



Tool and Control Quick Reference Guide

Software Release 11.8

Vision Program Manager Tools

Vision Program Manager Lite Tools are listed in Section Two

Settings - System Objects



General – provides program access to camera properties such as system time, CPU temperature, and available RAM. Also provides user setup for Trigger Events, Diagnostics, Administration, Security, IP Address, and others.



Camera – provides program access for camera properties such as Gain, Offset, Shutter Speed, and Scan. Provides user access to White Balance, Calibration, Trigger settings, etc.



File Camera – provides program access and setup for images in the File Camera.



System Log – provides program access to System Log entries and user log Archiving.



File Manager – provides user access to Load, Unload, and set vision program files to Load on Startup on the camera. Allows user to delete files and copy them between the Camera and the Host PC.



Modbus Server – provides user and program access to the server for camera communication with other Modbus devices on the network.



AB PCCC Server – provides user and program access to the server for communication on the network using Programmable Controller Communication Commands (PCCC).



OPC Data Access – provides user and program access to cameras and other devices on the network through the OPC Server.

Communication



Discrete Input – reads the camera's polled input lines when the tool executes.



Discrete Output – controls the camera's outputs.



EtherNet/IP Explicit Data – receives data from other devices that communicate via EtherNet/IP protocol.



EtherNet/IP Explicit Message – creates a message for setting or requesting data on another Ethernet/IP device.



EtherNet/IP Read Implicit Assembly – reads a reserved data area (called a static assembly) on the camera. Other EtherNet/IP devices can write data to this area.



EtherNet/IP Write Implicit Assembly – writes to a reserved data area (called a static assembly) on the camera. Other EtherNet/IP devices can read data from this area.



Image Archiving – Transfers images, indicated by user-defined settings, to an FTP server.



MC Read – reads data from a Mitsubishi Programmable Logic Controller (PLC) to a Datalogic camera using MELSEC Communication Protocol.



MC Write – writes data to a Mitsubishi Programmable Logic Controller (PLC) from a Datalogic camera using MELSEC Communication Protocol.



Send Message – sends data to a Wait For Message tool.

Communication



Wait For Message – waits for and receives data from the Send Message tool.



Serial Port Out – sends a string out the camera's serial port.



TCP/IP Out – sends a string out the camera's Ethernet port.

Feature Finding



Average Gradient – measures edge sharpness within an ROI. The higher the gradient, the more sharply focused the edge. The output value is between 0 and 100.



Average Intensity – measures the intensity of pixels within one or more ROIs. Average greyscale levels are compared to tolerances to determine ROI and tool pass or fail.



Blob – finds randomly oriented or amorphously shaped objects in the image and provides a blob list output.



Blob Filter – filters a list of blobs from the Blob Tool for features such as size and shape.



Circle Gauge – finds and measures a circle by searching along a radius for edge points and then finding the best fit circle to those points.



Color Blob – finds randomly oriented or amorphously shaped colored objects within a color range.



Color Checker – compares an image color with a trained color and provides a color difference value.



Contrast – checks the pixels within an ROI and provides the percentage or area of pixels that are outside and inside a range based on user-defined parameters.



Contrast-Multiple ROI – checks the pixels within multiple rectangular ROIs and provides the percentage or area of pixels that are outside and inside a range based on user-defined parameters.



Edge Point Find – finds edge points along a Line ROI.



Line Find – locates a line along an edge and reports the line length and angle along with straightness and gap lengths.



Pattern Sorting – finds multiple patterns within an image, compares them to previously trained images, and calculates best-match scores and a best origin output. (M-Series and MX-U Series only)



Spot Find – finds the maximum or minimum average greyscale level within a user-defined area in an image then locates objects or features by detecting uniformly bright or dark objects.



Wide Edge Point Find – finds edge points along a wide line ROI.

Flaw Detection



Adaptive Template – matches greyscale gradients of the inspected image and the trained image and creates an output image.



Average Intensity – measures the intensity of pixels within one or more ROIs. Average greyscale levels are compared to tolerances to determine ROI and tool pass or fail.

Flaw Detection



Blob – finds randomly oriented or amorphously shaped objects in the image and provides a variety of output variables.



Bump Find – finds bulges in polygon boundaries which may indicate defects.



Color Blob – finds randomly oriented or amorphously shaped colored objects within a user-defined color range.



Contrast – checks the pixels within an ROI and provides the percentage or area of pixels that are outside and inside a range based on user-defined parameters.



Contrast-Multiple ROI – checks the pixels within multiple rectangular ROIs and provides the percentage or area of pixels that are outside and inside a range based on user-defined parameters.



Extreme Difference – detects areas that are brighter or darker than the background.



Greyscale Template – creates a template of an image then compares that template to the snapped image. A “difference blob” is created from the differences between the template and the inspected image.



Polygon Smoothing – levels jagged polygon boundary edges caused by pixelation from image noise and blob thresholds. Use this tool for preprocessing before using boundary analysis tools.

Image Filtering



Average Filter – levels the average pixel greyscale level values in an image and provides that processed image as an output. The smoothing is done within a defined filter area of pixels that is moved progressively throughout the ROI.



Binary Image Filter – creates a binary (black and white) output image from an input image with varying greyscale level values.



Color Pixel Fill – fills portions of a color image with a specified RGB value.



Edge Enhancement – enhances edges within an image to produce an output image.



Gaussian Filter – filters pixel greyscale levels within an ROI to smooth an image. A filter area is defined and used to sequentially process an area that size within the ROI. Pixels at the center of the filter area are weighted more than those further away (a Gaussian curve).



Image Math – performs up to ten image math operations like AND, OR, and Subtract on the pixel greyscale level values in two images to produce an output image of the operation results.



Light Leveling – corrects for uneven lighting in an image by applying an average greyscale level calculated from a user-defined area.



Linear Morphology Close – removes small noise from an image, like the Morphology Close tool, but this tool retains thin lines in the image during the process.



Linear Morphology Open – removes small noise in an image, like the Morphology Open tool, but this tool keeps thin lines in the image during the process.



Median Filter – removes random noise from an image. The edges are not softened like the Gaussian filter. This tool is slower than the Gaussian and Average filters.

Image Filtering



Morphology Close – performs a morphological close (dilate followed by erode) operation on the white parts of an image. This makes it useful for removing small black noise from an image or to connect white areas together.



Morphology Dilate – performs a standard dilation operation on the white parts of an image.



Morphology Erode – performs a standard erosion operation on the white parts of an image.



Morphology Open – performs a morphological open (erode follow by dilate) operation on the white parts of an image. It uses a 3x3 pixel operation and 8-connectedness.



New Image – creates a new image of a specified size and fills it with a specified greyscale level.



Pixel Fill – fills portions of a greyscale image with a specified greyscale level.

Image Geometry



Color Image Sampling – samples a user-defined number of pixels in a color image to provide a reduced resolution image.



Color Image Stitching – combines (stitches) several smaller images into one large image using one of three modes: Image List Stitch with Step, One at a Time Stitching with Step, or One at a Time Stitching with Overlapped Features.



Deslant Image – corrects the slant frequently seen with dot matrix printed characters. Primarily used with the OCR tool.



Image Sampling – produces a reduced resolution image by sampling a user-defined number of pixels. For example, you can produce an image of one-half resolution by sampling every other pixel.



Image Stitching with Origins – combines (stitches) several smaller images into one large image using the images' origins. For example, you can take several images of sections of a large connector and stitch them together to produce and inspect the whole connector image.



Image Stitching with Points – combines (stitches) several smaller images into one large image using a list of common points. For example, if you have a large connector you can take several images of it and stitch them together to inspect the whole connector.



Line Profile – provides a list of the greyscale values of pixels along a Line ROI.



Multiple Image Stitch – semi-automatically combines (stitches) any number of images into one large image.



Undistort Image – removes perspective and radial distortion from an image. Removing distortion should only be necessary for tools that use pixel-level models (Pinpoint Pattern Find, Greyscale Template, and OCR).



Unwrap – unwraps a curved image within an arc-shaped region for OCR processing.



X-Y Projection – finds the average intensity of the X or Y ROI dimension and “magnifies” it for viewing, editing, or image processing.

Locating



Blob – finds randomly oriented or amorphously shaped objects in the image and provides a blob list output.



Circle Gauge – finds and measures a circle by searching along a radius for edge points and then finding the best fit circle to those points.



Circular Pattern Find – reports the rotational origin of rotating objects, such as coins or snap rings, using a search model and region.



Line Find – locates a line along an edge and reports the line length and angle along with straightness and gap lengths.



Origin – uses from one to three line ROIs to locate an area on an image and create output coordinates.



Pinpoint Pattern Find™ – uses a train region to create a pattern and calculates best-match scores and one or more origin outputs.

Logic



Basic – performs logical and mathematical calculations using the Basic programming language. The program results are available for display and to link to other tools.



Branch – chooses a true or false execution path by evaluating a user-defined expression.



Break – forces an end to loop processing or aborts the task if placed outside a loop.



Call Task – runs the called task and then returns to the calling task.



Counted Loop – loops a user-specified number of times. The starting and step-increment values may also be defined.



Counter – increments a count value then resets at a user-defined count limit.



Data Instance – The inputs and outputs of this tool vary depending on the data type selected and each data type has a specific set of data. Use the Data Instance tool if you want to access the data elements of another tool individually.



Data Set – accesses data elements of a tool and “pushes” this data to other tools.



Delay – delays task execution a user-defined number of milliseconds.



Event Scheduler – provides a user-definable delay period prior to initiating a system event. That event can then be used to trigger a task.



Group – provides a way to group and organize tools. Group tools may be placed within Group tools.



List Loop – loops through elements of a list to provide access to each element in the list.



List Sorter – sorts elements of a list into a user-defined order.



Multiple Branch – chooses multiple true or false execution paths based on the evaluation of a user-defined expression.

Logic



Pass Fail – chooses an execution path based on the pass or fail status of tools and maintains pass, fail, and run counts.



Reset – resets another tool's pass, fail, or run counts when it runs.



String Builder – creates an output string by combining a variety of user-defined input data types.



Switch – takes a user-defined input (Switch Condition), compares it to one or more values (Case Statement), then executes a branch (Case) based on the outcome.

Measurement



Angle – locates lines and measures the angle between them.



Circle Edge Refinement – locates a curved edge.



Circle Gauge – finds and measures a circle by searching along a radius for edge points and then finding the best fit circle to those points.



Line Find – locates a line along an edge and reports the line length and angle along with straightness and gap lengths.



Line Gauge – finds the distance between two points using a single line ROI.



Line Gauge Datum Line – finds the distance between a point and a line using a single line ROI.



Line Gauge Dual ROI – finds the distance between two points using two line ROIs.



Linear Regression – creates a line from a list of points. Points that lie too far from the line can optionally be ignored.



Midpoint – calculates the midpoint between two input points and provides its x-y coordinates as an output.



Multiple Point to Point Measurement – measures the distance between multiple points in a point list.



Peak Valley Find – locates and counts direction changes along the edge of an object.



Point Match – compares a list of ideal points with a list of input points and provides a list of extra and missing points.



Point-to-Line Measurement – measures the distance between a point and a line.



Point-to-Point Measurement – measures the distance between two points.



Subpixel Edge Extractor – finds the edge points along the edge of an arbitrary shape using subpixel accuracy.

P-Series (displayed for P-Series cameras only)



Green Red Spot – operates the integral red and green LEDs in the camera’s illuminator.



ProfinetIO Read – provides a way to receive explicit messages from other devices that communicate via Profinet protocol.



ProfinetIO Write – provides a way to write to a reserved data area on the Impact camera so other Profinet devices can read the data.

Readers



Character Contour Match – measures character defects by comparing an imaged character to a trained model.



Code Reader – decodes over 55 types of 1D, 2D, Pharmacode, and Postal codes.



OCR – reads characters or patterns by finding the best matching character from a trained library or string, within a minimum match score.

Specialized



Change Image Calibration – replaces the calibration data of an image with calibration data that is stored in the tool.



Clip ROI – clips the Region Of Interest to insure that it remains on the screen.



Data Transfer – “pushes” data to CPM control panels each time the tool runs.



Grid Statistics – provides extensive statistics about a series of points in a grid pattern.



Lead Statistics – provides extensive statistics about the pitch, width, and length of part leads.



Train – Trains another tool when it runs. Provides a way to train a tool from a control panel.

Vision Device Control



Camera Trigger – snaps a camera image and allows the configuration of one to three strobe widths and a new image ID. Original settings may be restored after the tool runs, if desired.



Device Settings – sets camera and strobe settings on the camera when the tool executes.



Offline – places the camera offline if it is online.



Online – places the camera online if it is offline.



Vision Program Load – loads a vision program file into camera memory.



Vision Program Save – saves a vision program using a different file name and program name.

Vision Device Control

Vision Program Unload – unloads a program from the camera if it is currently loaded.

Section 2: Vision Program Manager Lite Tools

Settings - System Objects



General – provides user setup for Shift Events, Diagnostics, Communication, Administration, IP Address, and others.



Camera – provides program access for camera properties such as Gain, Offset, Shutter Speed, and Scan. Provides user access to White Balance, Calibration, Trigger settings, etc.



File Camera – provides program access and setup for images in the File Camera.



System Log – provides program access to System Log entries and user log Archiving.



File Manager – provides user access to Load, Unload, and set vision program files to Load on Startup on the camera. Allows user to copy and delete files on the PC.

Communication



Discrete Input – reads the camera's polled input lines when the tool executes. (Weight 1)



Discrete Output – controls the camera's outputs. (Weight 1)



EtherNet/IP Explicit Data – receives data from other devices that communicate via EtherNet/IP protocol. (Weight 1)



EtherNet/IP Explicit Message – creates a message for setting or requesting data on another Ethernet/IP device. (Weight 1)



EtherNet/IP Read Implicit Assembly – reads a reserved data area (called a static assembly) on the camera. Other EtherNet/IP devices can write data to this area. (Weight 1)



EtherNet/IP Write Implicit Assembly – writes to a reserved data area (called a static assembly) on the camera. Other EtherNet/IP devices can read data from this area. (Weight 1)



Image Archiving – transfers images, indicated by user-defined settings, to an FTP server. (Weight 5)



Serial Port Out – sends a string out the camera's serial port. (Weight 1)



TCP/IP Out – sends a string out the camera's Ethernet port. (Weight 1)

Feature Finding



Average Intensity – measures the intensity of pixels within one or more ROIs. Average greyscale levels are compared to tolerances to determine ROI and tool pass or fail. (Weight 3)



Blob – finds randomly oriented or amorphously shaped objects in the image and provides a blob list output. (Weight 20)



Circle Gauge – finds and measures a circle by searching along a radius for edge points and then finding the best fit circle to those points. (Weight 10)



Color Blob – finds randomly oriented or amorphously shaped colored objects within a color range. (Weight 20)

Feature Finding



Color Checker – compares an image color with a trained color and provides a color difference value. (Weight 1)



Contrast-Multiple ROI – checks the pixels within multiple ROIs and provides the percentage or area of pixels that are outside and inside a range based on user-defined parameters. (Weight 3)



Edge Point Find – finds edge points along a Line ROI. (Weight 3)



Line Find – locates a line along an edge and reports the line length and angle along with straightness and gap lengths. (Weight 10)



Wide Edge Point Find – finds edge points along a wide line ROI. (Weight 3)

Flaw Detection



Average Intensity – measures the intensity of pixels within one or more ROIs. Average greyscale levels are compared to tolerances to determine ROI and tool pass or fail. (Weight 3)



Blob – finds randomly oriented or amorphously shaped objects in the image and provides a variety of output variables. (Weight 20)



Color Blob – finds randomly oriented or amorphously shaped colored objects within a color range. (Weight 20)



Contrast-Multiple ROI – checks the pixels within multiple ROIs and provides the percentage or area of pixels that are outside and inside a range based on user-defined parameters. (Weight 3)



Greyscale Template – creates a template of an image then compares that template to the acquired image. A “difference blob” is created from the differences between the template and the inspected image. (Weight 20)

Image Filtering



Edge Enhancement – enhances edges within an image to produce an output. (Weight 5)



Morphology Dilate – performs a dilation operation on the white parts of an image. (Weight 5)



Morphology Erode – performs an erosion operation on the white parts of an image. (Weight 5)

Locating



Blob – finds randomly oriented or amorphously shaped objects in the image and provides a blob list output. (Weight 20)



Circle Gauge – finds and measures a circle by searching along a radius for edge points and then finding the best fit circle to those points. (Weight 10)



Line Find – locates a line along an edge and reports the line length and angle along with straightness and gap lengths. (Weight 10)



Origin – uses from one to three line ROIs to locate an area on an image and create output coordinates. (Weight 10)

Locating



Pinpoint Pattern Find™ – uses a train region to create a pattern and calculates best-match scores and one or more origin outputs. (Weight 25)

Logic



Counter – increments a count value then resets at a user-defined count limit. (Weight 1)



Pass Fail – chooses an execution path based on the pass or fail status of tools and maintains pass, fail, and run counts. (Weight 3)



String Builder – creates an output string by combining a variety of user-defined input data types. (Weight 3)



Switch – takes a user-defined input (Switch Condition), compares it to one or more values (Case Statement), then executes a branch (Case) based on the outcome. (Weight 3)

Measurement



Circle Gauge – finds and measures a circle by searching along a radius for edge points and then finding the best fit circle to those points. (Weight 10)



Line Find – locates a line along an edge and reports the line length and angle along with straightness and gap lengths. (Weight 10)



Line Gauge – measures the distance between two points using a single line ROI. (Weight 3)



Line Gauge Dual ROI – measures the distance between two points using two line ROIs. (Weight 3)



Multiple Point to Point Measurement – measures the distance between multiple points in a point list. (Weight 3)



Point to Line Measurement – measures the distance between a point and a line. (Weight 1)



Point to Point Measurement – measures the distance between two points. (Weight 1)

P-Series (displayed for P-Series cameras only)



Green Red Spot – operates the integral red and green LEDs in the camera's illuminator.



ProfinetIO Read – provides a way to receive explicit messages from other devices that communicate via Profinet protocol. (Weight 1)



ProfinetIO Write – provides a way to write to a reserved data area on the Impact camera so other Profinet devices can read the data. (Weight 1)

Readers



Code Reader – decodes over 55 types of 1D, 2D, Pharmacode, and Postal codes. (Weight 10)



OCR – reads characters or patterns by finding the best matching character from a trained library or string, within a minimum match score. (Weight 10)

Control Panel Manager Controls

Not available with VPM Lite

Images



Histogram – displays the histogram of an ROI's greyscale values.



Image Display – displays an image linked from a VPM task.



Arc ROI – displays an Arc ROI on the image in the Image Display.



Blob List – displays a list of Blob ROIs on the image in the Image Display.



Greyscale Template Model – displays a Greyscale Template ROI on the image in the Image Display.



Line List – displays a Line List ROI on the image in the Image Display.



Line ROI – displays a Line ROI on the image in the Image Display.



Origin – displays an Origin ROI on the image in the Image Display.



Origin List – displays an Origin List ROI on the image in the Image Display.



Point List – displays a Point List ROI on the image in the Image Display.



Rectangle List – displays a Rectangle List ROI on the image in the Image Display.



Rectangle ROI – displays a Rectangle ROI on the image in the Image Display.



Shape List – displays a Shape List ROI on the image in the Image Display.

Input



Button – produces an action event when clicked. This event can be linked to another control or a VPM tool to cause an action.



Check Box – produces a variety of events when selected or unselected. The event can be linked to another control or a VPM tool to cause an action.



Drop List Selector – allow you to select an item from a list. For example, from a list of pre-defined or linked VPM tool inspection parameters.



Font Library – displays and manipulates the VPM OCR tool's font library.



Character Contour Library – displays and manipulates the VPM Character Contour Match tool's verification library.



Keyboard – displays an On Screen Keyboard (OSK) for entering text or numbers. The OSK can also be enabled in CPM Preferences for all Text Entry and Numeric Entry controls.



Numeric Entry – lets you enter numbers on the control panel. These values can be linked to VPM tools or other controls.

Input



Password – defines and manages up to five levels of users and passwords to allow or limit access to controls and panels.



Pattern Database – loads, views, and updates a pattern database. Pattern databases are used in the Pattern Sorting tool.



Radio Button – defines choices on a control panel which are automatically limited to one button at a time. Used with Radio Button Group control.



Radio Button Group – used to group Radio Button controls.



Range – allows you to enter the start and end values of a Range1D and Tolerance input data types in a VPM tool.



Range Scroll – displays and adjusts a range of values with a scroll bar. For use with VPM tools that have a Range1D data type.



Slider – varies a value when a slider is moved on the control panel. You can define the size, orientation, and major and minor tick spacing for the best presentation.



Table – display and edit a two-dimensional table of data.



Text Entry – lets you enter text on the control panel. This text can be linked to a vision program or another control panel.



Toggle Button – produces Action, Selected, and Unselected events when clicked.



Tolerance – displays and adjusts tolerance values with a step button. For use with VPM tools that have a Tolerance data type.

Display



Chart – creates five different types of charts to display values on a control panel.



Frame – groups controls so you can move and set some of the properties of all the controls within the Frame at one time.



Graphic Display – displays a graphic image on a control panel. For instance, you could display a company logo or an icon that represents an operation or machine.



Indicator Light – shows a user-defined color indication of its current state.



Numeric Display – displays numbers on the control panel.



Rich Text – displays formatted text on the control panel. You can format the text's font type and size, change the text pane color, and insert images.



Scrolling Table – displays user defined controls in a grid format where only one row or column is updated and extra rows or columns are scrolled off the table when new ones are added.



Tab –used with the Tab Group control to combine controls into an area that is selectable by the operator.



Tab Group –used with the Tab control to combine controls into an area that is selectable by the operator.

Display



Text Display – displays text on the control panel.



Xbar-R Chart – graphs statistical information on the control panel. It will show both the mean value (Xbar) and the range (R) of a data set.



XML Table – reads an XML formatted file and displays the information. The XML data must be structured in a specific way, as defined by the control's properties.

General



Basic Interpreter – performs logical and mathematical calculations based on a set of user-written statements using the Basic programming language. The program results are available to link to other controls.



Change Log – provides the option to track changes generated by camera changes and user interaction with the control panel application.



Execute Command – executes a system command from the Control Panel.



Impact Connector – connects the control panel to a vision device or camera. Vision programs, tasks, and tool data are linked to this control, then linked to properties, methods, and events in other controls.



Load Image – loads an image from a file on the client into an Image Display control.



Load Vision Program – loads a vision program file onto the connected camera.



Save Vision Program – saves a loaded vision program file on the connected camera.



Scriptor – used to write Java-based control panel commands and apply them to a running control panel application.



TCP-IP Logger – receives data from a vision program TCP/IP Out tool and writes it to a text file.



Timer – creates time-based events during Run mode. It can be set to repeat the time interval.