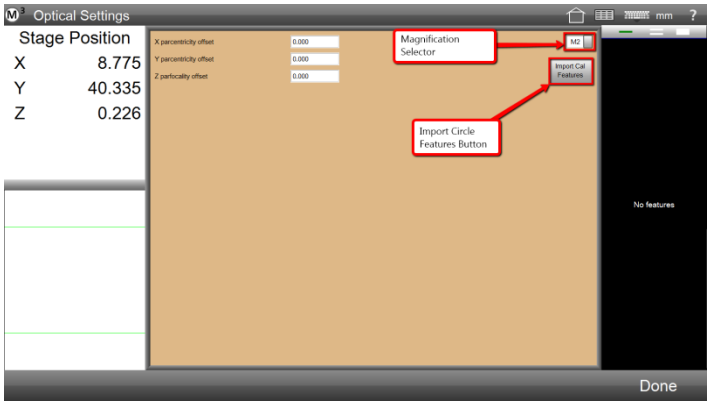
-Measure the circle using the “Measure Logic” video probe.

-Select the next magnification down, and repeat the circle measurement. Do the same for each magnification until the lowest mag is reached.

-You should have one circle feature in the feature list for each magnification level currently configured in the system.

-Go to the M3 setup menu and select the “Optical Settings” button. The “Optical Settings” setup screen will only be available when more than one magnification is defined in the system.

-Set the magnification to the mag label name that represents your highest magnification level.



-Press the “Import cal features” button, located on the right side of the screen.

-The high magnification will now be used as the reference magnification. Toggling to different magnifications will display the X, Y, and Z offset values between the currently selected magnification, and the reference magnification.

The calibration is complete. To confirm calibration results, see the OOP hierarchy, and test suggestions, at the beginning of the Camera Setup section.

5) Field of View (FOV) Calibration

The Field of View (FOV) correction capability in the M3 software is designed to correct for, and to minimize, the effects of spherical aberration, lens imperfection, machine mechanics, and sensor defect, for a given video measuring machine.

The correct calibration grid should be selected to match the specification of a given video measuring machine. Factors such as stage size, magnification range, camera sensor size, and accuracy and repeatability requirements, will all play a role in choosing an FOV calibration artifact. Please contact your Metlogix representative for assistance with this selection.

FOV Calibration Procedure

Fixture the grid to the measuring stage, confirming that artifact movement is minimized or eliminated. The grid position on the stage should be aligned as much as possible to the measuring stage. For machines with proper camera alignment, the grid should appear aligned in XY within the live video image of the M3 software.

Center the artifact grid in the FOV, confirming that equal space exists around the horizontal and vertical sides of the FOV.

Select the number of rows and columns to be used for the FOV calibration. The number of rows and columns that fit in the FOV will vary based on the magnification level used, select an appropriate number of rows and columns for each calibration of a magnification.

Select the “Video” setup button from the main M3 setup menu.

Note the default FOV file name displayed in the “FOV corrections file name” field. This filename can either be used, or a new file name can be entered by clicking in the field and entering the desired FOV correction file name.

Press the “FOV cal” button, located on the right side of the Video setup screen.

Enter the grid spacing and circle artifact diameter for the FOV calibration grid being used.

Enter the number of rows and columns to be used for the FOV calibration being performed. This number will be based on the maximum number of rows and columns that within the FOV.

Press the “Teach” button, located on the right side of the screen.

Position the crosshair-grid overlay on the FOV grid, confirming the green crosshair is as near center(as possible), for each calibration circle in your grid.

Note: For systems with moveable stages, the machine stage position can be adjusted to alight the crosshair and circle grids. In this case the stage should be completely immobilized prior to completing the “Analyze” and “Calibrate” steps of the FOV procedure.

Note: For systems with stationary measuring stages, the calibration grid will need to be adjusted for proper alignment with the FOV crosshair grid. Once aligned, the grid should be securely fixtured prior to completing the “Analyze” and “Calibrate” steps of the FOV procedure.

Once the grid is aligned with the green crosshairs, press the “Analyze” button.

Indicators of positional error will appear, as blue direction lines, at each calibration crosshair location. The blue lines indicate the direction, and relative amount, to be applied at each correction position.

Press the “Calibrate” button to generate the FOV correction file and enable the FOV correction.

The FOV correction file name, and enable state, can always be observed in the Video setup screen.

6) Part View Overlay

The M3 software can be configured to overlay the part view feature drawings, and their corresponding annotation, over the live video image. This setting is found in the Video setup of the M3 settings screen.

Enable Part View Overlay by setting the “Overlay Part View” setting to either “Everything” or “Annotations”.

The “Everything” setting will overlay both feature drawings and annotation elements. The “Annotations” setting will overlay only the annotation elements.

7) VED Stitch Spacing

The **MeasureLogic™** probe can be configured for custom stitch spacing. Stitch Spacing is defined as the distance, in pixels, between each point captured, as part of Measure Logic probe measurement. The spacing is configured in the Video setup of the M3 settings screen.

The default stitch spacing is 10 pixels.

Set the desired number of pixels between VED stitches by changing the value in the “Stitch Spacing” field in the Video setup screen.

8) Display pixel resolution in corner

Display pixel resolution in corner setting configures the M3 software to display the pixel resolution, for the current magnification, in the bottom right corner of the live video image.

Set the “Display pixel resolution in corner” item to “Yes” to display the resolution value for the current magnification in the bottom right corner of the live video window.

9) Auto name archived Images

When set to “Yes” the M3 software will automatically assign a file name to the exported image file according to the following convention:

“Img(x).bmp”, where x is an automatically assigned image number. The exported .bmp image will, by default, be sent to the “Images” folder in your metlogix file output folder.

When set to “No”, all image archive commands will trigger the Windows 7 save file dialog box. Enter the desired filename, choose an export location, and press Save, to export the archived image

10) Auto Focus configuration

The proper camera interface hardware is required to utilize “latched” or “triggered” auto focus functionality. If you are unsure as to whether the camera and measuring machine are equipped for use with auto focus, contact your Metlogix representative for assistance.

The Auto Focus configuration setup item configures the M3 software for use with the Auto Focus feature. The following (4) choices are available for selection from the Video setup screen:

Off: Disabled the auto focus functionality for the system.

Latched: Configures the M3 software for a latched frame camera interface.

Triggered: Configures autofocus for a triggered frame camera interface.

Free: Configures autofocus for a software frame latch based autofocus functionality.

Stage Correction

Repeatable errors of measurement due to stage characteristics such as straightness, squareness, and linearity can be corrected in the M3 software using one of the supported Stage Correction methods. These corrections cannot compensate for dynamic errors such as temperature variation or mechanical backlash.

Supported stage correction methods include;

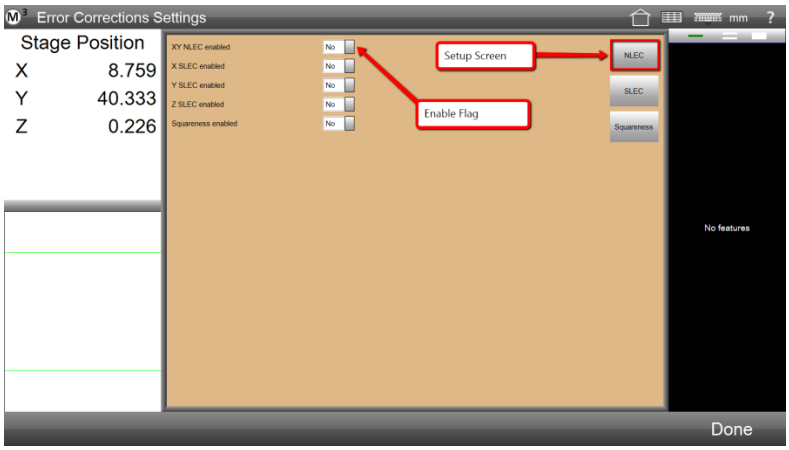
- Non-Linear Error Correction (**NLEC**)
- Segmented Linear Error Correction (**SLEC**)
- Orthogonality (**Squareness**)
- Linear Error Correction (**LEC**)

Note: NLEC and SLEC stage corrections require that the machine have the ability to set a repeatable machine zero. The machine zero must be set at the start of any M3 software session where the corrections are to be applied. See the "Reference Marks" section in the Axes Setup section of this document for more information.

NLEC (non-linear error correction)

NLEC corrects for measurement error in the XY measuring plane by applying correction coefficients generated by measuring a traceable calibration grid. The coefficients are produced by comparing the measured "observed" locations on the grid to the certified, "actual" locations.

Note: **If NLEC is used, no other stage corrections are necessary in the XY plane.**



The correction data file is named NlecNew.txt and is located in the settings directory within the Metlogix file output directory. This file is encrypted and may not be changed manually. In a new system, the file is a placeholder only, and will be overwritten when the calibration is performed. The presence of the file does not necessarily indicate the stage has been calibrated.

Calibration may be performed using non-Metlogix software and applied in the M series. This procedure is described in a later section.

The following is a suggested procedure for calibration using the M3 to collect the calibration data.

Preparation for calibration (or recalibrating):

1. Configure the M3 software for a repeatable machine zero position using either a hard stop or reference marks.

2. If you are calibrating from a grid for the first time, be sure that NLEC is disabled, in the Error Corrections setup screen.

3. After homing the system (setting machine zero), create a program that measures the calibration grid.

   Details: First record datum steps (skew on bottom row and zero X and Y at lower left). Delete all features but the zero. Then measure the artifact in serpentine order. At the completion you will have all the "actual" positions. You may wish to apply position tolerance to the features so that the accuracy can be easily assessed. A report may be printed to include with the systems calibration documentation.

4. Create an ACF file if the grid you are using has certified positions (optional)

   Details: The ACF file should contain only the grid positions you are actually using in "raster" order from the bottom row. The first position (corresponding to the lower left) should be zero in the ACF file. The ACF file is named grid.acf and should be placed in the settings directory of the Metlogix file output folder. If the file is not found, the calibration will assume that the calibration grid is perfect.

5. Enable the NLEC status indicator in the NLEC setup options.

After all of these preparations, and with the M3 feature list containing only the calibration measurements:

Press the Import button in the NLEC setup options to perform the calibration. The actual features are compared to the certified or nominal positions and the NLECNew.txt data file is written to the settings directory. If the calibration is successful, a success message will be displayed. In addition the corrections will be enabled.

Note: Take care not to press the Import button a second time.

Exit from the system setup and confirm that the corrections are active (the indicator should display a green checkmark).

Checking the NLEC correction

Run the program that you created to do the calibration, and note the accuracy by examination or a report with tolerances.

The calibration routine may be performed incrementally. The import may be performed again using these results (measured with corrections active), and the data file will be adjusted accordingly.

If the calibration is not successful (no success message), please contact your Metlogix representative for help in finding the cause.

Using NLEC.TXT from another calibrating system:

Important preparation: If you plan to use an existing correction file (NLEC.TXT), the position of the machine zero in X/Y must be (approximately) the same as that used in the calibration process. Ensure this (while using the calibration software) by making temporary marks on the stage to allow you, at any time, to move to the zero position that was present during calibration. After configuring the Metlogix readout on the same stage, if the DRO does not read zero at this position, use the zero offset in the axes setup to "move" the home position. A match of position within 0.250 mm will be adequate for typical systems.

Assuming the Metlogix system has not been calibrated already (see last section), when the NLEC.TXT file is copied to the M3 settings directory, it will be imported the next time the system is started. An "NlecNew.txt" file will be written to the settings directory with the correction data extracted from "NLEC.TXT".

It is possible to "force" the "NLEC.TXT" file to be re-imported by deleting the "NLECNew.txt" file from the settings directory (or moving it to a different directory). The import requires that the software be restarted.

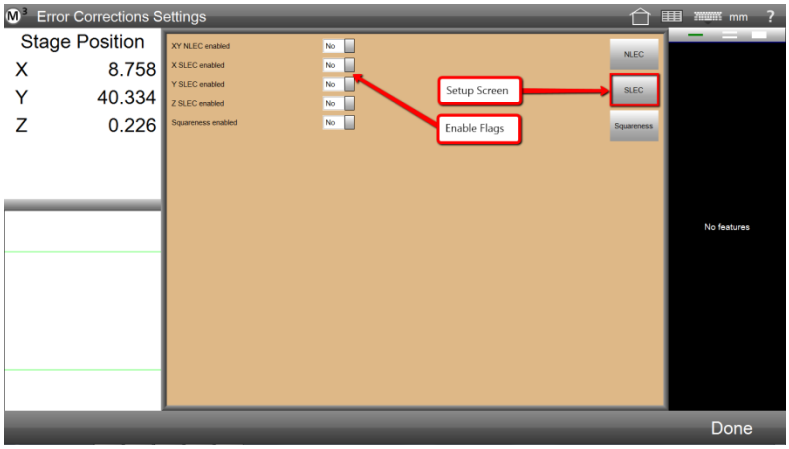
The import and conversion of "NLEC.TXT" does not enable NLEC corrections. To confirm the corrections, enable NLEC, in the corrections setup screen, and measure the features of the grid.

SLEC (segmented linear error correction)

SLEC corrects for nonlinearities of a single axis. The entire range of a given axis is typically broken into equal length segments. The linear errors, which may vary between segments, are corrected according to which segment is being traversed. Standard and observed position values, generated from measurement of (certified) positions along a linear calibration artifact, are entered for each segment or station.

***Note:* X and Y SLEC are not needed if NLEC is used.**

SLEC calibration and correction requires that the axis have a repeatable machine zero position. Before starting the calibration, use axis setup to define a startup zero method and use it to establish home or machine zero. You may also use the offset fields to place the home position wherever is convenient. That optional placement must also be done before the SLEC calibration.



For the original calibration, be sure to disable the SLEC correction under the corrections setup page. It is possible to recalibrate later on using corrected data. That is called an incremental calibration. See comments in step 5 below.

Calibration procedure:

1. Manually align the calibration artifact with the axis to be calibrated. The artifact will allow a number of position measurements in relation to a part zero measurement at the minimum end of the artifact. Perform a skew on the artifact for best results, and perform a datum zero.
2. After the datum operations, delete the datum features except for the zero position and measure all the desired positions in ascending order. If the original zero was deleted, it should be re-measured first. The calibration/correction can use equal or unequal segment sizes along the same axis.
3. For each station (position), enter a nominal position for each of the actual features (in the tolerance views). Set a tight tolerance if desired as the same procedure will be used to confirm the calibration. Set the nominal position of the zero feature to zero. It is only necessary to set nominal and optional bidirectional tolerance on the axis being calibrated.

4. Save the part file for future use if desired. In the correction setup page, select the axis you are calibrating and press Import. If the feature data is correct, the system will display the stations according to the actual and nominal entries of the part. A message will be displayed indicating success and the correction will be enabled for the axis.
5. You may run the part again (i.e. as a program) to confirm that the correction is working. If you plan to recalibrate the axis in the future, it is important to place the calibration artifact at approximately the same position on the stage.

Incremental SLEC calibration procedure

The incremental calibration procedure is identical to the initial calibration outlined above except that the artifact is measured **with SLEC correction enabled** for that axis. When the features are imported, the software will adjust the corrections and display the correction data "as if" the calibration was absolute. Run the part file a second time to confirm that the correction is accurate.

LEC (linear error correction)

Linear error correction can be considered a simple subset of SLEC. LEC applies a singular correction coefficient over the entire range of a single axis of travel on a machine stage. The coefficient is calculated based on a single set of standard and observed values from a calibration artifact. **LEC is not needed if using NLEC or SLEC on the axis.**

Simple LEC may be satisfactory in some systems and is easy to calibrate. A repeatable machine zero position is optional. There are two methods to perform the calibration.

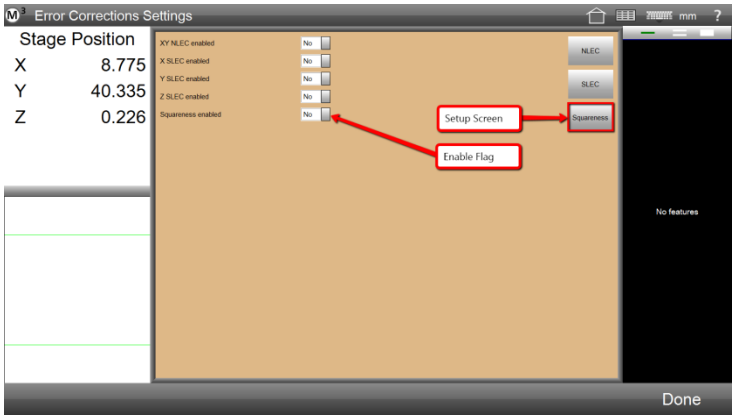
1. Perform all of the steps of SLEC calibration, but measure just one position in addition to the zero position. The SLEC import is used, but there will be exactly two features in the feature list. Don't forget to select the axis before pressing Import. For the best accuracy, use as long a length as possible to calibrate LEC.
2. Skew the part and then measure **a distance feature** the length of the part. Delete any other features (keep only the distance) and enter tolerance data (nominal value and optional tolerances) for the axis you are calibrating. Use the SLEC Import button. Don't forget to select the axis before pressing Import.

Either method will display LEC data in the correction table at left. A success message should be displayed, and the correction will be enabled. You may re-measure the length to confirm that correction is working.

Orthogonality (Squareness)

Squareness correction compensates for lack of orthogonality between the X and Y axis on a machine stage. A length artifact is measured both at 45 degrees and 135 degrees and the observed difference between the two lengths (they should be identical) is used to calculate an axis angle value and squareness correction coefficient.

This calibration is done after LEC or SLEC. It is not needed if using NLEC.



Squareness calibration and correction does not require a machine zero. It is assumed that the angle between the X and Y axis is the same regardless of the current position. A length artifact is used for the calibration, but the actual length does not need to be known. It is only necessary that the length is able to be measured when placed on the stage at a 45 degree angle and at 135 degrees.

Calibration procedure: (disable squareness correction before performing the calibration)

1. Place the length artifact on the stage at a 45 degree angle. It may be convenient to define a part zero to help in this placement, but do not use the skew or alignment buttons. Measure the length as a distance feature. A rule of thumb is that the X and Y components of the distance are not to be more than 5% different. Delete all features except the distance. This is known as the radial distance.
2. Place **the same length artifact** on the stage at 135 degrees. Again, be sure that the placement is such that the X and Y length components be equal to within a 5% margin. Measure the length as a distance feature and delete any intermediary features. This is known as the tangential distance. There are now two distance features in the feature list.
3. From within the “Error Correction” setup screen, use the Import button in the “Squareness” screen to find the Squareness angle. Note that the distances may be entered manually if desired.

   Note: It is the “L” coefficient of the distance that is used to perform the calibration.

4. A success message will be displayed and the correction will be enabled. To confirm the calibration, re-measure the length at 135 and 45 degrees. The length should be nearly the same in either orientation.

Other Software Settings

The following section will cover the remaining software settings found in the M3 settings screens. All general settings discussed below can be accessed from the corresponding M3 Settings screen.

- Factory and System Options
- Contact Information
- About Screen
- Languages
- File Locations
- Light Control (only available for Light Control enabled systems)
- Measure
- Part View
- Printouts
- Export
- Programs
- Desktop
- Display Formats
- Sounds
- Colors

Factory and System Options

-“Factory” and “System” options provide access to the Factory Options and System Options enable screens. Options in these screens can only be enabled if the connected Metlogix hardware has been authorized, and configured, for use with a given option. Access to the Factory Options and Systems Options screens is only available for the Super Admin account login.

Contact Information

-The “Contact Information” screen provides access to the Contact Information form. This form can be filled out with information for an OEM, distributor, or dealer. Name, Address, Phone, Email, and Website information can all be entered. Information added to this Contact Information form will be displayed in the system’s “About” screen.

Note: It is recommended that, once Contact Information is entered for an OEM or distributor, that access to the “Contact Information” setup screen be restricted for standard User logins. This will prevent unauthorized manipulation of the contact information. See the M3 Security and Account Setup section earlier in this document for more information on defining user privileges.

About Screen

-The “About” setup screen contains detailed system information for the current M3 software installation. The software version number and release date, currently enabled system options, and user name currently logged in, can all be viewed from within this screen.

-Specifics on the connected Hardware can also be viewed from this screen by pressing the Hardware button.

-Contact Information entered in the “Contact Information” setup screen will be displayed in the “About” screen.

Languages

-The M3 software provides multi language translation. Full translations are available for the following 9 languages: English, Spanish, German, French, Italian, Spanish, Portuguese, Russian, Traditional Chinese, and Simplified Chinese.

-Select the desired Language from the “Languages” settings menu. The translation of screen text will occur immediately, no software restart is required.

File Locations

-The “File Location” setup screen is used to configure target locations, on the system, for saving part files, data exports, archived images, and settings backup files.

-Click the item you would like to select a target folder location for.

-Choose the target location from the Windows Browse dialog box and press OK.

Light Control

-The M3 software supports 6 channels of analog light control. Light control channels are defined as diascopic(sub-stage), episcopic(coaxial), or Quadrant(ring).

-The quadrant light channels include four, discrete, channel designations where each ring quadrant’s illumination can be ramped independently.

-The M3 light control system utilizes a 0-5 Volt analog interface, and supports line output enable/disable. (See diagram and pinout on page 7)

-Machine lighting sliders are either enabled or disabled by setting the “Has light channel” field to “Yes” or “No”. Light sliders set to “No” will not be displayed in the Light Control UI.

-Each light control path to be used is specified by a channel output line number. The output line number is entered into the corresponding control field, either episcopic(1 channel), diascopic(1 channel), or Quadrant(4 channels).

-When control line enables are being utilized, set the “Lights have enable/disable” field to “Yes”. When enable/disable is being used, the active bit state can be defined by entering a “1” or “0” into the “Light enable state for output line” field.

Measure

“Auto Enter” count down time(seconds)

This parameter controls the duration of time, in seconds, required for the auto point enter, countdown timer to expire. This parameter controls Auto Point entry for both measuring mode, and program playback mode.

"Auto Enter" no movement threshold(seconds)

This parameter controls how long, in seconds, a target position must be maintained to enable the start of the "Auto Enter" countdown timer. This parameter can be thought of as a dwell time requirement setting for activating the Auto Enter timer.

Automatically save UCS

This setting controls the behavior of the "multiple reference frame" system in the M3 software. Please see the M3 User Guide pages 45 and 46 for detailed information on the Auto Save UCS setting.

Statistical Point Filtration occurs during the calculation of features from probed points. Least squares fits (in all multi-point features) are filtered by default while alternate fits (circle/arc, line, and plane) do not normally use filtering. Alternate fits include "Best Form" and Min and Max circle/arc. Use of filtration is controlled with the enable items.

Sigma Factor

For both least squares and alternate fits, the sigma factor is used as a multiplier for the standard deviation of the error of the probed points in relation to the feature calculated from those points. Three sigma means that a point may be filtered only if the error of that point is greater than the standard deviation of error multiplied by three. A larger number means less filtration.

Proportion Factor

For both least squares and alternate fits, the proportion factor simply is the fraction of the probed points set used to calculate a feature that will be retained, even if one or more of those points retained are outliers. The fraction value has a maximum of 1.0, in which case, no points will be filtered. 0.8 means up to 20% of points may be filtered.

Note: statistical point filtration also requires a minimum number of points to start with (16 points) and point error greater than the estimated measure repeatability (based on the encoder resolution or pixel size (in video measuring systems).

■ **Enable Tolerance places:** When enabled, when a nominal value is entered by rounding the actual, the system will automatically insert +/- tolerance values based on the rounding digit. The tolerance values to be used are specified in a "lookup table" accessed from the nominal entry screen (the x.xx button).

For example, if an actual diameter is 4.2493, and the requirement is for 2 place tolerances, the user would press the "4" in the nominal entry screen, yielding 4.25. Since this is the second place digit, the system would then enter the +/- tolerance values specified in the table (0.01 by default). Each coefficient may use a different number of places according to the rounding function.

■ **Tolerance Places on New Part:** The table used to specify the tolerances applied for each place may be set to default values when a "New Part" is created or kept indefinitely to apply to all parts.

■ **Allow ++/-- tolerance entries:** This setting enables ++/-- entries on circle diameters only.

Part View

The “Part View” settings screen contains settings for the following part view specific display options.

■ **Display Field of View Indicator:** Set this field to “Square” to display a green Field of View Overlay in the part view. When viewing the part view the green FOV indicator will represent the current FOV region relative to the total part view. For Optical Edge enabled systems the FOV indicator can also be set to “Round” or “Crosshair” style. The field of View Diameter, Width, and Height can be configured for non-VED systems, using the appropriate fields. Set this option to “No” to hide the FOV indicator in the part view.

■ **Display Grid:** Set this field to “Yes” to display grid lines on the part view. Set to “No” to hide the grid lines in the Part View.

■ **Grid Spacing:** Enter the desired spacing for the grid density. The currently selected unit display type is used for the grid spacing value entered.

■ **Display Origin Indicator:** Set this field to “Yes” to display the Origin Indicator in the part view. The Origin Indicator is a small symbol that will indicate the location of the currently set datum zero position. This symbol will shift in the part view when a new zero position is set. The axis with (2) dot indicators represents the Y-axis, the axis with (1) dot indicator represents the x-axis.

■ **Display Scroll Bars When Necessary:** Set this field to “Yes” to display scroll indication bars on various software screens when content extends beyond the currently viewable space. Set this field to “No” to hide the scroll bars.

■ **Allow Gesturing:** Set this field to “Yes” to enable the Gesturing “Pie” menu for use in the part view. Initiate the Gesturing Pie Menu by clicking/pressing and holding on a feature in the part view. The Gesture menu will appear with options for constructing features or for adding annotation to features in the part view. Set this field to “No” to disable the Gesture Pie menu.

■ **Highlight Parent Feature:** Set this field to “Yes” to enable feature highlighting for construction parents. When a distance is constructed between (2) circles, the distance is the child feature and the circles are the parent features. When enabled, this option will cause the circles to be highlighted when the distance construction is selected. When set to “No” no feature highlight will appear.

■ **Animate Selected Features:** Set this field to “Yes” to configure the software to animate selected features in the part view. Features selected either in the part view or selected from the feature list will cause the drawn feature in the part view to display as rotating dashed lines. Set this field to “No” to disable animated features.

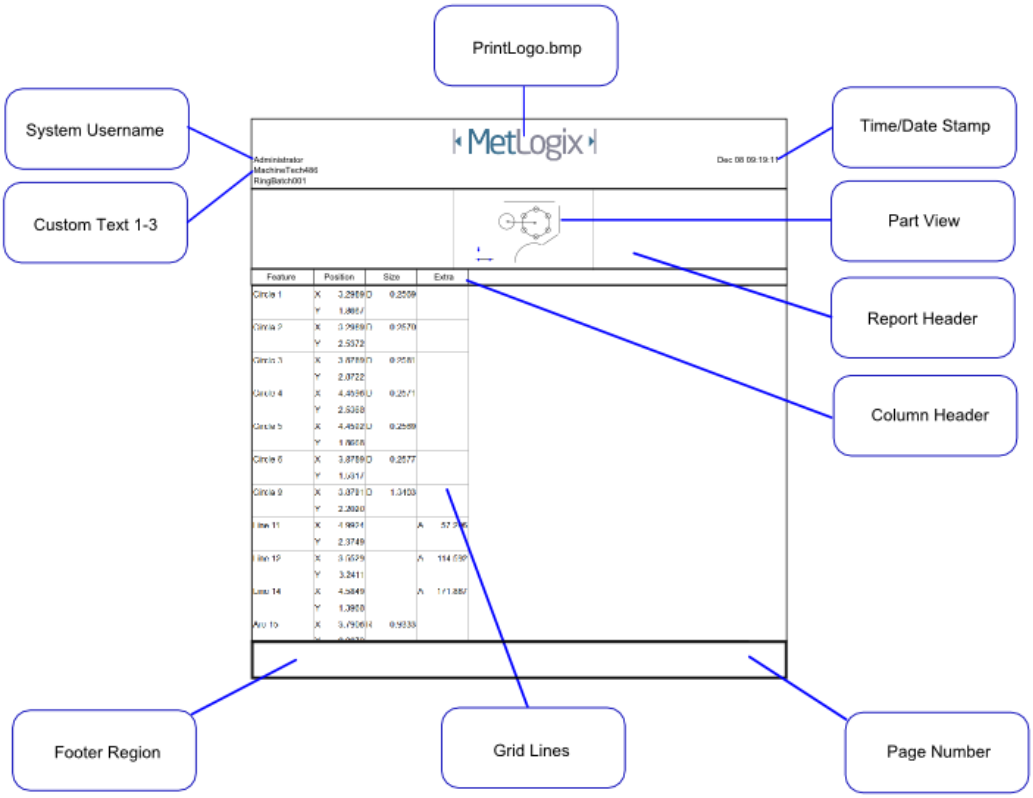
■ **Display Size in Corner:** Set this field to “Yes” to display the size, in the selected units, of the current part view. Set this field to “No” to remove the size reading from the part view.

■ **Display Overview Map:** Set this field to “Yes” to enable a small part view thumbnail in the lower right corner of the part view window. This part view thumbnail will always display a full map of the current features.

Printouts

The “Print Settings” screen contains settings fields for the following Report Printing options:

Refer to the report sample below for the location of the various report elements within a report.



■ **Print Report Header:** Set this field to “Yes” to include the report header in your report printout. Additional items, listed below, will affect what items are included in the report header. Set this item to “No” to omit the report header from printed reports.

■ **Print Column Header:** Set this field to “Yes” to include column headers in report printouts. The column header labels the contents of a report column by category. Some examples are X, Y, Deviation, etc…Set this field to “No” to omit the column header from printed reports.

■ **Print Grid Lines:** Set this field to “Yes” to include grid lines on printed reports. Set this field to “No” to have the grid lines removed from printed reports.

■ **Print Report Name in Header:** The report name referred to for this option is the report format type. This is found at the top of the report screen. It will be Standard, CSV, or European. This report name can be displayed by setting this field to “Left”, “Right”, or “Center” depending on the desired location or can be removed from the report header by setting the field to “No”.

■ **Print Bitmap (PrintLogo.bmp) in Header:** Set this field to “Left”, “Center”, or “Right” to include a custom bitmap image in the desired location of the report header. Set this field to “No” to omit the custom bitmap from the report header. Place the desired custom bitmap image, with the file name “PrintLogo.bmp”, into the root location of your M3 software.

■ **Print User Name in Header:** Set this field to “Left”, “Center”, or “Right” to include the currently “logged-in” user name in the desired location of the report header. Set this field to “No” to omit the username from the report header.

■ **Print Date/Time in Header:** Set this field to “Left”, “Center”, or “Right” to include the system date and time in the desired location of the report header. Set this field to “No” to omit the date and time from the report header.

■ **Print Part View with Data:** Set this field to “Top”, “Bottom”, or “Watermark” to include an image of the current part view in the desired location of the printed report. Setting the field to “Watermark” will print an alpha blended part view image underneath the report data. Set this field to “No” to omit the part view image from printed reports.

■ **Print Page Number in Footer:** Set this field to “Yes” to print page numbers in the report footer. Page numbers will only be printed when there is more than one page in the report. Set this field to “No” to omit page numbers from the report footer.

■ **Printed Part View Height:** Set this item to the desired size of the part view to be included with the printed report. This item can be set to 25%, 50%, 75%, or 100% of the native size of the part view image.

■ **Print Custom Text in Header/Footer:** Enter custom alpha-numeric information into these fields to be displayed in the report header or Footer. Custom text entered into these fields will always be aligned left and bottom in the report header. Leaving these fields blank will omit custom text from the printed report.

Export

■ **File Name:** Use this alpha numeric data entry field to enter the desired base filename to be used for file exports. “Auto-Number” index numbers will be appended to this base file name when “Append” or “Auto Number” target file types are used.(see below)

■ **Include Column Headers:** Set this field to “Yes” to include column headers in exported data report files. Set this field to “No” to omit column headers from exported reports.

■ **Target File Type:** Set this field to “Append” to append exported data to the existing target file. Set this field to “Overwrite” to overwrite the target file with a new file on each data export. Set this field to “Auto Number” to create a new file on each export that increments, starting with the Auto number file name identified below.

■ **Auto Number File Name:** Set this field to the desired file export “auto-number”. This file number will be appended to either the default file name, or a custom file name(see above). The number will automatically increment when the target file type is set to “Auto Number”.

■ **Prompt for Settings on Each Export”:** Set this field to “Yes” to configure the software to display the Print Settings screen at each file export execution. When set to “No”, the current settings configured in this screen will be used at each file export execution.

Programs

■ **Auto Name on a Run Part:** Set this field to “Yes” to enable part program auto-save functionality. The auto-save functionality will automatically save a part program when it is “played back” the first time. The part name prefix(below) will be used as the base file name for this auto-save routine. When set to “No” the system will not automatically save a part program upon initial playback.

■ **Part Name Prefix:** Enter the desired base part file name to be used when the “Auto Name on Run Part” option is enabled(above). The next part auto number setting(below) will be used to automatically assign an index number to part programs generated(saved) using the Auto Name on Run Part feature.

■ **Next Part Auto Number:** Enter the desired starting index number to be used with the Auto Name on Part Run feature. Subsequent Auto Name saves will increment this number using the same defined base part name.

■ **Target Zone Radius (pixels):** Enter the desired target zone size to adjust the size of the target circle displayed as part of the program playback navigation system. Enter the desired size in pixels to either increase or decrease the size of the target circle for playback.

■ **Minimal Acceptable Measurement points (percent):** Enter a value to specify what percentage of the total number of recorded points is required to be collected in playback, for playback to advance. At the system default of 75%, a feature initially measured from 100 points requires that 75 points are collected in playback in order to advance the program.

Desktop

The “Desktop” settings screen contains fields for customizing the appearance of your M3 software desktop.

■ **Display Measure View:** The “Measure View” setup item enables the DRO/feature detail display port. Set this item to be displayed to the left or right side of the main view port, or set to “No” to hide the measure view port.

■ **Display Part View:** The “Part View” setup item enables the part view display port. Set this item to be displayed to the left or right side of the main view port, or set to “No” to hide the part view port.

■ **Display Feature List:** The “Feature List” setup item enables the feature list display port. Set this item to be displayed to the left or right side of the main view port, or set to “No” to hide the feature list.

■ **Lock Window Layout:** When set to “Yes” the sizes of the view ports at the main M3 software desktop will be locked. When set to “No” re-sizing is permitted. Most view ports displayed at the main M3 software desktop can be resized. Press or Click and drag on the vertical view port dividers to resize the width of the left or right port panels. Press or click and drag on the horizontal view port divider to resize dual view ports on either the right or left view port panel.

■ **Display In/MM Button:** When set to “Desktop” the “In/MM” toggle button will be displayed in the toolbar at the top right of the Desktop. When set to “Extra” the “In/MM” toggle button will be displayed in the Extra menu. The extra menu button will be displayed when any of the display items are set to “Extra”. When set to “No” the “In/MM” toggle button will be hidden.

■ **Display DD/DMS Button:** When set to “Desktop” the “DMS/DD” toggle button will be displayed in the toolbar at the top right of the Desktop. When set to “Extra” the “DMS/DD” toggle button will be displayed in the Extra menu. The extra menu button will be displayed in the bottom toolbar when any of the display items are set to “Extra”. When set to “No” the “DMS/DD” toggle button will be hidden.

■ **Display Cart/Polar Button:** When set to “Desktop” the “Cart/Polar” toggle button will be displayed in the toolbar at the top right of the Desktop. When set to “Extra” the “Cart/Polar” toggle button will be displayed in the Extra menu. The extra menu button will be displayed when any of the display items are set to “Extra”. When set to “No” the “Cart/Polar” toggle button will be hidden.

■ **Display On-Screen Keyboard Button:** When set to “Desktop” the “Keyboard” button will be displayed in the toolbar at the top right of the Desktop. When set to “Extra” the “Keyboard” button will be displayed in the Extra menu. The extra menu button will be displayed when any of the display items are set to “Extra”. When set to “No” the “Keyboard” toggle button will be hidden.

■ **Display Feature Lock/Unlock Button:** When set to “Desktop” the “Feature Lock/Unlock” toggle button will be displayed in the toolbar at the top right of the Desktop. When set to “Extra” the toggle button will be displayed in the Extra menu. The extra menu button will be displayed in the bottom toolbar when any of the display items are set to “Extra”. When set to “No” the “Feature Lock/Unlock” toggle button will be hidden.

■ **Display” DisplayLogo.bmp”:** When set to “Yes” a bitmap file named “DisplayLogo.bmp” can be displayed in the top right of the M3 software desktop. The file to be used should be named “DisplayLogo.bmp” and placed in the root location of the M3 software. Set the Display “DisplayLogo.bmp” to “No” to hide the bitmap image.

■ **Display Reference Frame Button:** When set to “Desktop” the “Reference Frame” toggle button will be displayed in the toolbar at the top right of the Desktop. When set to “Extra” the toggle button will be displayed in the Extra menu. The extra menu button will be displayed in the bottom toolbar when any of the display items are set to “Extra”. When set to “No” the “Reference Frame” toggle button will be hidden.

■ **Default Home View:** Set this item to Video, Part View, or Data View to define what view type is used as the “Home” view. The selected “Home” view will be displayed when the Home button is pressed. This view type will also be displayed as the result of an encoder movement view switching mechanism.

■ **Height of List Items:** This setting configures the size of the displayed features in the feature list. This item can be set to small, medium, large, or extra large.

■ **Shutdown the Computer on Exit:** Set this item to “Yes” to configure the M3 software to shut down the computer upon exit.

■ **Display at Full Screen Size:** Set this item to “Yes” to display the M3 software in full screen mode. When set to full screen mode, the Windows 7 “window” elements will not be displayed. When set to “No” the Windows “window” elements, such as minimize, and resize buttons, will be displayed.

■ **“Switch to Home” Movement Threshold:** This setting will define the minimum amount of encoder position change required to trigger the switch to Home View mechanism in the M3 software. The entered value will use the unit type currently set as the display unit. Environmental vibration or encoder movement at rest, may require that this value be increased or decreased.

Note: For systems that initiate this screen switching mechanism without an intended stage movement, increase this value to prevent this undesired screen switching.

■ **Send:** When set to “Desktop” the “Send RS232” button will be displayed in the toolbar at the top right of the Desktop. When set to “Extra” the button will be displayed in the Extra menu. The extra menu button will be displayed in the bottom toolbar when any of the display items are set to “Extra”. When set to “No” the “Send RS232” button will be hidden.

Display Formats

The “Display Formats” screen contains fields for configuring the properties of displayed values in the M3 software.

■ **Display resolution (mm, inch, decimal degrees and degrees/minutes/seconds):** is set by inputting the desired resolution into the corresponding display unit field. The display resolution set in this screen will determine the displayed resolution for values throughout the software. Feature Detail, Live DRO value and part view annotations will all be displayed according to this resolution setting.

■ **Current (in/mm, DD/DMS, Cart/Polar):** setting the current unit type for in/mm, DD/DMS, and Cart/Polar defines the default unit type used in the M3 software. This setting will govern the unit type used at the start of each M3 software session.

■ **Use Comma for Radix:** is used configure radix display to use commas or decimals. Set this item to “Yes” to display with comma separators, set to “No” to display with decimal point separators.

Sounds

-System events in the M3 software can produce various audio signals. The individual sound events can be enabled or disabled from the “Sounds” setup screen. Each sound event has both a description and an Enable field. Set any item to “No” to prevent the sound event from occurring.

Colors

-The color of various software elements and objects can be configured in the “Color” setup screen. Each customizable element is described in the “Description” field and can be set by selecting the item in the list and then choosing a color from the palette to the right of the setup screen. The currently set color for a given item can be viewed to the left of the given item.

Operating System/M3 Boot Settings

The M3 software is designed to be installed on computer systems running an existing Win7 Operating System environment. The M3 software is launched via an executable file (.exe) and runs within the Win7 platform. There are Operating System, BIOS, and M3 Software optimizations that can prepare a system for a more "embedded-like" look and feel. The decision as to how to configure a system will be the result of several factors specific to a given hardware and software platform, customer requirements, and security and interoperability factors.

Windows 7/BIOS Boot Settings

The following boot configuration changes are for use with the Windows 7 operating system. Some of the items below will pertain only to a specific BIOS type. In these cases consider the information below as a guide for optimizations that may also be supported in a different BIOS, where items mentioned below are found under different naming conventions or menu screens.

Changes to the Windows 7 registry or system BIOS can cause serious PC or Operating System failures. Only make changes when you are confident about the area of the registry or BIOS that you are editing. It is recommended that individuals with experience in registry modification perform these changes. As always, Windows restore points and registry backups are recommended.

A) BIOS Settings

Most BIOS systems support a form of "quick boot" capability. Primarily these options disable certain routine hardware checks from being performed on every boot, thus improving boot speed. If you are aware of the machines motherboard manufacturer and model number, documentation can likely be found online for your motherboard. A motherboard user's guide may help to locate Boot Specific settings more quickly.

-Access the BIOS for your system and navigate to the BIOS Boot menu.

-Search for a boot item relating to "Enabling of Quick Boot" options.

-Enable Quick Boot, save BIOS changes, and exit the BIOS.

In addition, many BIOS systems allow for skipping various BIOS splash screens. Not displaying these screens during startup can also improve boot speed. This option would also likely be found in the BIOS boot menu.

B) Windows 7 Settings

Set Windows to "No GUI boot" to remove the Windows opening launch screen using the following procedure:

-Type "msconfig" in the search/run field found at the bottom of the Windows Start Menu and press "Enter".

-The System Configuration window will appear. Select the "Boot" tab from this window.

-Put a check in the box next to the item labeled “No GUI boot”. Click OK to close the “System Configuration” window.

Change the default windows background images to a custom image to help to disguise the login process and underlying operating system. One option is to set the Login Wallpaper, the Desktop Wallpaper, and the M3 software startup bitmap all to the same image. This will produce the effect of a more seamless boot process through Windows and into the automatic launch of the M3 software. The following procedures will describe how to change each of the 3 displayed images just described.

Begin by selecting the desired image to be used. It is recommended that the image size match the screen resolution that will be used on the PC to be configured. In addition, you will need a .bmp and .jpeg version of the image file.

Applying the custom Windows Login Image:

-Edit the following registry location to enable OEM custom background use.

[HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion\Authentication\LogonUI\Background]

-Set the Value “OEMBackground” within this folder to “1” by right clicking on the value, selecting modify, and setting the Value Data to 1. Click OK, close the registry editor.

-Navigate to the folder C:\Windows\System32\oobe\info\backgrounds

-Place the desired image file, in .jpeg format into this folder.

-Rename the .jpeg file to “backgroundDefault”.

The image file size should not exceed 256kb.

Applying the custom image to the Windows desktop

-Right-click on the Windows desktop, select “Personalize” from the menu.

-Select the “Desktop Background” link at the bottom of the screen.

-Select the “Browse” button and locate the desired custom image file in .bmp format.

-Set the “Picture Position” to “Center” from the list at the bottom of the screen.

Applying the custom image to the M3 software splash screen

-With the M3 software closed, locate the M3 software root folder location.

-Rename the file “Startup.bmp” to “10Startup.bmp”.

-Place the new startup image file, in .bmp format, into the M3 root folder location.

-Rename the new image file to “Startup.bmp”.

C) M3 Settings

Configure Windows to launch the M3 software automatically by locating the M3.exe file on your system.

-Create a shortcut to this file on the Windows desktop.

-Move the M3.exe shortcut from the Desktop to the Startup Folder in the Windows start menu.

-The M3 software will now launch automatically on Windows startup.

Boot the M3 software to the desired username automatically by accessing the “Security” setup screen from the M3 settings menu. The SuperAdmin, or Supervisor login must be used to configure specific user’s to login automatically.

-In the security settings screen, select the user display name you would like to configure for automatic login.

-Set the “Automatically login as this user” field to “Yes”. Press “Done” to exit setup.

-The M3 software will now bypass the user login screen, logging in the configured user automatically.

Configure the M3 software to shut down the PC on exit by accessing the “Desktop” settings screen in the M3 settings menu.

-Set the “Shutdown Computer on Exit” setting to “Yes”.

Configure the M3 software to launch to full screen mode by accessing the “Desktop” setting screen in the M3 settings menu.

-Set the “Set at full screen mode” setting to “Yes”. When set to “Yes” the M3 application will boot in full screen, removing the Microsoft window control buttons and borders.

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