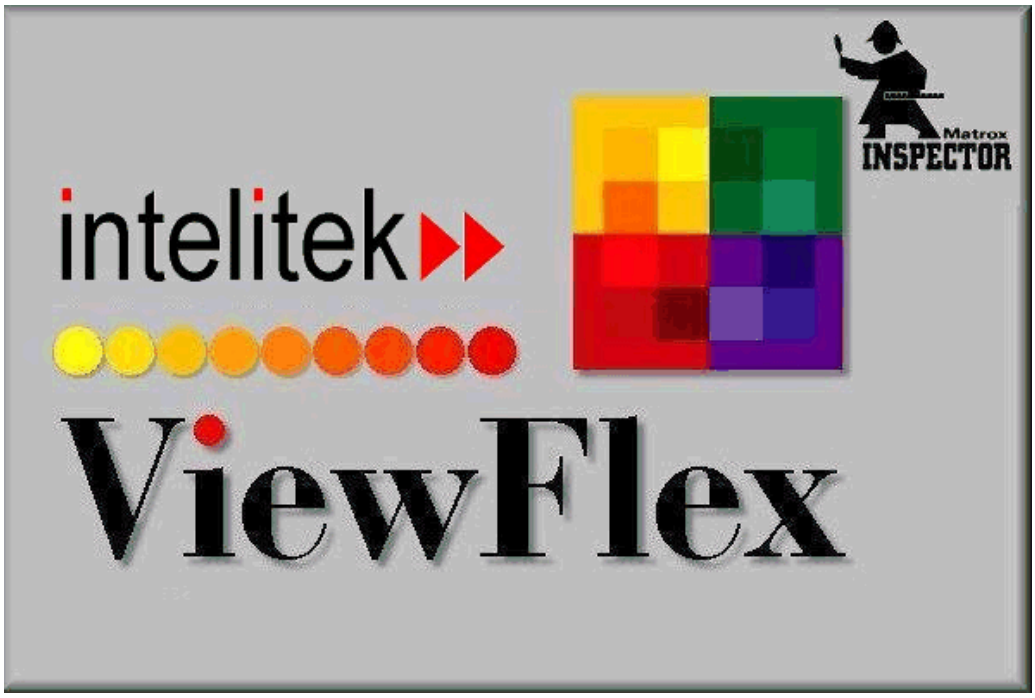
ViewFlex



Version 3.3

User Manual

100299 Rev. J

December 2009

intelitek

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Catalog #100299 Rev. J

December 2009

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intelitek bears no responsibility for errors that may appear in this publication and retains the right to make changes to the application and manual without prior notice.

The complete Matrox Inspector User Guide can be viewed and printed from the Matrox Inspector Help File **Inspector_UserGuide.chm** included on the ViewFlex software CD.

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1

ViewFlex Installation

Unpacking the Equipment

Before installing the equipment, check for signs of shipping damage. If any damage is evident, contact your freight carrier, and begin appropriate claims procedures. Make sure you have received all the items listed on the packing list. If anything is missing, contact your supplier.

System Requirements

- Dual Core with 3 GHz processor or higher, with CD drive
- At least 512 MB RAM (1 GB for Vista/Windows 7)
- A hard drive with at least 100 MB of free disk space (500MB free)

Windows 32 and 64 bit:

- Windows XP Professional
- Windows Vista (Home Premium/Business/Ultimate editions)
- Windows 7 (Home Premium/Professional/Enterprise/Ultimate editions)
- A VGA or better graphics display, minimum 256 colors
- A Mouse or other pointing device
- USB port

Installing the ViewFlex System

Install the ViewFlex system in the following order:

1. Connect the software protection key. See *Connecting the Software Protection Key* on page 1-2.
2. Install the ViewFlex software. See *Installing the ViewFlex Software* on page 1-3

3. Install the Camera:

   - **Veo Camera*:***
     - Install the Veo camera software. See *Installing the Veo Software* on page 1-10
     - Connect the Veo camera to your computer. See *Connecting the Camera to the Computer* on page 1-10

     Important:

     - *Microsoft Windows XP: Do not plug the camera into the USB port of the computer until after the software installation.*
     - *Microsoft Windows Vista /Window 7: Plug the camera into the USB port of the computer before the software is installed.*

   - **Logitech Camera*:***
     - Installing the Logitech Software. See *Installing the Logitech Software* on page 1-11
     - Connect the Logitech camera to your computer. See *Connecting the Camera to the Computer* on page 1-11

Connecting the Software Protection Key

This step describes how to connect the software protection key, without this software protection key, the software is programmed to run on a 30-day trial basis.

To connect the software protection key, plug the software protection key into a USB port in your computer.

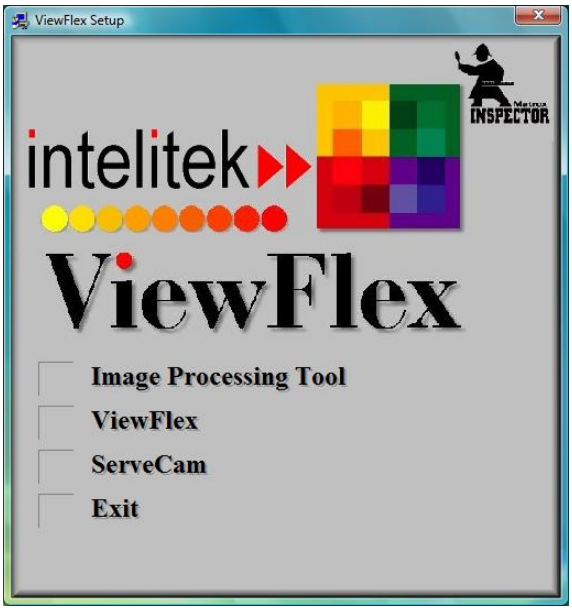
Software Protection Key

Installing the ViewFlex Software

To Install the ViewFlex Software

1. Insert the ViewFlex CD-ROM in the drive.
2. The installation procedure should begin to run automatically. If it does not, select **Start | Run**, and select install\setup.exe.

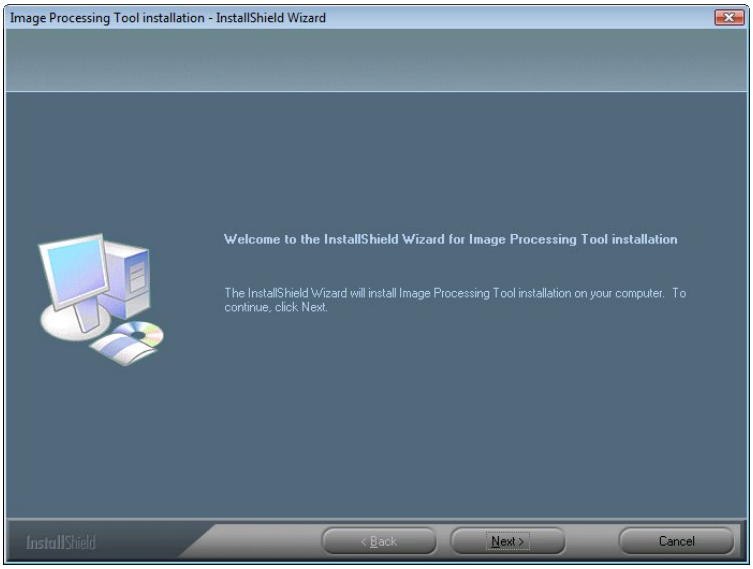
   The following window is displayed.



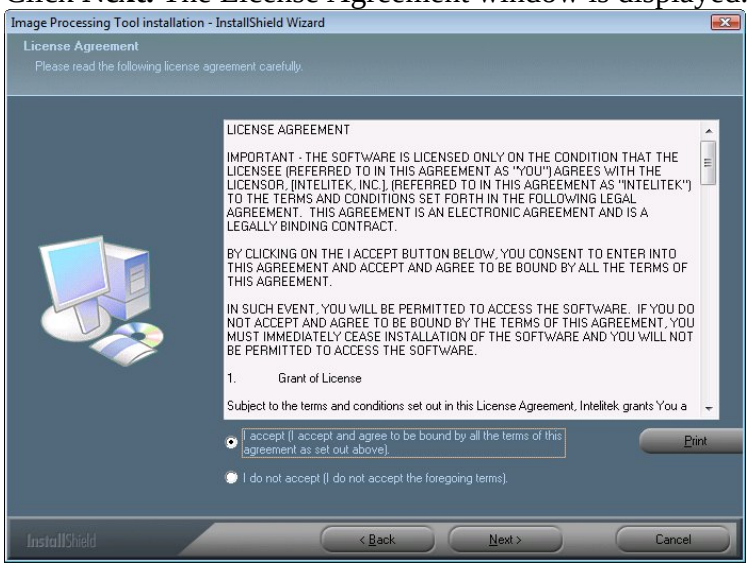
ViewFlex Setup dialog box

You must first install the **Image Processing Tool** module. Only then can you install the ViewFlex software.

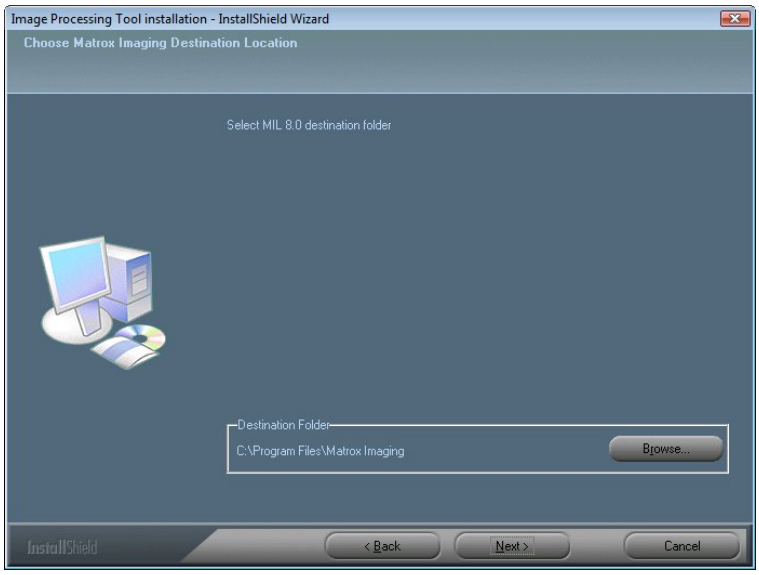
3. Click on **Image Processing Tool**. The Matrox Inspector setup will begin to run.



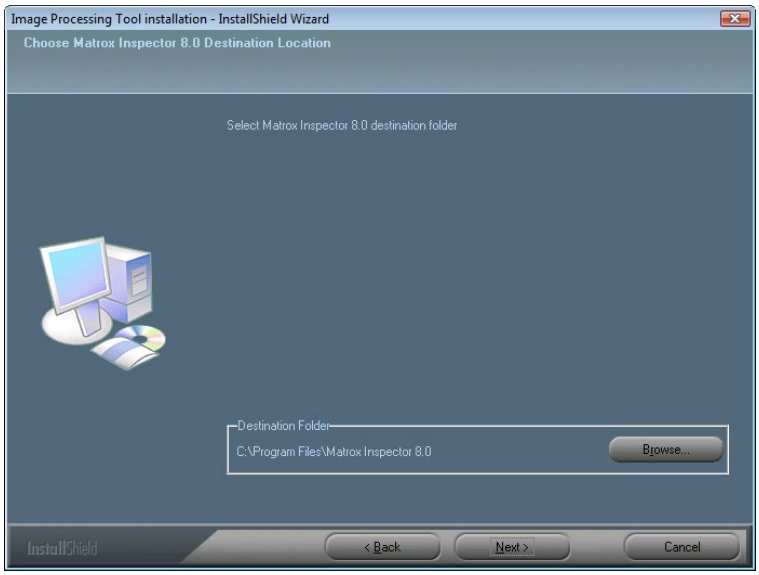
4. Click **Next.** The License Agreement window is displayed.



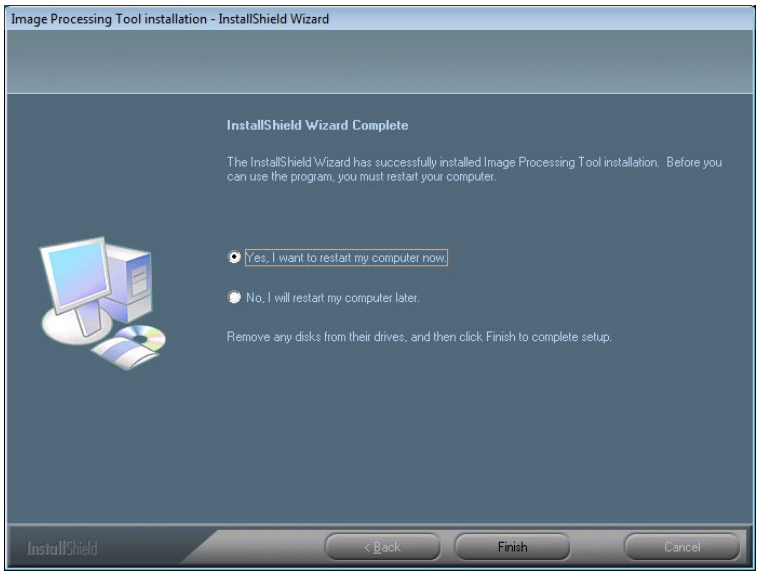
5. Select the **I accept the terms of the license agreement** radio button and click **Next**.
6. Click **Next** to select the destination location for Matrox Imaging Library.



7. Click **Next** to select the destination location and run the Matrox Inspector.

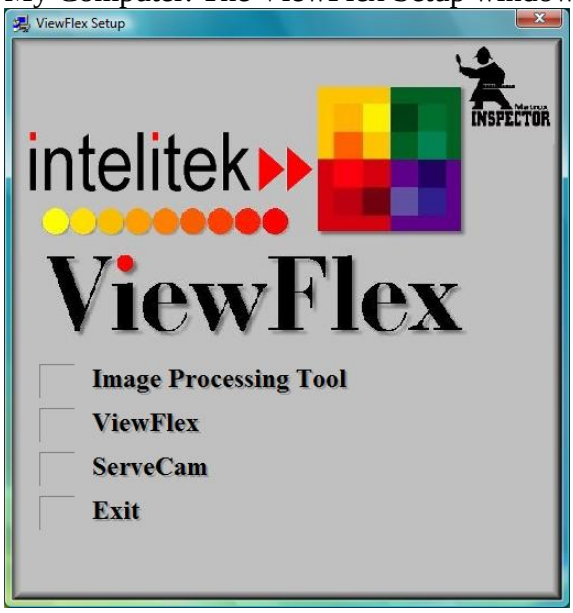


8. Select destination and click **Next**.

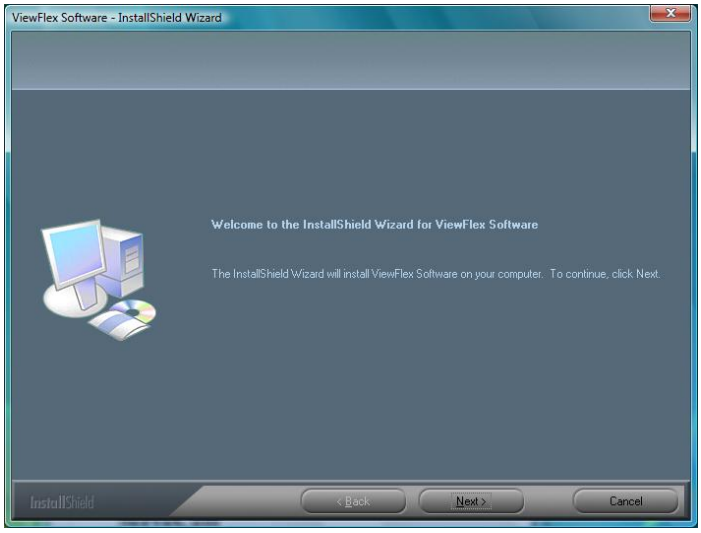


9. Select **Yes, I want to restart my computer now** when prompted at the end of the installation process.
10. Click **Finish**. The computer will restart.
11. Plug the software protection key into the USB port of your computer.

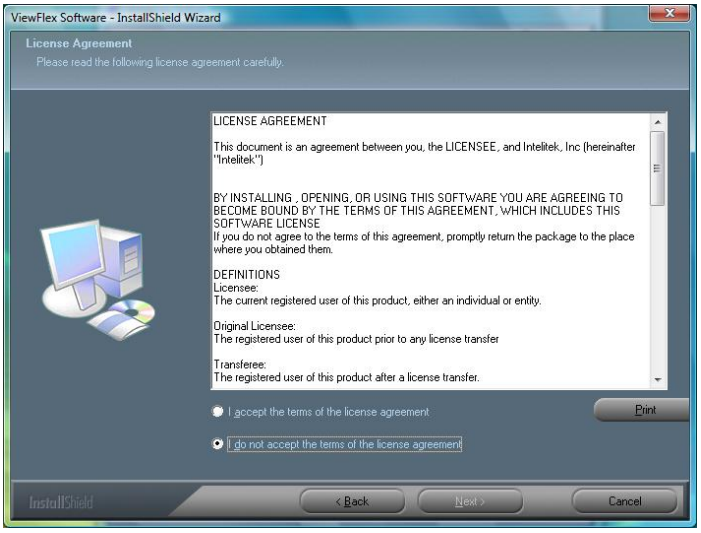
12. Start the ViewFlex installer by clicking on the icon of the CD drive in My Computer. The ViewFlex Setup window is displayed.



13. Select **ViewFlex**. A Welcome window is displayed.

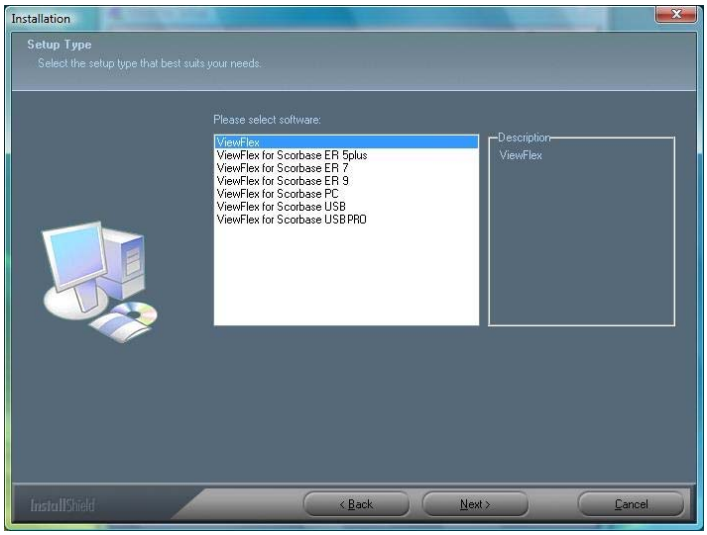


14. Click **Next.** A License Agreement window is displayed.



Select **I accept the terms of the license agreement** radio button, and click **Next**.

15. The Installation window is displayed.

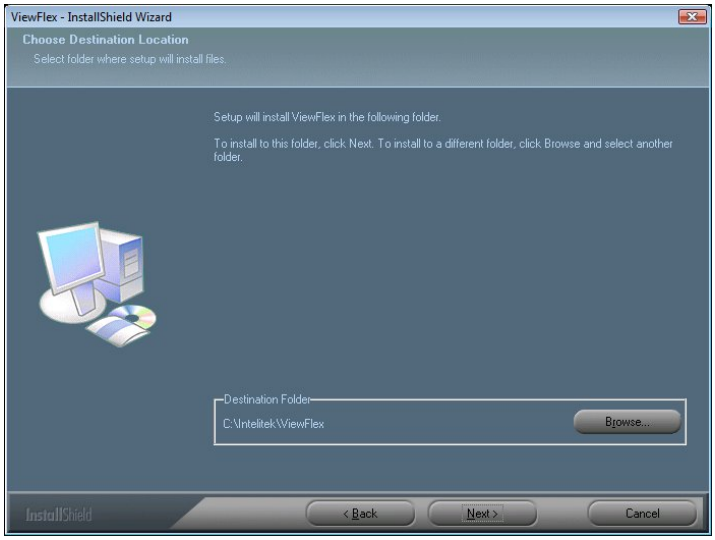


16. Select the required option, as follows:

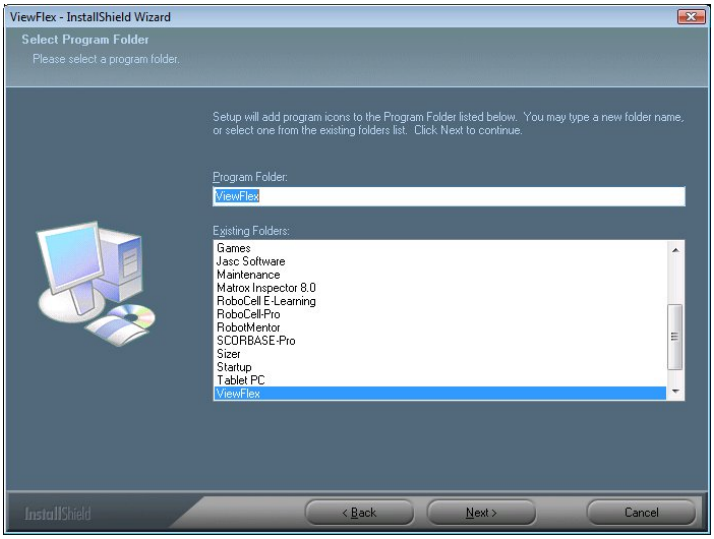
- **ViewFlex:** Select this option to install ViewFlex for example, when using OpenCIM or when operating the robots via the ACL Controller.
- **ViewFlex for SCORBASE ER 5plus**: Select this option for ER-5.
- **ViewFlex for SCORBASE ER 7:** Select this option for ER-7.
- **ViewFlex for SCORBASE ER 9**: Select this option ER-9.
- **ViewFlex for SCORBASE USB**: Select this option for ER2U and ER4u.

- **ViewFlex for SCORBASE USB PRO** : Select this option for ER 9Pro .

17. Click **Next** to select the destination location for example for ViewFlex.

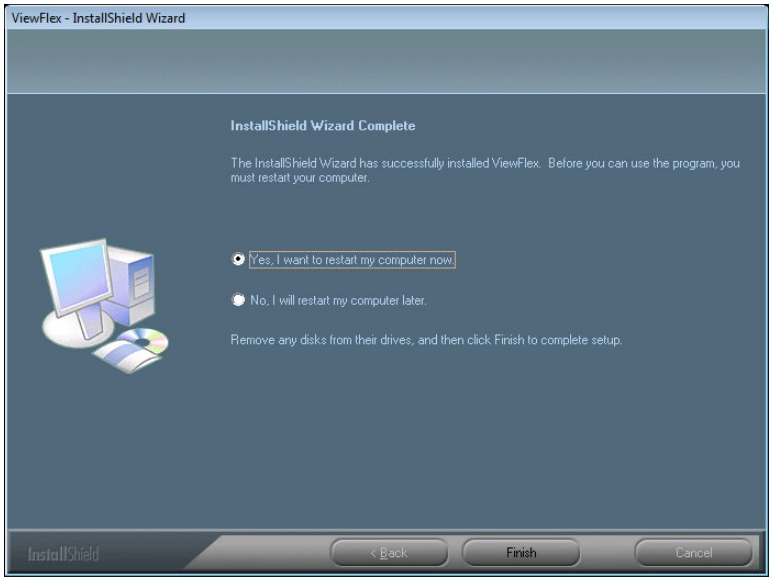


18. Click **Next** to select the program folder.



19. If you want to create a Desktop shortcut click **Yes** .

20. The installation is complete.



Select **Yes, I want to restart my computer now.**

21. Click **Finish**. The computer will restart.
22. Plug the software protection key into the USB port of your computer.

Note:

If you receive the message: "Could not start ViewFlex" message, perform the following:

1. Go to **Start | Program Files**
2. Select **Matrox Inspector** and right click
3. Select **Run as Administrator**
4. **Wait till Matrox Inspector loads.**
5. **Close Matrox.**
6. **Run ViewFlex again.**

Camera Installation

After installing the ViewFlex software the next step is to install the camera.

Installing the Veo Camera (Windows XP/Vista/7 32 bit OS versions only)

Installing the Veo Software

Follow the steps below to install the Veo software. For additional details refer to the *Veo Velocity Connect User's Guide* provided with the camera.

For Vista/Windows 7, the camera **must** be attached to the computer before installing ViewFlex.

For Windows XP:

1. Insert the Veo Velocity Connect Installation CD-ROM into your CD-ROM drive.
2. The Velocity Connect installation screen is displayed. Click **Install** and follow the directions on your screen to complete the installation and refer to the *Veo Velocity Connect User's Guide* for further details.

For Vista/Windows 7:

(For installing the Veo Software only (without the driver)):

Browse the Veo CD to VeoCreativeStudio\setup.exe

For Windows Vista/Windows 7

1. Insert ViewFlex CD.
2. Browse to Windows: drivers\VISTA_Windows 7
3. Launch the file VeoVista7Driver.exe

Connecting the Camera to the Computer

After installing the Veo camera software, the next step is to connect the camera to your computer (Windows XP only. in Windows Vista/Windows 7 the camera should have been attached before installation of the software). You must ensure that the camera's lens cover is open.

To connect the camera to the computer, plug the USB Connector into any available USB 2.0 port on your computer. A window should appear and recognize a new device being installed. Once it has been installed, in order to use the camera, it must be connected to the same USB port it was installed on.

Installing the Logitech® QuickCam®Pro 9000 camera

Installing the Logitech Software

Follow the steps below to install the Logitech software.

You must verify that the device driver of your video card is updated for optimum performance of the camera.

1. Insert the ViewFlex CD-ROM into your CD-ROM drive.
   - **XP/Windows 7 32 bit OS:**

     Browse to Drivers\Logitech QuickCam pro 9000\ Windows_7_XP\32-bit \lws110.exe

   - **XP/Windows 7 64 bit OS:**

     Browse to Drivers\Logitech QuickCam pro 9000\Windows_7_XP\64-bit\ lws110_x64.exe

   - **Windows Vista 32 bit OS:**

     Browse to Drivers\Logitech QuickCam pro 9000\Vista\32-bit\ lws110_vista.exe

   - **Windows Vista 64 bit OS:**

     Browse to Drivers\Logitech QuickCam pro 9000\Vista\64-bit\ lws110_x64.exe

2. The Logitech QuickCam Installation screen is displayed. Follow the directions on your screen to complete the installation and refer to the ***Logitech 9000 User's Guide*** for further details.

Connecting the Camera to the Computer

You will be instructed during Logitech Software installation to plug the camera to an available USB port on your computer.

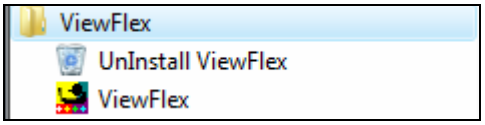
You must ensure that the camera's lens cover is open.

Viewing the ViewFlex Properties

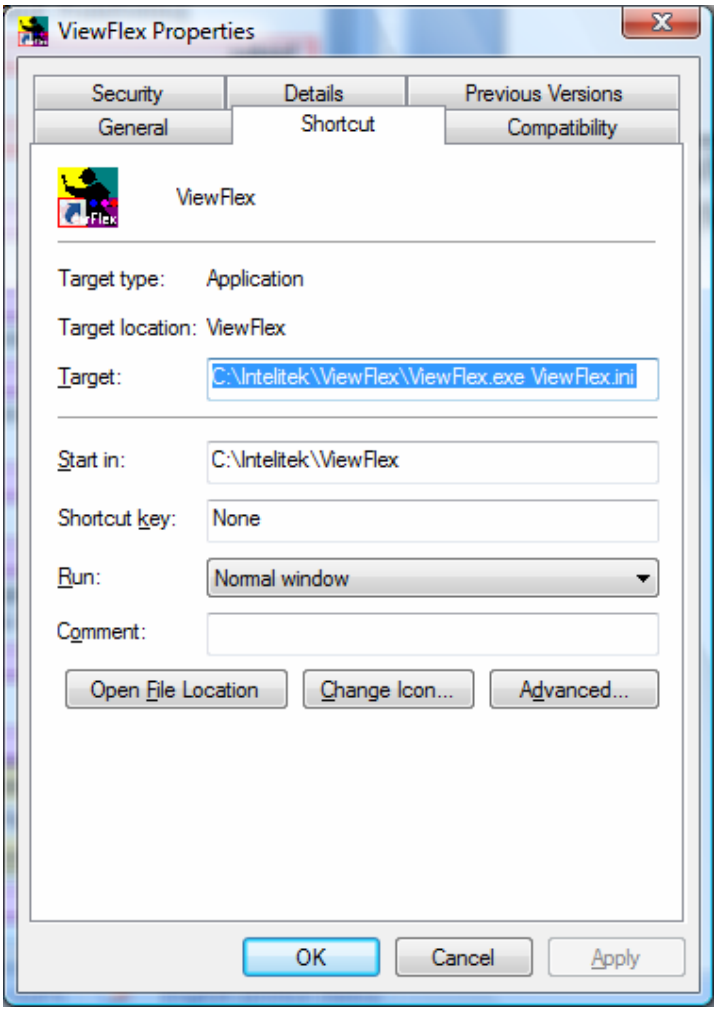
The ViewFlex Properties window enables you to view the ViewFlex Installation directory and so on.

To view the ViewFlex properties:

1. From your windows Start menu select **All Programs | ViewFlex**. A menu is displayed.



2. Right-click **ViewFlex**. A popup menu is displayed.
3. Select Properties. The ViewFlex Properties window is displayed.
4. Select the Shortcut tab to view the ViewFlex target location. From the containing Folder you can access the other ViewFlex files.



ViewFlex Properties

ViewFlex.ini File Configuration (for advanced users)

The ViewFlex.ini file initializes the ViewFlex software. The ViewFlex.ini file includes the following options:

1. The directory in which the script files are located (only for the ViewFlex Device Driver):

   [Device Driver Definitions]

   ScriptPath= \Vision Script

2. You can choose the controller type – A, B, PC, USB, USBPRO.

   [Controller Setting]

   Controller=A

   (Note: You can choose: ER4, ER4u, ER5, ER9, ER9PRO, ER14, ER14PRO, viewSV)

   RobotType=ER14

3. For configuring the second camera to be either a local camera or a ServeCam:

   IsSecondCameraRemote = YES - camera 2 client servecam

   IsSecondCameraRemote = NO - camera 2 local camera

Accessing ViewFlex

Running the ViewFlex Software

To run ViewFlex, from the Start menu,

1. Select Programs | ViewFlex
2. Click on the ViewFlex icon.

Running ViewFlex for SCORBASE USB, USB Pro, ER5, ER7 and ER9

The following explanation refers to all above types of SCORBASE:

To run ViewFlex for SCORBASE

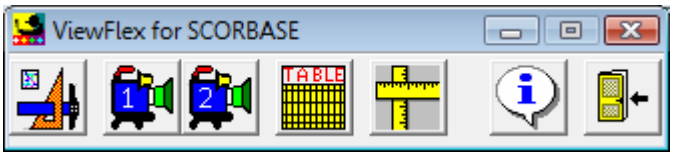
1. In the Start menu, select Programs | ViewFlex for SCORBASE
2. Click on the ViewFlex for SCORBASE icon.

2

Software Operation

ViewFlex for SCORBASE USB, USB Pro, ER5, ER7 and ER9 Toolbar

The ViewFlex for SCORBASE Toolbar contains icons that are shortcuts for selecting certain commands and functions:



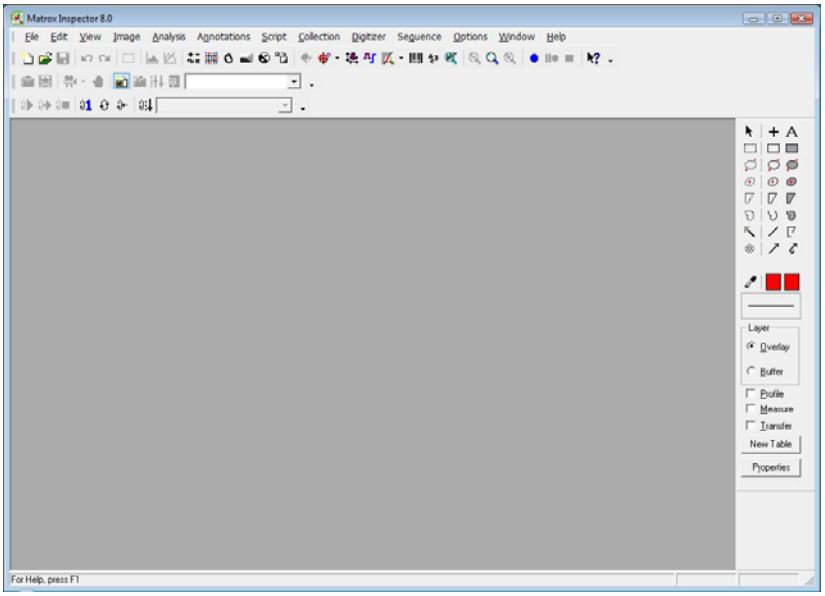
ViewFlex for SCORBASE Toolbar

- **Image Processing Tool**; see details on page 2-2
- **Camera 1**
- **Camera 2**
- **Results Table**
- **Calibration**; see details on page 2-18
- **About**
- **Exit**

Image Processing Tool

Open the image-processing tool (*Matrox Inspector*).

(*Refer to the **Matrox Inspector Instruction Manual** for more information.*)



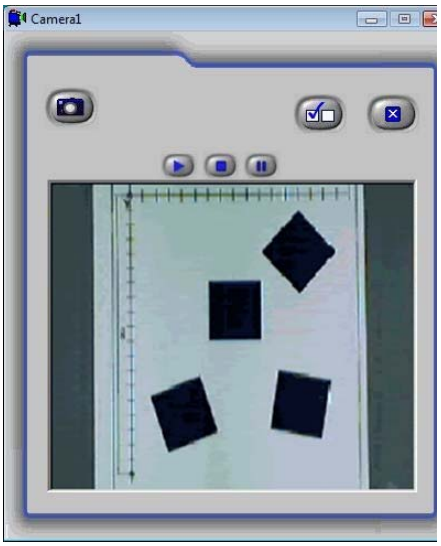
Matrox Inspector

Camera (Camera 1 / Camera 2 / ServeCam)

When two cameras are used, a **Select Video Device** dialog box will prompt you. The camera icon opens the **Camera** (capture) window or the **Client Camera** window.

The Client (remote) camera operation operates as follows:

- When the Client Camera is activated, it connects to the server.
- The Client Camera displays the computer IP address where the ServeCam is located.



Camera Window

Client Camera Window

Note:

Play

Enables camera streaming

Stop

Stops camera streaming

(When using a resolution higher than 320x240, we recommend that you stop the streaming to ensure optimum performance of the robot. Even though streaming is stopped the snap command can still be performed.)

Pause

Pauses camera streaming

Snapshot (ALT + S)

Grabs (captures) a picture and displays it in a frame.

OR

Inserts an updated picture from the ServeCam.

Options (ALT + O)

Opens a dialog box use for video settings and configuration.

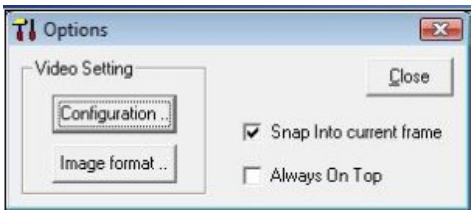
Connection (available only in Client Camera)

Enables connection of remote cameras on a network.

Exit

Closes the Camera window.

Camera Options



Camera Options

Always On Top

Checking this box prevents the Camera window from being hidden by other windows.

Snap Into Current Frame

The captured image will be put into the current frame in the Image

Processing Tool. The part of the image that will be inserted into the frame depends on the current frame size. If left unchecked, a new frame will be created each time an image is captured (every Snap).

Configuration

Displays the Video Source Properties dialog box, described in the following section.

Image Format

Displays the Video Format Properties dialog box, described in the following section.

Configuration

The configuration is different depending on the camera used.

Logitech® QuickCam® Pro 9000 Configuration

Ensure that you have the Logitech software installed before configuration.

The Video Source Properties dialog box is displayed by pressing the

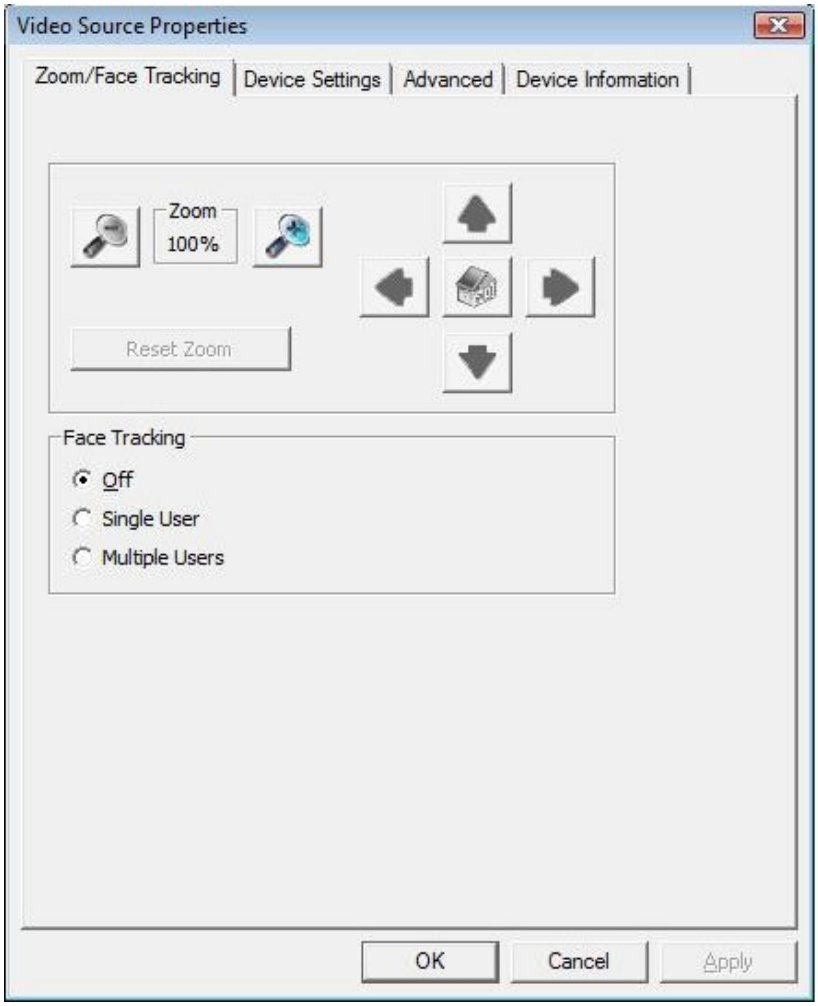
button, as shown below.

The Video Source Properties window contains the following configuration tabs:

- **Zoom/Face Tracking Tab** describes how to define your device settings.
- **Device Settings Tab,** describes how to define your image options, such as flickering reduction, exposure control, picture quality and more.
- **Advanced Tab**

Tabs description

- **Zoom/Face Tracking Tab**



The Zoom/Face Tracking tab contains the following options:

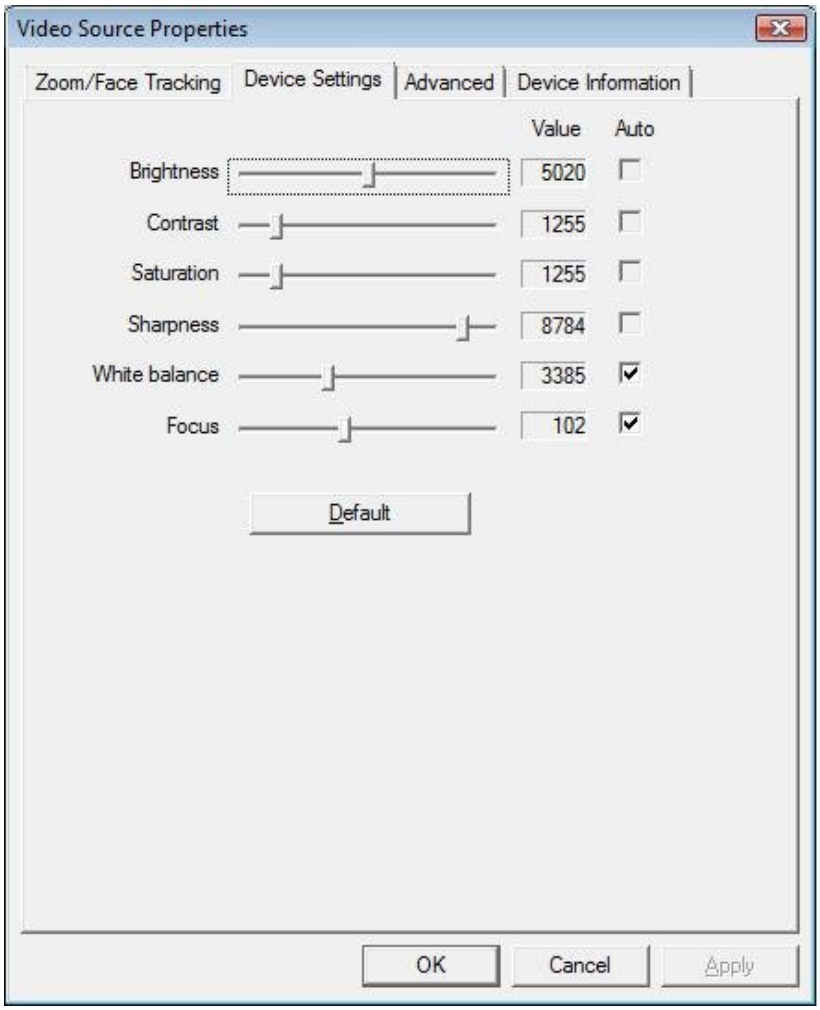
Zoom

Adjust the zoom of the camera.

Face Tracking

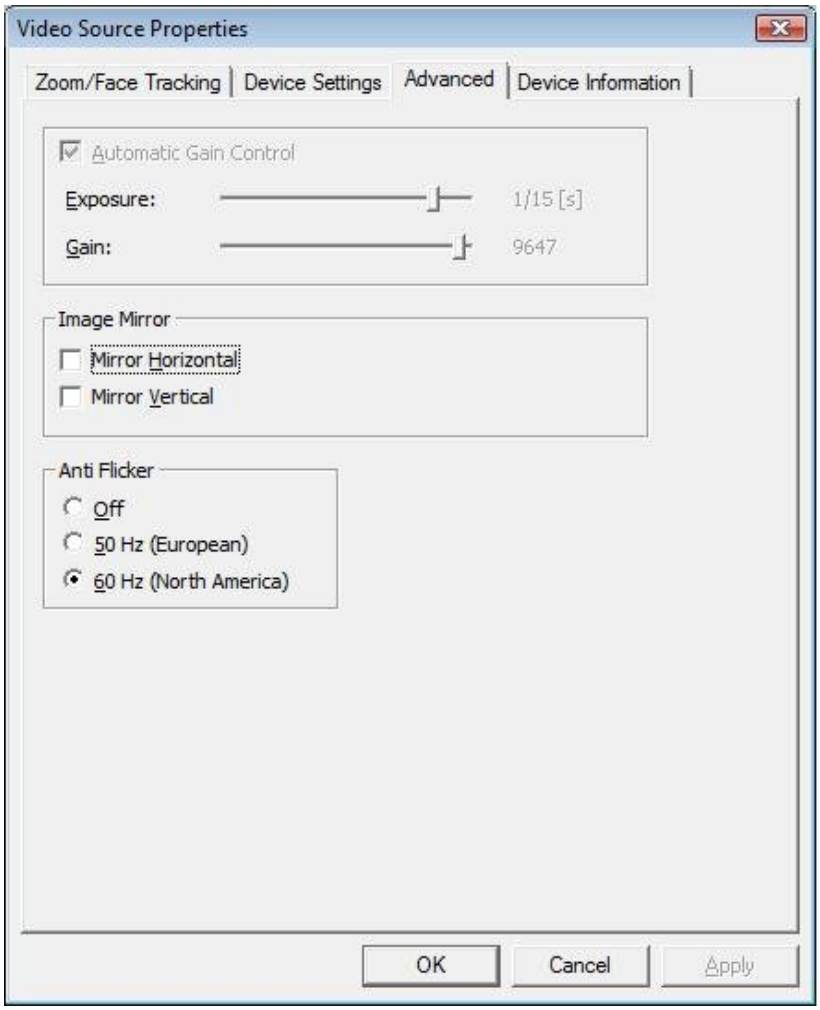
When enabled for either single or multiple users, the Logitech software will recognize and track the face(s) in the camera's view.

- **Device Settings Tab**



The Video Proc Amp tab enables you to define your device settings, by dragging the relevant sliders such as Brightness, Contrast, Hue Saturation and more. You can define your default settings as required and then press **Default**.

- **Advanced Tab**



The Advanced tab contains the following options:

Exposure

Adjust the exposure control for added customizing.

Gain

Modify the brightness.

Image Mirror

Check either the Mirror Horizontal or Mirror Vertical check boxes to mirror the video capture in that direction.

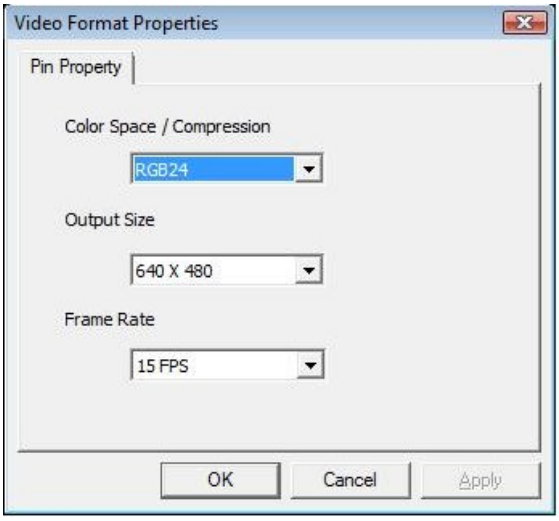
Anti Flicker

Select the appropriate radio button for your region to reduce flickering.

Note: These tabs contain the default settings of the camera. For additional information on the camera configuration, refer to the Logitech® QuickCam® Pro 9000 User's Guide.

Image Format

The Video Format Properties dialog box is displayed by pressing the Image format .. button, as shown below.



Video Format Properties Dialog Box

The Format Properties dialog box enables you to define your video format setting, such as frame rate, color space, output size and more.

Veo Configuration

The Video Source Properties dialog box is displayed by pressing the Configuration .. button, as shown below.

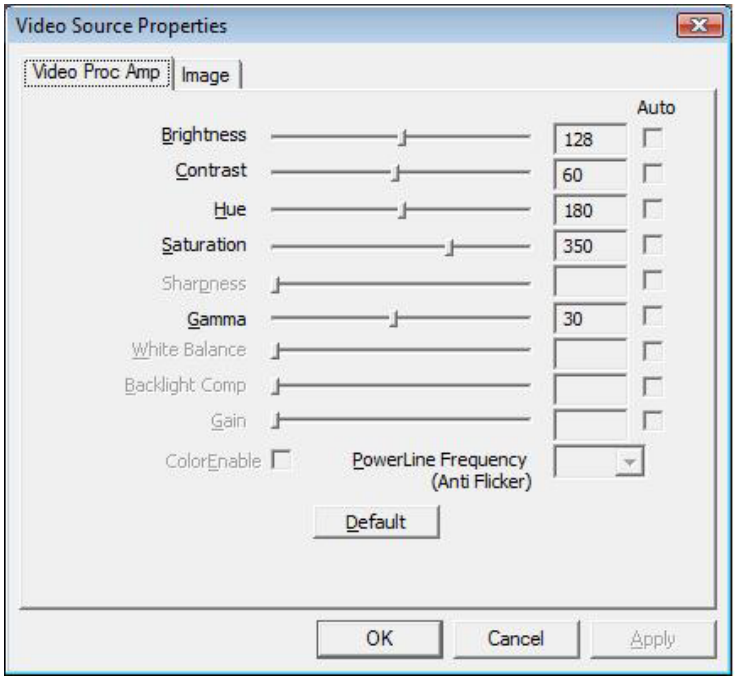
The Video Source Properties window contains the following configuration tabs:

- **Video Proc Amp Tab** describes how to define your device settings.
- **Image Tab,** describes how to define your image options, such as flickering reduction, exposure control, picture quality and more.

Note: These tabs contain the default settings of the camera. For additional information on the camera configuration, refer to the Veo (Velocity Connect) User's Guide.

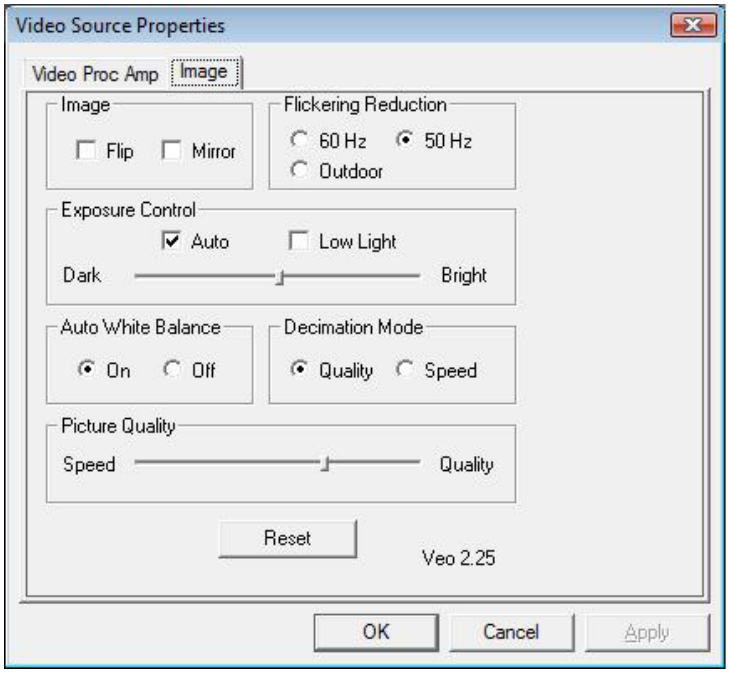
Tabs description

Video Proc Amp Tab



The Video Proc Amp tab enables you to define your device settings, by dragging the relevant sliders such as Brightness, Contrast, Hue Saturation and more. You can define your default settings as required and then press **Default**.

Image Tab



The Image tab contains the following options:

Image

Select this check box to flip images horizontally (mirror image).

Flickering reduction

Select the lightening type used in your environment.

Exposure control

Adjust the exposure control for added customizing.

Auto White balance

Adjust the white balance to fine tune the camera to your lightening conditions.

Decimation mode

Select the **Quality** or **Speed** decimation mode.

*Note: For USB you must select the **Speed** decimation mode.*

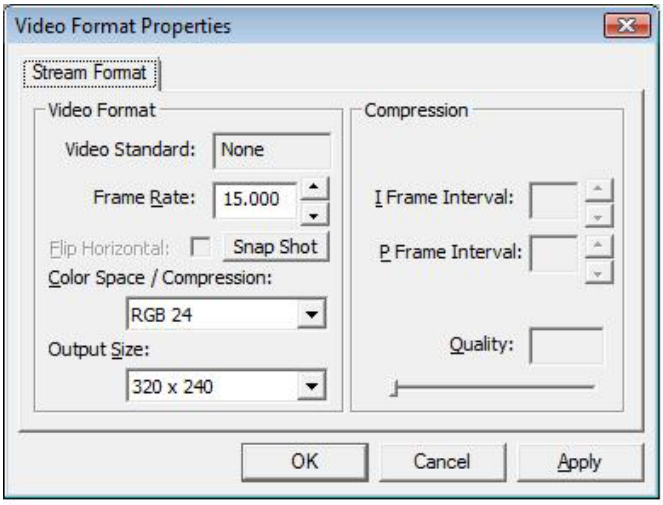
Picture Quality

Move the slider to define the picture quality

*Note: For USB, move the slider close to the **Speed** option.*

Image Format

The Video Format Properties dialog box is displayed by pressing the Image format .. button, as shown below.



Video Format Properties Dialog Box

The Format Properties dialog box enables you to define your video format setting, such as frame rate, color space, output size and more.

ServeCam Camera Connection (Client Camera only)

Connect to

If there is more than one ServeCam on the network, then you can make a connection to the specific ServeCam that you want by entering the IP address of that ServeCam's computer.

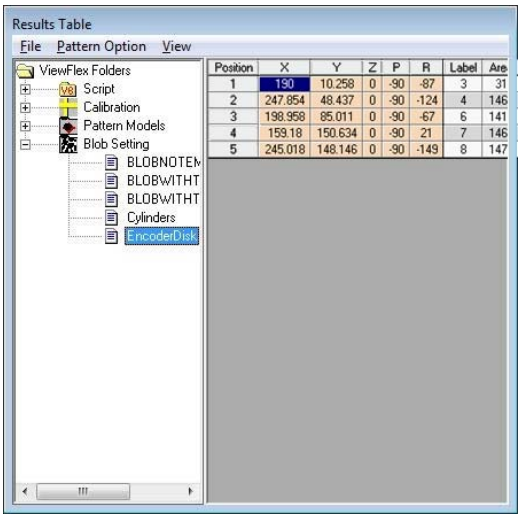
The default IP address is the one that initially appears in the box, which was automatically detected.

Clicking OK will connect to the ServeCam at the IP address shown.

To configure a second local camera in place of a ServeCam Camera, refer to *ViewFlex.ini File Configuration (for advanced users)* on page 1-13.

Results Table

The Results Table window is divided into two sections: one section is a tree representing the ViewFlex folders, and the second section is a table with the coordinates of the object in the robot world – including blob features.



Results Table

Every time a new file is saved in one of the ViewFlex for SCORBASE folders, the tree is updated.

- Selecting one of the **Pattern Models** executes Find Object with the model on the current image.
- Selecting one of the **Blob Settings** executes Find Blobs with the Blobset on the current image
- Selecting one of the **Scripts** executes the first function/ subroutine in the Script.

File

Save Results to file so that they can be opened with Excel.

Load results from file into the Results Table.

Pattern Option

Foreground: Defines whether black pixels or white pixels are to act as the foreground (or blob) pixels.

View

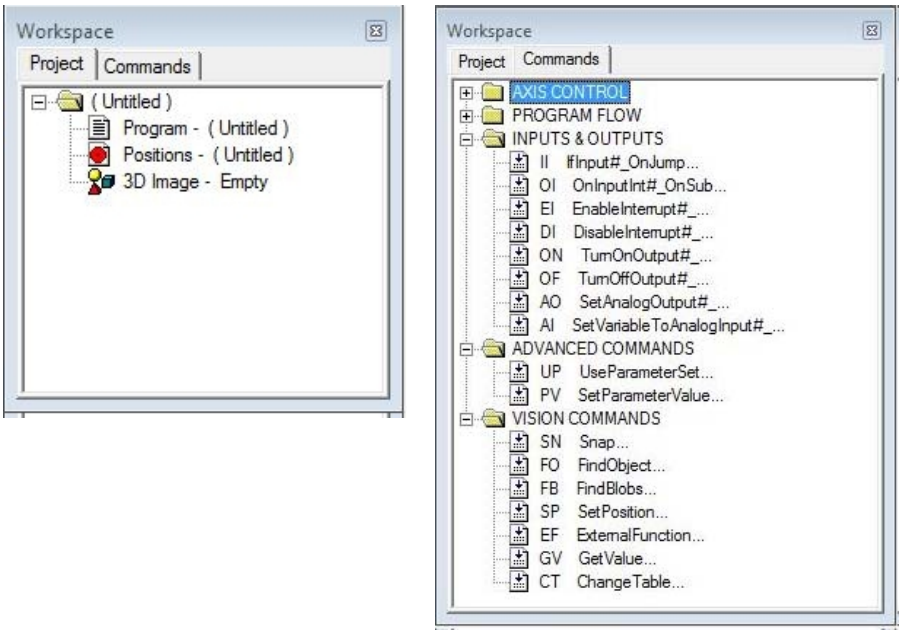
Always on top: Checking this box prevents this window from being hidden by other windows.

Vision Commands in SCORBASE

All SCORBASE programming commands are available from the Command List and are easily compiled into a robot program.

The list shows the two-letter hot-key combinations that allow you to enter commands from the keyboard.

Many commands open dialog boxes for completing the command line parameters.



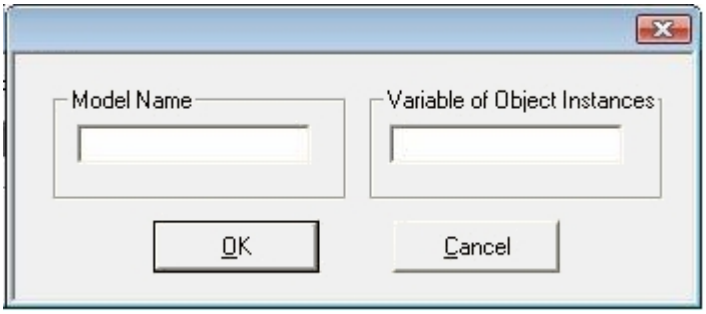
Left: Command list with the Vision Command (ER 4pc, ER-5, ER-7, ER-9).
Right: Vision Command Group (ER 4u).

SN Snap

Captures an image.

FO Find Object

Finds object according to the Pattern Model Name that has been saved in the Pattern folder. Returns the number of instances of the object.



Enter the name of the model in the **Model Name** field.

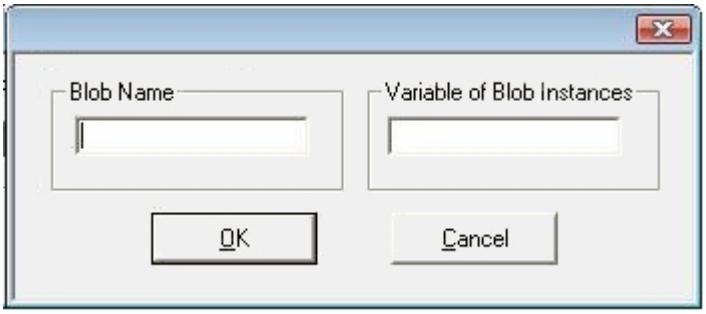
(Note: The name must be the same as it is in the Result Table.)

The SCORBASE variable must be entered into the **Variable of Object Instances**. The results (Number of Object) will be assigned to the variable.

All of the robot's coordinates and blob features will be put into the Results Table

FB Find Blobs

Finds blobs according to the blob analysis name that has been save in the Blobs folder. Returns the number of instances of the Blob.



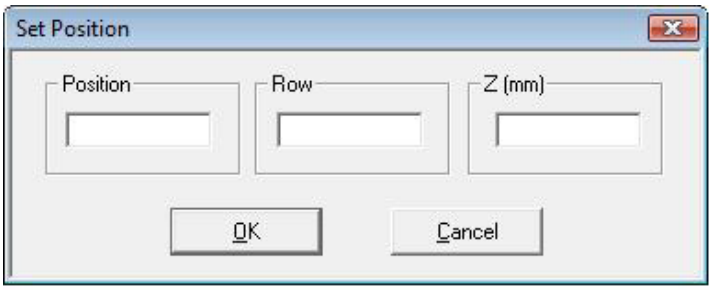
Enter the name of the model in the **Blob Name** field. (*The name must be the same as it is in the Results Table.*)

The SCORBASE variable must be entered into the **Variable of Blob Instances** field. The results (Number of Blobs) will be assigned to the variable.

All of the robot's coordinates and blob features that were defined by the user will be put into the Results Table.

SP Set Position

Sets coordinate value from the Results Table into the SCORBASE Position Number.



In the **Position** field, insert SCORBASE Position Number.

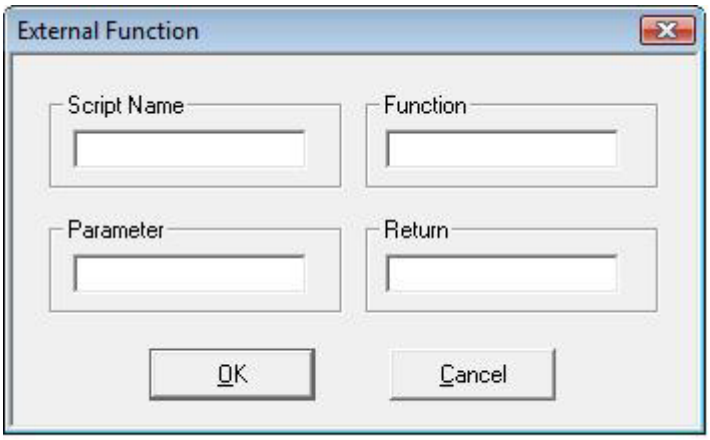
In the **Row** field insert the Position Number (Row) in the Results Table.

In the **Z (mm)** field insert the Z-coordinate, by default the value in the Z-coordinate will be the same as the value of the calibrated position.

Z can be a variable or constant.

EF External Function

Executes the function or subroutine that the user writes in the Matrox script.



The results of the function will be assigned to the variable.

In the **Script Name** field, insert the name of the script in the script folder.

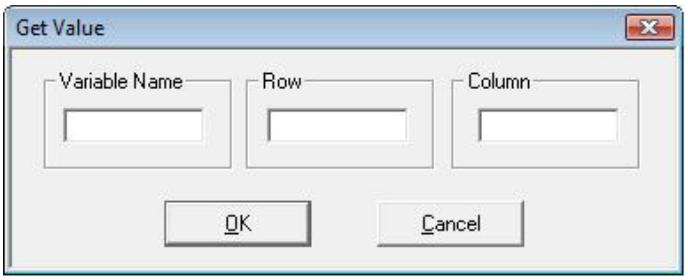
In the **Function** field insert the function or subroutine name that is in the script.

In the **Parameter** field insert the parameter that can be the SCORBASE variable or constant. (*Note: Available for ViewFlex for SCORBASE for ER-4u only*.)

In the **Return** field, insert SCORBASE variable that will get the function return.

GV Get Value

Receive a value from any cell in the Results Table.



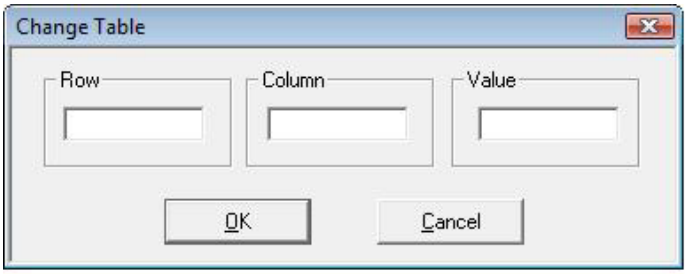
In the **Variable Name** field, insert the SCORBASE Variable. The cell value will be assigned in the variable.

In the **Row** field insert the cell row in the Results Table.

In the **Column** field insert the column name in the Results Table. The **Column** can be a number or the exact column name.

CT Change Table

Change value in any cell of the Results Table.



In the **Row** field insert the cell row in the Results Table.

In the **Column** field insert the column name in the Results Table. The **Column** can be a number or the exact column name.

In the **Value** field insert the SCORBASE variable, or constant that you want the cell to have.

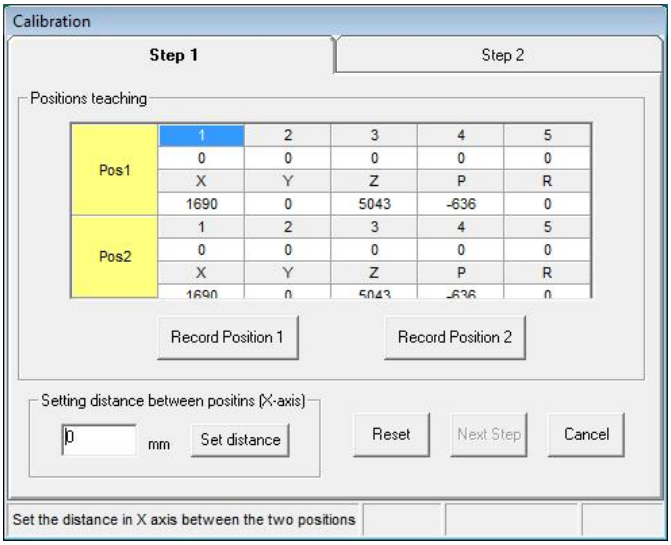
Calibration

Synchronizing the Vision System and the Robot

To calibrate real-world measurements with the vision system's system of pixels, perform the following steps:

1. Execute the HOME routine.
2. Open Client Camera.

   Check camera to make sure that the picture is adjusted, clear and free of distortions.
3. Click the Calibration icon.
4. Using SCORBASE, move robot arm into desired position within the camera's field of vision.
5. Using a pen or marker, mark a position on a piece of paper (or on the coordinate grid) close to the robot and strong enough to be seen in the camera picture. This position should be aligned with the TCP (tool center position – the exact center of the robot gripper). This first position is called Pos 1.
6. Click Record Position 1.

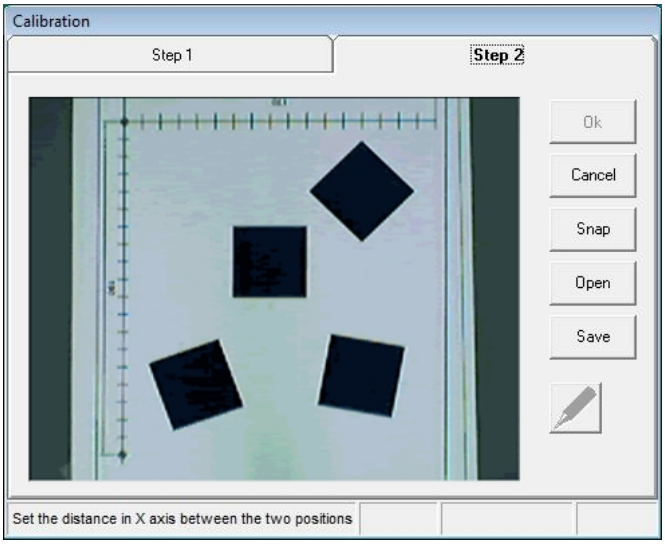


Calibration Step 1 dialog box

7. Along the X-axis only, move the robot to a position on the X-axis that would be greater (+X) than Pos 1. Take a writing instrument and mark the position. This second position is called Pos 2.

   Click Record Position 2.

8. Now you will see in the Combo box the distance between the two positions (Setting Distance) on the X-axis. To achieve the most accurate measurement, take a ruler and measure the distance between Pos 1 and Pos 2 by hand.
   - **Change the distance if necessary according to the hand measurement.**
   - **Click Set Distance.**
   - **Click Next Step. This opens the Step 2 dialog box.**



Calibration Step 2 dialog box

9. If necessary, move robot arm out of the camera's view.
10. Click Snap in the Step 2 dialog box.
11. You will be able to recognize Pos 1 and Pos 2 in the image.
    - **Click the Pen icon. The Pen icon will start flashing after being engaged. Your mouse arrow will become a cross.**
    - **Click on Pos 1, and then make a dragging motion, using your mouse, toward Pos 2. This movement represents an increase in the X-axis. (Shows the direction of increase of the X-axis).**
12. Click the Pen icon again. Now the X and Y-axes are set and the distances are in real-world millimeters.

    When you move your mouse along the image, Pos 1 becomes coordinate 0,0 (center-point) and the directions of X and Y are now the same as the robot. The movement of the mouse along the axes shows changes in X and Y.
13. Click Save to save the calibration. Browse to C:\Intelitek\Viewflex for Scorbase USB\Calibration. Define a file name and click Save.
14. Click OK. Now the Vision System is calibrated and synchronized with the robot, and all new images will become calibrated.

Opening and Saving Calibration Files

The Configuration Step 2 dialog box enables file management operations.

Save

Saves the calibration. The filename extension is CAL.

Open

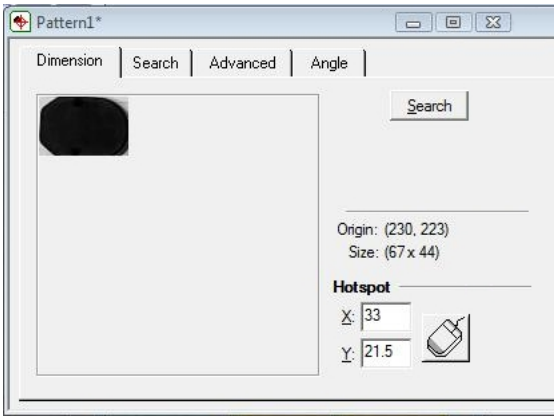
Allows you to load backup calibration files. When the OK icon is clicked, the system is calibrated.

You can configure immediately in the Step 2 tab and open the calibrated file.

Example of Creating a Pattern Model

1. System must be calibrated, so that real-world measurements correspond with the vision system's set of pixels.
2. Open Client Camera.
3. Click the Image Processing Tools icon to open Matrox Inspector.
4. For this example, set a cube down within the camera's field of vision, so that its edge is parallel to the edge of the Client Camera window.

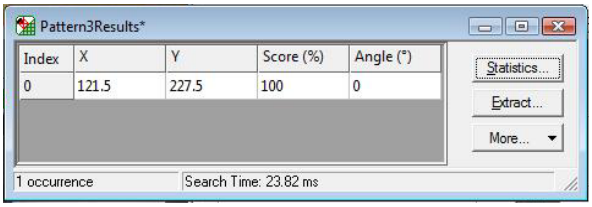
   In order for both the robot gripper and the cube to be set to zero degrees, the cube must be defined as parallel to the X-axis of the camera's world. Subsequently, the robot arm's rotation will be relative to this point.
5. In Client Camera, click Snap.
6. Click the ROI (Region of Interest) icon, and outline the perimeter of the cube that was set.
7. Click the Pattern Matching icon.



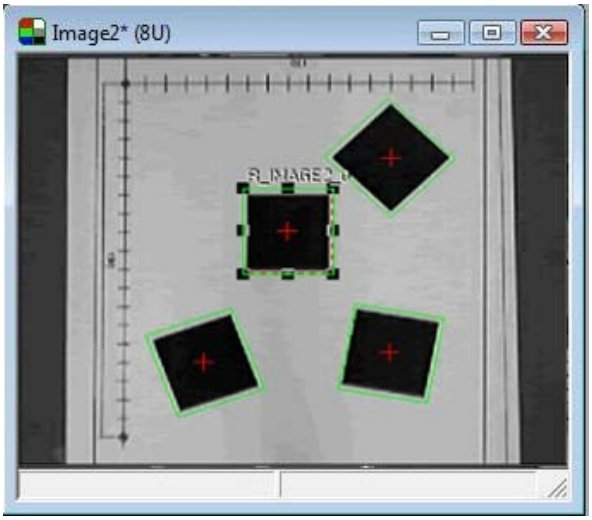
Pattern Matching Model Dialog Box

- **From the Dimension tab, you will see the cube that was outlined using the ROI icon.**

- **From the Search tab, click All.**
- **From the Angle tab, check Enable Search With Rotate. Then enter 180 for Delta Negative, and 180 for Delta Positive (this enables a full 360-degree search).**
- **Click Search. This will build a Measurement Table containing all the positions of the object relative to Pos 1.**



Measurement Table

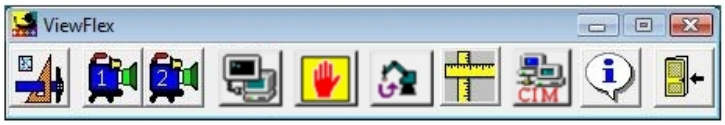


Searched Images

8. Save the Pattern Matching Model in the Pattern Folder, located in the ViewFlex for SCORBASE root folder. Ensure that the Pattern dialog box is selected when saving.
9. Open the Results Table and expand the Pattern Models in the folder tree. Check that the name you gave is listed in the tree.
10. Use this name when you Find Object.

ViewFlex Toolbar

The ViewFlex Toolbar contains additional icons to the ViewFlex for SCORBASE USB Toolbar, and some of the icons that are the same activate certain commands and functions with different functionality than that of ViewFlex for SCORBASE USB:



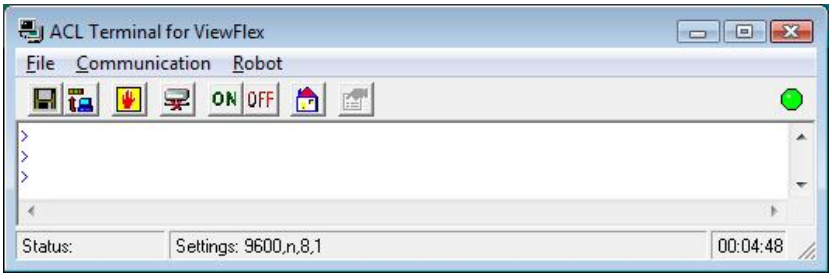
ViewFlex Toolbar

- **Image Processing Tool**
- **Camera 1**
- **Camera 2**
- **ACL Terminal** (for ViewFlex)
- **Abort All**
- **Go Position**
- **Calibration**
- **OpenCIM Device Driver**
- **About**
- **Exit**

ACL Terminal for ViewFlex

ACL, Advanced Control Language, is an advanced, multi-tasking robotic programming language.

The ACL Terminal for ViewFlex is the software interface that provides access to the controller from a PC, and provides functions needed to configure, program and operate the robot system.



ACL Terminal for ViewFlex

Save

Saves a listing of all user programs, variables and positions in one file. The files are in ACL format (.acl).

Download

Downloads data from a user-backup file in the host computer to the controller. (Does not erase or modify existing programs.)

Abort All

Immediately aborts all running programs and stops movement of axes.

On-Line/Off-Line

Opens/closes the communications port.

ON-CON

Enables servo control for all axes, a specified group of axes, or a single axis.

OFF-COFF

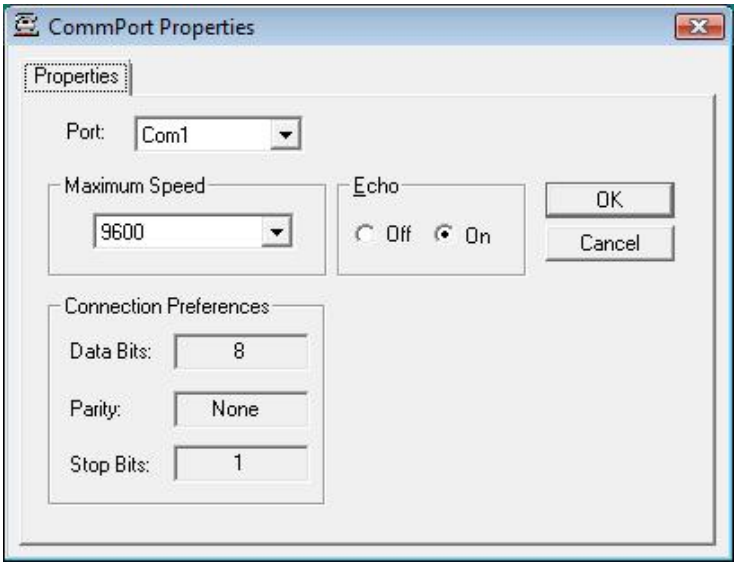
Disables servo control for all axes, a specified group of axes, or a single axis.

Home

Drives all robot axes to their home position.

Port Properties

Opens a dialog box that allows you to configure the RS232 serial communication port in the PC that communicates with the robot controller:



ACL Terminal CommPort Properties

ACL ViewFlex String Commands

The ViewFlex String Commands are written as:

Print / Println “%ViewFlex string commands %”

ViewFlex helps you make applications that combine vision and robot guiding that will use the ACL language for controlling and executing robot tasks.

ViewFlex Variable

Vision functions are written in Visual Basic (VB) script. The vision script will operate the vision task. To synchronize the vision and robot tasks, there is the Global Variable (VF). After executing the Vision Function or subroutine, the VF value will be 1 (VF=1).

SNAP

Format: %SNAP%

Description: Will capture an image from the camera and put it into the Image Processing Tool.

Examples: PRINTLN "%SNAP%"

RUN

Format: %RUN prog%

Description: Where: **prog** is the name of a function or subroutine in the script. The function returns the ACL command back to the controller.

Examples: PRINTLN "%RUN PROG%"

This executes the function or subroutine in the open VB script file. If you execute the function, the results will be sent to the controller.

The script must be loaded before it can be executed from the ACL.

SETPOS

Format: %SETPOS Position, Table index, Table name, Z(mm)%

Description: Where:

Position is a defined robot position.

Table index is a position of the object in a measurement table that was found in the image after searching. The reserve word ALL means that if a Position is the name of a vector all the positions in the table will be set.

Table name is the name of the measurement table. If omitted, it means Current table.

Z is the value of the Cartesian coordinate Z in millimeters.

Examples: PRINTLN "%SETPOS *pos,1, , 60*%"

Position *pos* receives the coordinate value of position *1* in the Current measurement Table, while the coordinate value of Z is *60* mm.

PRINTLN **"**%SETPOS *pv[4],3,table1 , 80*%"

Position *pv[4]* receives the coordinate value of position *3* in the measurement table named *table1*, while the coordinate value of Z is *80* mm.

PRINTLN "%SETPOS *pv,ALL,table2 , 80*%"

Vector *pv* receives the coordinate values of *ALL* positions in the measurement table named *table2*, while the coordinate value of Z is *80* mm.

Project: The following example project shows how the ACL program is used with the Vision System, in order to automate the robot and the Vision System. The example is made from two programs:

- **ACL:** for the robot task
- **Visual Basic Script**: for the vision task.

GOPOS.ACL

(Note: N should be a Global Variable.)

- The code initiates the global variable VF before sending comments to the Vision System, so that it can cause the ACL program to wait until the vision command is finished. This happens when VF is 1.
- The program tells the Vision System to Snap, then executes the GetPos function in the script. The results of the GetPos function is a string that is an ACL command. **If the search results are 3, for example, then set N to 3 ("set n=3")**.
- SETPOS takes the position of the object from the measurement table that was found after the search, and converts it to positions that can be sent.
- ALL takes every position from the Measurement Table and sets them into positions in the vector.
- At the end of GoPos, the program moves the robot to the position in the vector.

```
PROGRAM GOPOS
*********************
SET VF = 0
PRINTLN "%SNAP%"
WAIT VF = 1
SET VF = 0
PRINTLN "%RUN GETPOS%"
WAIT VF = 1
SET VF = 0
PRINTLN "%SETPOS POS,ALL,,60%"
WAIT VF = 1
FOR I = 1 TO N
  MOVED POS[I]
ENDFOR
END
```

GETPOS.BAS

- In order for the Run command to work, the script must be loaded.
- The model for the object whose script will be searched should also be loaded.
- When the script will be executed, a measurement table with the positions will be created. The script will also send a command that initiates a sign of the number of objects that were found.

```
Function GETPOS()As String
 I_IMAGE1$ = Insptr.ImgGetCur
 Insptr.ImgSetCurrent I_IMAGE1$, R_Def$,
ALL_BANDS
 Insptr.ImgConvertType(TO_8U)
 Insptr.MeasNew()
 M_X_MOD$=Insptr.PatGetCur
 Insptr.PatSetCur M_X_MOD$
 x=Insptr.PatFind
 Insptr.ImgClose
 Num=Insptr.MeasGetLastID
 GETPOS="SET N=" + CStr(num)
 End Function
```

Abort All

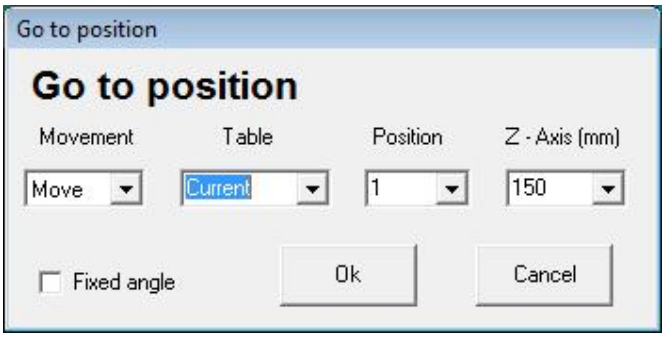
Format: [Ctrl] + A

Description: Immediately aborts all running programs and stops movement of axes.

[Ctrl] + A is the fastest software method for stopping program execution and halting movement of all axes. It can be used at any moment, even while entering another command, in order to instantly halt programs and axes.

This command is entered from keyboard, but does not require [Enter] for execution.

Go To Position



Go to Position dialog box

Movement

Move/MoveL (Move Linear).

Table

Can be the Current table, or any other named measurement table.

Position

The index of a position in the measurement table.

Z-axis (mm)

The Cartesian coordinates in millimeters.

Fixed Angle

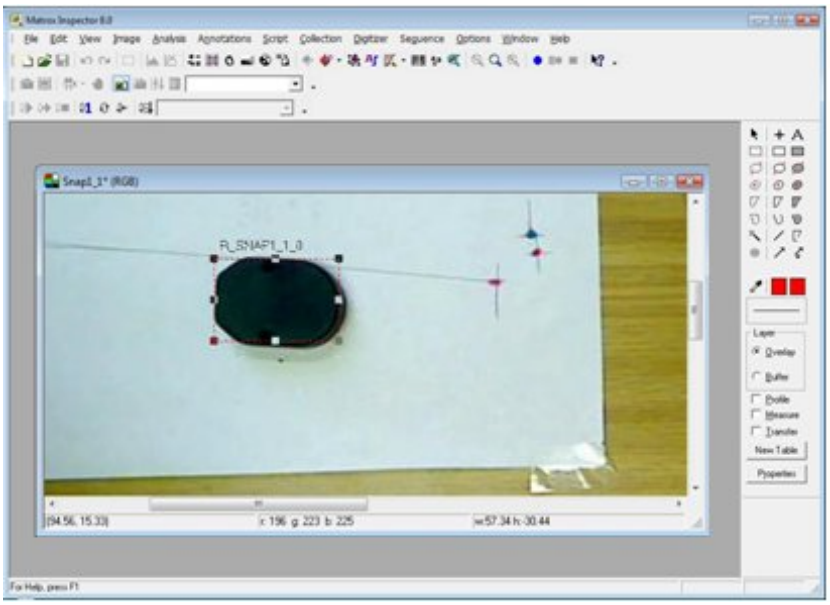
Enabling this option causes only the X and Y axes to be. This option can be used with circular objects when the gripper rotation is not important.

Example of Using Go To Position

1. System must be calibrated, so that real-world measurements correspond with the Vision System's world of pixels.
2. Open Camera 1.
3. Click the Image Processing Tool icon.
4. In this example, put a cube down within the camera's field of vision, so that its edge is parallel to the edge of Camera 1 dialog box's border.

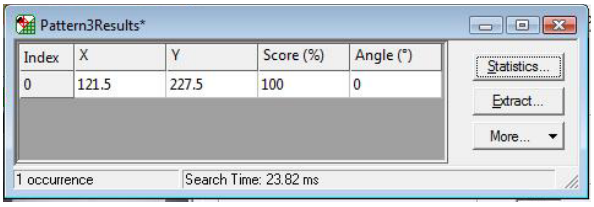
   In order for both the robot gripper and the cube to be set to zero degrees, the cube must be defined as parallel to the X-axis of the camera's world. Subsequently, the robot arm's rotation will now be relative to this point.
5. In Camera 1, click Snap.

6. Click the ROI (Region of Interest) icon, and outline the perimeter of the cube that was set.
7. Click the Pattern Matching icon.

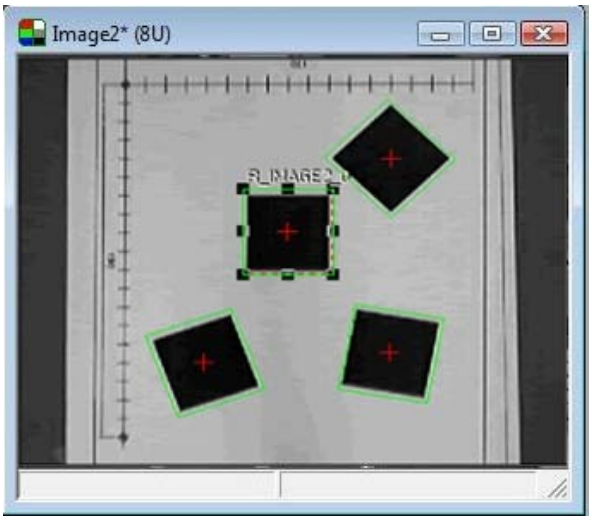


Pattern Matching Model dialog box

- **From the Dimension tab, you will see the cube that was outlined using the ROI icon.**
- **From the Search tab, click All.**
- **From the Angle tab, check Enable Search With Rotate. Then enter 180 for Delta Negative, and 180 for Delta Positive (this enables a full 360-degree search).**
- **Click Search. This will build a Measurement Table containing all the positions of the object relative to Pos 1.**



Measurement Table



Searched Images

8. In this example, choose the Current table (which will be the opened table), and Position 1 (Pos 1). Click OK.

   The robot will move according to the Go To Position and find the cube.

Calibration

Synchronizing the Vision System and the Robot

To calibrate real-world measurements with the Vision System's world of pixels, it is necessary to perform the following steps:

1. Make sure that there is communication between the controller and the robot.

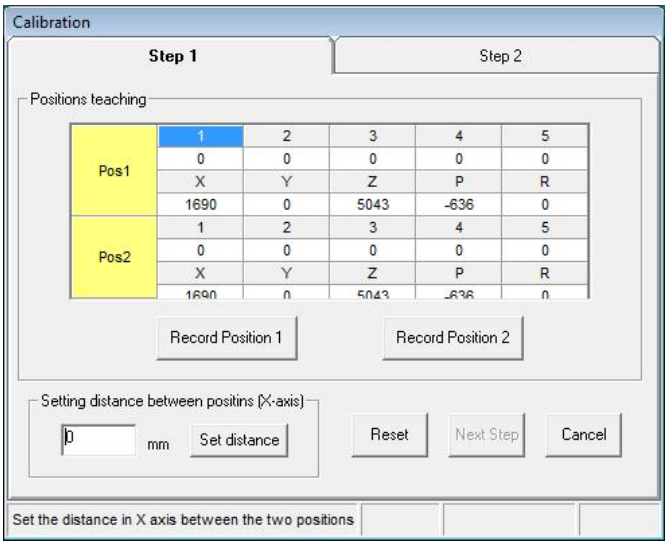
   Click the ACL Terminal icon. Click the On-Line/Off-Line icon if necessary.

2. Execute the HOME routine.
3. Open Camera 1.

   Check camera to make sure that the picture is adjusted, clear, and free of distortions.

4. Click the Calibration icon. This automatically establishes a connection between controller and robot.
5. Move robot arm into desired position within the camera's field of vision.

6. Using a pen or marker, mark a position on a piece of paper (or on the coordinate grid) close to the robot and strong enough to be seen in the camera picture. This position should be aligned with the TCP (tool center position – the exact center of the robot gripper). This first position is called Pos 1.



Calibration Step 1 dialog box

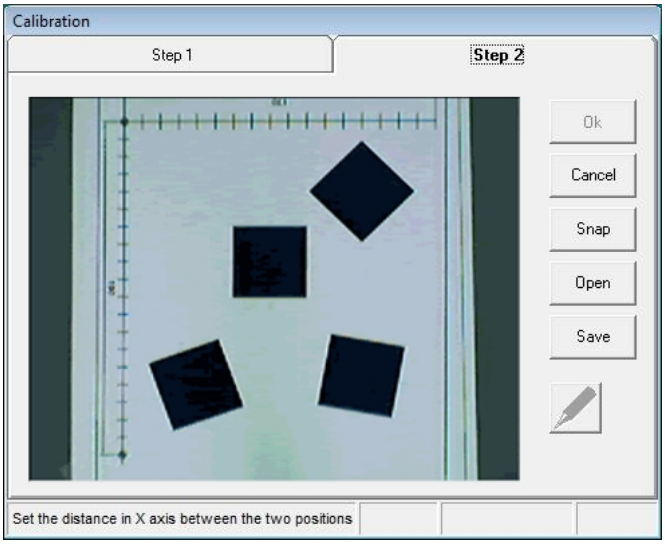
Click Record Position 1. (*If using Controller-B, be sure it is in Auto Mode*.)

If trying to record a position produces a beep sound the reason may be that the Teach Pendant has not been changed from Teach Mode to Auto Mode. (In the ACL Terminal, type Auto, then click Enter.)

7. Only along the X-axis, move the robot to a position on the X-axis that would be greater (+X) than Pos 1. Take a writing instrument and mark the position. This second position is called Pos 2.

Click Record Position 2. (*If using Controller-B, be sure it is in Auto Mode*.)

8. Now you will see in the Combo box the distance between the two positions (Setting Distance) on the X-axis. To achieve the most accurate measurement, take a ruler and measure the distance between Pos 1 and Pos 2 by hand.
   - **Change the distance if necessary according to the hand measurement.**
   - **Click Set Distance.**
   - **Click Next Step. This will take you to the Step 2 dialog box.**



Calibration Step 2 dialog box

9. If necessary, move robot arm out of the camera's view.
10. Click Snap in the Step 2 dialog box.
11. You will be able to recognize Pos 1 and Pos 2 in the image.
    - **Click the Pen icon. The Pen icon will start flashing after being engaged. Your mouse arrow will become a cross.**
    - **Click on Pos 1, then make a dragging motion, using your mouse, toward Pos 2. This movement represents an increase in the X-axis. (shows the direction of increase of the X-axis).**
12. Click the Pen icon again. Now the X and Y-axes are set and the distances are in real-world millimeters.

    When you move your mouse along the image, Pos 1 becomes coordinate 0,0 (center-point), and the directions of X and Y are now the same as the robot. The movement of the mouse along the axes shows changes in X and Y.
13. Click OK. Now the Vision System is calibrated and synchronized with the robot, and all new images will become calibrated.

Opening and Saving Calibration Files

The Configuration Step 2 dialog box enables file management operations.

Save

The Save icon saves the calibration. The extension of the files is .CAL.

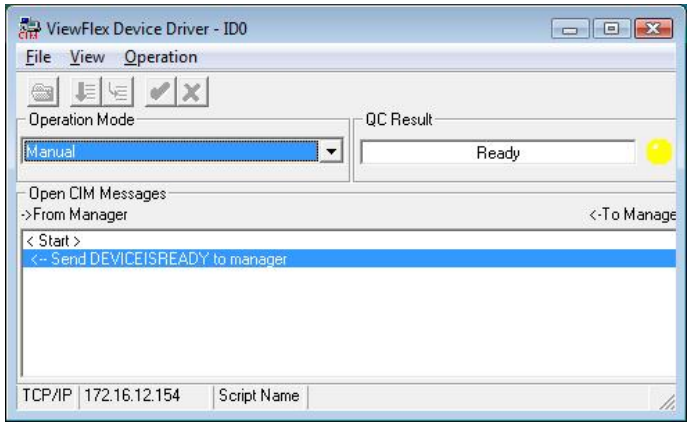
Open

The Open icon will allow you to load backup calibration files. When the OK icon is clicked, the system is calibrated.

You can configure immediately in the Step 2 dialog box and open the calibrated file.

OpenCIM Device Driver

The ViewFlex Device Driver interfaces between the OpenCIM network and the Vision Machine System as a quality control device.



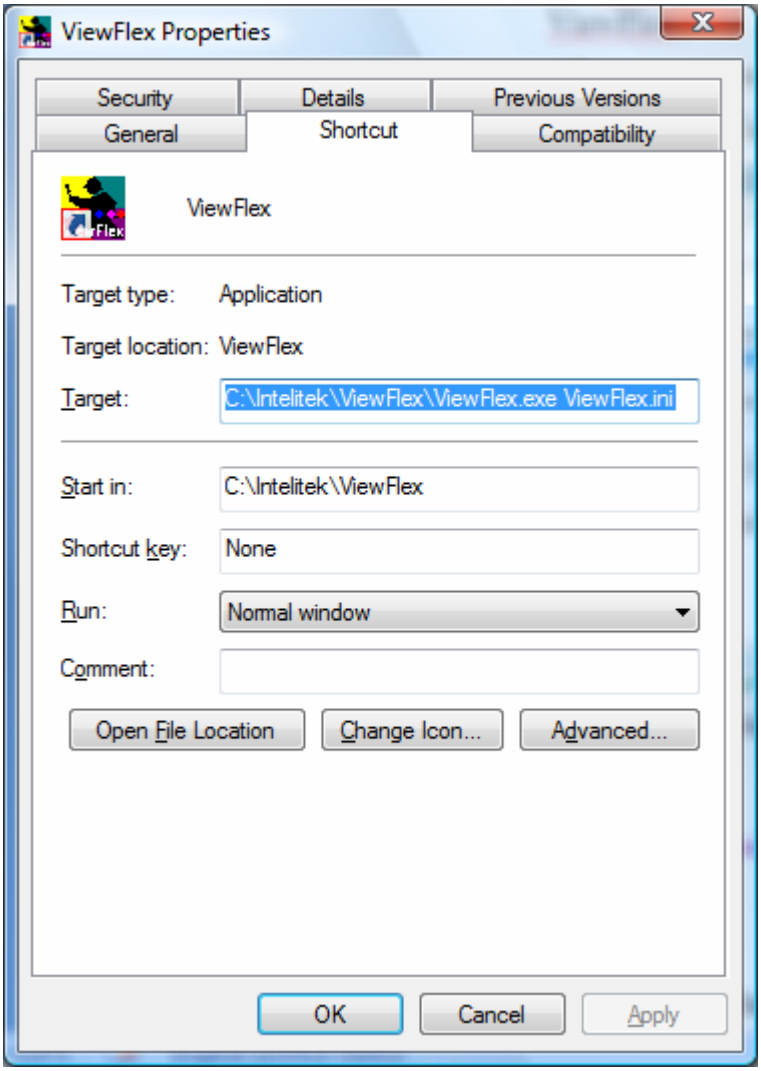
ViewFlex Device Driver

Each quality control test is defined as a separate process in the Machine Definition module. The quality control test consists of three parts:

- **File**: The File is the Script File (.bas) that contains the Program (Function) to be executed.
- **Program**: The Program is the Function from the File that returns the results of the quality control process to the OpenCIM Manager as Pass/Fail or Error.
- **Fail %**: Simulates test results (only in Simulation Mode) by determining the Pass/Fail according to the percentage of failure that was input.

The ViewFlex Device Driver performs the following functions:

- Activates a test on the Vision Machine System.
- Receives status messages from the Vision Machine System and from the OpenCIM Manager. (OpenCIM Messages dialog title in the ViewFlex.)
- Allows you to test and debug the Vision Machine process.
- Emulates the Vision Machine System in Simulation mode.



ViewFlex Properties

ViewFlex.ini

Be sure to update the script-path to the folder where the scripts files are. An example of where the directory that the script files are located in:

[Device Driver Definitions]

ScriptPath= C:\Users\Public\Documents\Intelitek\OpenCIM\Projects\LIB\viewflex

Operation Modes

The Operation Mode lets you to define the control mode ViewFlex Device Driver is running in:

On-Line

On-Line mode the ViewFlex Device Driver waits for the commands from the OpenCIM Manager, and then Snap, Load Script, Execute Program Script, and Send Results.

Manual

Manual Mode allows you to test the OpenCIM Manager and manually simulate conditions of Fail and Pass.

The following are activated only in Manual Mode, after a request from the OpenCIM Manager:

Send Pass

Sends pass to the Manager.

Send Fail

Sends fail to the Manager.

Simulation

Simulation Mode allows you to simulate test results by determining the Pass/Fail according to the percentage of failure that was input to the OpenCIM Manager.

Debug

The Debug Mode allows you to debug every step of the script. This is made for testing the script before it will be run online.

The following are activated only in Debug mode:

Open File lets you load the script.

Run Script icon executes the script that has been chosen.

Step-By-Step icon lets you to execute each command line of the script individually.

Example of Script for Pass/Fail Test

The following script is an example for testing Pass/Fail Models. A Model refers to the pattern for which you are searching, and the image for which it is extracted.

The following program will try to find the “x” object by using the x-model (x.mod). If found, Fail is sent (QCR=“Fail”). If not found, then it will try to find the “v” object. If found, Pass is sent (QCR=“Pass”). If neither is found, Error is sent (QCR=“Error”).
For more information on the commands, refer to Inspector’s online help.

```
Function QCR() As String
Dim x As Integer
I_IMAGE1$ = Insptr.ImgGetCur
 Insptr.ImgSetCurrent I_IMAGE1$, R_Def$, ALL_BANDS
 ' X.mod is a Model Search of object for Fail sign
 M_X_MOD$ =
Insptr.PatLoad("C:\Users\Public\Documents\Intelitek\OpenCIM\Projects\\MICROC
IM\WS3\ViewFlex\X.mod")
 Insptr.PatSetCur M_X_MOD$
 Insptr.ImgConvertType(TO_8U)
 Insptr.MeasNew()
 x=Insptr.PatFind
 If x=1 Then
 QCR="Fail"
 Else
 ' V.mod is a Model Search of object for Pass sign
 M_Y_MOD$ =
Insptr.PatLoad("C:\Users\Public\Documents\Intelitek\OpenCIM\Projects\MICROCI
M\WS3\ViewFlex\V.mod")
 Insptr.PatSetCur M_Y_MOD$
 x=Insptr.PatFind
 If x=1 Then
 QCR="Pass"
 Else
 QCR="Error"
 End If
 End If
 Insptr.PatClose
 Insptr.ImgClose
 Insptr.MeasClose
 Insptr.CloseAll
End Function
```