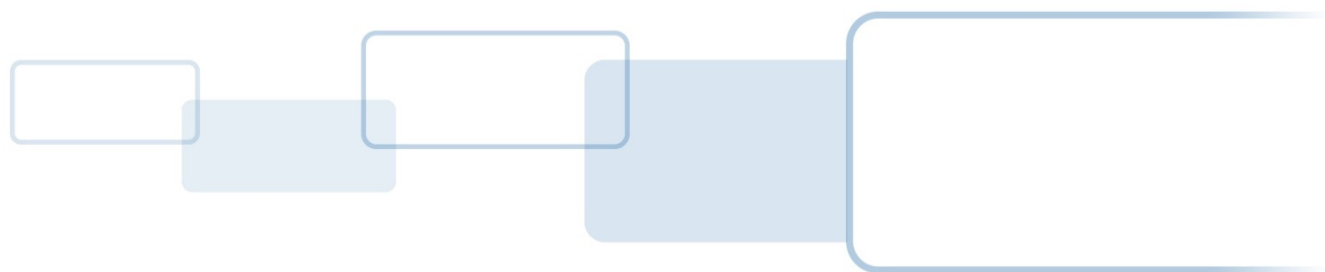




Lumidigm Frequently Asked Questions

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1 Biometrics

What is verification?

Verification, or one-to-one (1:1) matching, is used to verify the identity of a user. A user provides a credential (e.g., an ID card, PIN, etc.) and submits a finger to the sensor. The system matches the fingerprint against the credential and thereby “verifies” that the user is who they say they are.

What is identification?

Identification, or one-to-many (1:N) matching is used to determine the identity of a user. A user submits a fingerprint to the sensor. The system will “identify” the user by comparing the data against a database and returning the top one or more matches.

What is a template? Minutiae point? Match score?

Minutiae points on a fingerprint are the points where fingerprint ridges end or split. Measurement of these points is used to create a *template* and is one method of mathematically representing a fingerprint. Two templates are compared to create a *match score*. The match score represents how alike two templates are to each other.

What is a match threshold?

A biometric system must make a decision about match scores. Are two templates similar enough to call them a match? The point at which the match score is deemed high enough is called the threshold. The threshold is set by the system administrator and is specific to each application.

2 Features

How does Lumidigm liveness (spoof) detection work?

The Lumidigm V-Series includes Premium Liveness Detection, which provides superior, extended spoof protection with update capabilities. The Lumidigm M-Series includes Standard Liveness Detection, a fake-finger detection capability that meets the industry standard available in competing fingerprint sensor products.

Lumidigm liveness detection software returns a value that indicates the likelihood that the fingerprint image collected was from a live human. The lower the value returned, the more likely it is to be genuine. For information on setting a threshold for spoof detection for your application, please refer to the performance document relevant to your Lumidigm sensor: *Biometric Performance 5.30 - V-Series.pdf* or *Biometric Performance 5.30 - M-Series.pdf*.

Lumidigm liveness (spoof) detection functionality was designed to be independent from the acquisition and biometric matching functionalities, an independence that allows great freedom in application development and integration. Therefore, an image and template will be created with every acquisition, leaving your application software to make a decision on how to proceed based on the spoof value returned. For example, an application might be designed to require a second finger be collected, an attendant be called over to the station, or a warning sent to the user.

Do Lumidigm sensors have finger presence detection?

Yes. When the platen is illuminated in blue light, it is “searching” for a finger. When a finger is properly placed on the platen, the sensor collects biometric images. Live feedback for proper finger placement is available.

3 System Design

What value should we use for our biometric match threshold? Spoof threshold?

We cannot recommend one threshold because every application has different requirements. For help determining the threshold that is most appropriate to your application, please refer to the *Biometric Performance 5.30 - V-Series.pdf* or *Biometric Performance 5.30 - M-Series.pdf* documents we have included with our software distribution CD. These documents show the false accept rate (FAR) and false reject rate (FRR) at various thresholds in an office setting for the Lumidigm sensors. Consider this information along with the specific requirements of your application to choose a threshold.

How should we handle enrollment?

Enrollment is a critical component of a biometric system. All future tests are compared against the enrollment data. Thus, it is very important that the enrollment templates are of high quality and that they fully represent the finger. Using Lumidigm software, there are several ways to do this.

The best method is to store multiple templates for each enrolled finger, if at all possible. (Some systems may not have the memory resources for this method.) This allows the selection of the highest of multiple returned match values during system operation.

The benefit of storing multiple templates for each enrolled finger is virtually eliminated when the finger is not lifted between placements during enrollment. Thus, it is absolutely critical that the enrollment policy for any application demands complete separation of finger placement events; i.e., multiple images must not be taken from a single placement during enrollment.

If only one template can be stored at enrollment, it is important to perform test insertions to ensure that the chosen enrollment template can be used for matching.

How do I optimize finger placement?

For the best quality images, fingers should be placed such that a maximum area of the fingerprint is imaged. Generally this means that the first knuckle of the finger is at the bottom of the platen and the fingertip is at the top, with the finger centered on the platen from left to right.

The Lumidigm SDK allows for a video stream to be shown to the user so they can see how their finger is placed. Additionally, acquisition status indicators are available to provide specific feedback (e.g., “move finger to the left”) to the user. An example of how to use the feedback features is given in our sample code, *StreamCheck*.

4 Images and Templates

What format are your images in? What other image formats does the software support?

The Lumidigm images are natively binary. You can also obtain ISO/IEC 19794-4:2005 and ANSI/INCITS 381-2004 images by using the *LumiFIRRecord* commands and setting the LUMI_FIR_STANDARD type. The *LumiInOpAPI.h* has the settings for these image types.

In addition, you can save the images as bitmap files using *LumiSaveAsBitmapToFile* by using the Windows SDK InOp API.

Do you have a quality metric for your images?

We have the NIST NFIQ image quality metric available in the Windows SDK InOp API.

Do you support WSQ images?

In the Lumidigm SDK InOp API, WSQ image support is available. The functions are *LumiWSQDecode* and *LumiWSQEncode*.

How many templates can you store on the devices?

V30x sensors can store at least 1000 templates. The actual number will depend on how many insertions you store per user.

For verification-only databases, M30x sensors can store 50,000 fingers if 3 templates per finger are stored. The actual number will depend on how many templates you store per enrolled finger.

For mixed verification and identification or identification-only databases, M30x sensors can store 25 sets of 1,000 fingers (3 templates per finger). For identification, exactly 3 enrollment insertions are required.

V31x and M31x sensors do not store templates on the devices. Thus, template capacity is limited only by the disc space available on the PC.

Are your templates ANSI 378 / ISO compliant?

The templates the Lumidigm sensor provides are ANSI 378 compliant and MINEX certified. You can use the Windows SDK InOp API to convert these templates to ISO 19794-2 compliant templates.

	M30x	V30x	M31x	V31x
Templates	2048 bytes	2048 bytes	2048 bytes	2048 bytes
Images	108,800 bytes (272x400)	98,560 bytes (280x352)	191,488 bytes (352x544)	98,560 bytes (280x352)*

*Processing done on the host PC.

What is the minimum size for templates?

The Windows SDK InOp API allows for templates to be truncated using the function *LumiTruncateANSI378Template*. Several options exist for truncation, but the minimum template size is 398 bytes. We require 32 bytes for the format/header + 6 bytes per minutiae. Our SDK truncation requires at least 61 minutiae.

5 Compatibility

May we use a matcher from Neurotech, Sagem, Cogent, etc?

We provide an ANSI 378 compliant, MINEX certified template extraction and matching algorithm as an option with our sensors. In addition, we have customers who have successfully used various matching and template extraction software with our sensors.

Our enrollments were taken with a different sensor. Will they be compatible with your sensors?

Our V-Series has been tested for the ILO Seafarers program which is an independent test for system interoperability. This testing found that the V30x sensor is one of the top 2 sensors for interoperability of those tested. Other customers have successfully integrated our sensors into their applications containing image databases from other fingerprint sensors. Internal testing has shown the V31x, M30x, and M31x sensors are also interoperable with other fingerprint readers.

6 Software

Do you have a driver for my system?

System	Driver Available
Windows XP	Yes, through LumiDrivers_Setup
Windows 2000	Not available in release 5.30
Windows Vista 32-bit	Not available in release 5.30
Windows Vista 64-bit	Not available in release 5.30
Windows 7 32-bit	Yes, through LumiDrivers_Setup
Windows 7 64-bit	Yes, through LumiDrivers_Setup
Windows 8 32-bit	Yes, through LumiDrivers_Setup
Windows 8 64-bit	Yes, through LumiDrivers_Setup
Windows CE	Yes, through vCOM, for V30x and M30x sensors only
Linux	Yes, through vCOM, for V30x and M30x sensors only
MacOS	No

I am using vCOM. What do the packets mean?

You do not need to parse the individual packets output from the sensor. Use the vCOM development environment and the associated communication protocol for the fastest development.

Can I change the timeout?

There are two ways to change the timeout on the Lumidigm sensors, described below. The first method is temporary and will revert back to the default after the sensor is powered off. The second method retains the timeout until changed.

Temporary

To change the default, first call `LumiGetConfig` to get the `LUMI_CONFIG` structure. Set the `nTriggerTimeout` member of the `LUMI_CONFIG` structure, and then call `LumiSetConfig`, passing the `LUMI_CONFIG` structure that was just modified. This process is shown in the *CmdLnExample* code that ships with the Lumidigm SDK.

If you are using vCOM, you can change the timeout through the `V100_INTERFACE_COMMAND_TYPE` structure by using the `V100_GET_CMD` and `V100_SET_CMD` functions. An example of how to do this is included with the vCOM example code.

You will need to do this every time you initialize the sensor because it will reset to the default after being turned off.

Stored

The sensor configuration tool, called *LumiCfgToolGUI*, is installed as part of vCOM and allows the sensor timeout to be changed and stored in the Lumidigm sensor. If your application requires a specific timeout, this is the best option.



I am using a different extractor. Can I turn off template extraction in the sensor to reduce overall latency?

Yes. The sensor configuration tool, called *LumiCfgToolGUI*, is installed as part of vCOM and allows the template extraction functionality to be turned off.

I am writing an application in Java. Do you have any sample code?

Sample code for Java is included in the vCOM installation. If you are using one of our V30x sensors, it must have embedded functionality to use this application.

I am writing an application in Visual Basic. Do you have any sample code?

Sample code for VB6 is included in the Windows SDK installation.

Do you have software to do identification?

All of our M-Series sensors (M30x, M31x) as well as the Lumidigm V31x sensor have identification capability using Lumidigm's own identification software. In addition, our templates are compatible with the Innovatrics identification software.

What Windows XP Service Pack or hotfix is required?

Service pack 1, 2, or 3 is required for all sensors. Hotfix KB969238 is required for the V31x and M31x sensors. This hotfix is available at <http://support.microsoft.com/kb/969238>.

7 Hardware

Why can't I find my sensor product in the technical documentation?

Lumidigm currently supports two sensor series, the V-Series and the M-Series. The V-Series has two product lines, the V30x (formally called Venus) and the V31x (formerly called Voyager). The M-Series also has two product lines, the M30x (formerly called Mercury) and the M31x (formerly called Mariner).

What do you mean by smart and streaming sensors?

Lumidigm offers both “smart” and “streaming” sensors in its V- and M-Series product lines. Lumidigm’s streaming sensors, the V31x and the M31x, send raw data to a Windows® PC for processing. The Lumidigm smart sensors, V30x and M30x, can do data processing aboard the sensor.

The distinction between smart and streaming is important when deciding whether to install the device service or the sensor drivers for development and deployment. See *Lumidigm Device Service Deployment v5.30.pdf* for more information.

I am working through a USB Hub or USB Extender. Will I have any problems?

The Lumidigm sensors receive power through the USB cable. The sensors can work through USB hubs or extenders as long as they provide adequate power (500 mAmp).

Do you support RS-232?

Yes, for some products. V30x and M30x OEM devices support RS-232; you can access the RS-232 pins through our OEM devices. You will need to use vCOM to use the functionality. Also, because of the speed of RS-232, receiving images from the sensor is not recommended.

How do I change the RS-232 baud rate?

The sensor configuration tool, called *LumiCfgToolGUI*, is installed as part of vCOM and allows the baud rate to be changed and stored in the Lumidigm sensor.

How do we interface with the Lumidigm sensor?

You can communicate with M30x and V30x devices through either USB or RS-232. M31x and V31x support high-speed USB 2.0 only.

Do you have mechanical or electrical drawing to assist in my integration?

Mechanical and electrical integration documents for Lumidigm sensors are provided with the CD that comes with development kits.

Will the Lumidigm sensor work with USB 1.1?

Lumidigm V30x and M30x will work with USB 1.1. However, because of the reduced speed compared to USB 2.0 there will be a difference in the time to get an image or template. Lumidigm V31x and M31x require USB 2.2.

Can we change the orientation of the sensor? The finger?

Rotating the finger or sensor 180 degrees will not degrade performance of the sensor. However, the LEDs in the sensor are oriented to flash away from the user in the normal orientation. If the finger or sensor is rotated 180 degrees (with the communication ports facing the user), these LEDs will flash toward the user. If the finger completely covers the platen, no light will be seen by the user. If the finger does not cover the platen, the light may inconvenience the user but will not harm them.

Other rotations of the finger or sensor may cause some degradation in performance. Rotating the finger 90 degrees will severely degrade the performance of the system because only a small part of the finger will be imaged. Rotating between 0 and 90 degrees will show smaller degradation of performance. For highest performance, the finger should be placed on the sensor platen so that it can be completely imaged.

What is the minimum power required?

The sensors require 500 mAmp to function. This is the minimum amount of power provided by USB according the USB specification. Below this level, the sensor will behave unpredictably.

8 Troubleshooting

My sensor is not working with my application. What should I do?

The first step is to determine if the problem is the application software or the hardware. If your sensor has template functionality, the quickest way to make this determination is to use the Lumidigm demonstration application through a USB connection. If your sensor does not have template functionality, you can do similar testing using the Visual Basic application installed with the Lumidigm SDK. If your sensor can initialize, capture high-quality images, and enroll and verify users (if available), the problem is most likely related to the software of your application. If your sensor does not work correctly with these applications, please contact Lumidigm technical support for further help and information about returning your sensor for repair.

The SDK returns a license error with my V30x sensor. What does that mean?

The most common reason for the Lumidigm SDK to return a license error is because the application is attempting to use a functionality that the sensor does not have, e.g., creating biometric templates or getting a spoof value.

The demonstration application returns an error that it cannot initialize the sensor with my V30x sensor. What does that mean?

The error either indicates that your computer and sensor are not able to communicate or that your V-Series sensor does not have the functionality to use the application. Specifically, the sensor is required to have functionality to create templates to use the Lumidigm demonstration application.

The Visual Basic 6 application that is included with the Lumidigm SDK installation will work on any sensor configuration.

vCOM returns license error GEN_ERROR_LICENCES when using my V30x sensor. What does that mean?

Generally, this error occurs because your V-Series sensor does not have the required functionality to use vCOM. vCOM requires the sensor to have embedded functionality.