How to Select the Right Tenprint Device

HID® offers two lines of tenprint devices, each with its own distinct advantages. This white paper provides the key features and advantages for each tenprint scanner to aid in choosing the right device for your unique identity management challenges.

This guide focuses on the selection criteria for tenprint, FAP (Fingerprint Acquisition Profile) 60 devices, and the following general questions should be considered when choosing any tenprint device.

WHITE PAPER

Key Questions Before You Start

When deciding what type and brand of fingerprinting device to purchase, there are some general questions to consider. It is also important to note that in some cases the initial cost of a competitive device may be low, but the total cost of ownership may be high.

Additionally, we stress that it is crucial to remember the main purpose of collecting prints is to create a benchmark record to later match against. A poor benchmark record could result in an inconclusive or missed match. Quality at all levels is important given the typically critical nature of the use cases.

1. What is the Mean Time Between Failures (MTBF) for the device?
2. Are the resulting images high quality?
   - Can they be later matched against latent prints effectively?
   - Can they be used during court cases to prove a connection between criminal and crime?
   - Can forensic experts rely on the images consistently?
   - Do the prints provide good scores for NIST Fingerprint Image Quality (NFIQ) and other types of quality tests?
3. What is the device throughput when all other things are equal?
4. How many times will a slap or roll have to be repeated during the enrollment process because the device didn't capture the right quality level on the first try?
5. How many times has a vendor's device been implemented and then removed within the first year or two due to low quality issues or frustrated users? Conversely, how many times has a customer purchased HID devices, then purchased new ones at the end of the lifecycle (typically 6 to 9 years)?
6. Do the devices produce high-quality images even when the subjects' fingers are dry, damaged, moist or tattooed?
7. Can the vendor provide an entire solution or just hardware devices?
8. Does the provider have a track record that can be relied on to maintain devices or service the account in the future?

HID Tenprint Device Overview

HID offers two lines of tenprint devices: the Guardian™ and the Patrol.

HID GUARDIAN 100 AND 200

The HID Guardian tenprint scanner represents the most advanced optical fingerprint devices in the world. They contain moisture discrimination optics (MDO), superior user guidance FlexFlat and FlexRoll (Guardian 200) technology, and a range of optional features such as Presentation Attack Detection (PAD) and a silicone membrane for excellent dry fingerprint capture.

HID PATROL

The HID Patrol offers an economical approach to certified tenprint acquisition without sacrificing image quality. Optional silicone membrane is available for superior dry fingerprint capture. HID Patrol is compliant with the Modular Open Source Identity Platform (MOSIP) program. MOSIP is a modular and flexible identity platform that helps Governments and other user organizations implement a digital, foundational identity system in a cost effective way.

GUARDIAN 100

GUARDIAN 200

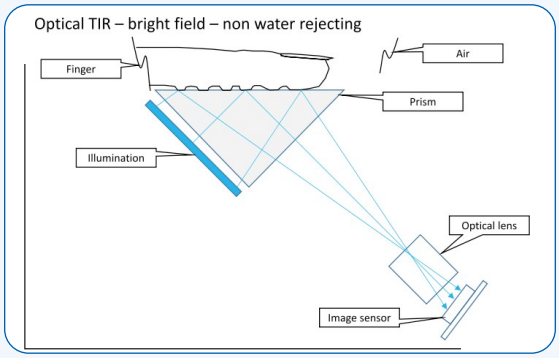
PATROL

MOSIP COMPLIANT

Key Features

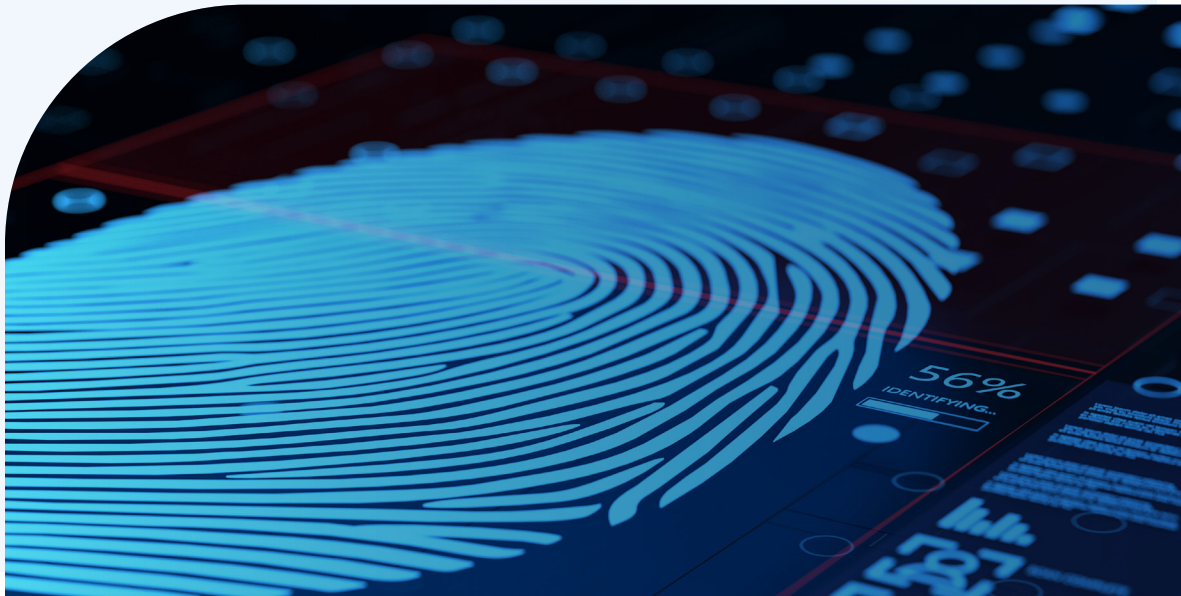
MOISTURE DISCRIMINATION OPTICS

All optical-based fingerprint devices work in a similar manner where there is an illumination source, a prism, a surface where fingers are placed and a sensor. The light is directed at the fingers and is absorbed by fingerprint ridges and reflected off the air in between the ridges. This occurs because of a concept called “Total Internal Reflection,” where light is reflected when it moves from a denser medium to a less dense medium (glass to air in this case.)



But a problem occurs when fingers are moist as the moisture “fills” the spaces between fingerprint ridges. Light reflects differently off water than air (the refractive index is different according to Snell’s Law), causing more light to be absorbed (almost like the valley is a ridge). The result can be a darker than normal print (see example, below left) and in many cases, the print can be unusable unless the user takes effort to dry their fingers.

Wet print vs. normal print



HID's moisture discrimination optics (MDO) solve this problem by changing the angle of incidence (see equations below), changing the wavelength of light for the illumination source (from green to blue) and changing the focus of the lens system along with other improvements.

Air and Glass:

$$\theta = \sin^{-1}\frac{1}{1.52} = 41°$$

Water and Glass:

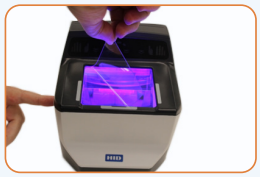
$$\theta = \sin^{-1}\frac{1.33}{1.52} = 61°$$

The result is higher quality (usable) images when a subject's fingers are wet with sweat or humidity. The optics also allow for faster auto-capture. The Guardian 200 has received very favorable feedback in terms of capture speed when compared to other competitive devices.

We encourage tests where a subject dips their hands in a glass of water, lightly dries them and then presents them to the Guardian scanner platen versus other platen of competitive scanners.

The moisture discrimination optics are built into the Guardian line, but not the Patrol.

SILICONE MEMBRANE FOR DRY FINGER ENHANCEMENT



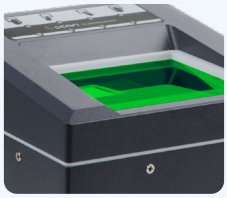
Adults with dry or damaged skin are four (4) times more likely to fail on fingerprint verification or matching. An estimated 15% of the world's population suffers from hand dermatitis or skin inflammation. In a recent study, 27 out of 100 people with dermatitis failed a verification test.

Our silicone membrane, helps by increasing the intimate contact area between the finger and the platen. This allows for much better contrast between the fingerprint ridges and valleys for both rolls and flats which results in better images faster.

The silicone membrane has an additional side benefit of protecting the glass platen from scratches which might be caused by a subject's ring or other hard, sharp object coming into contact with the glass platen. The membrane can be cleaned and simply replaced when necessary.

Silicone membranes are available for all Guardian and Patrol models.

USER GUIDANCE



The HID Patrol has traditional LED lights that turn orange and then green to indicate when the fingerprint is accepted.

The HID Guardian 100 and 200 have more advanced pictograms which guide the subject to place the right or left four fingers (commonly referred to as a “slap”), one or two thumbs, or an individual finger. The green arrows in the middle indicate quality. Since most subjects are being printed for the first time, this allows for faster, more intuitive capture. Additionally, if the subject is to perform a roll, the roll icon illuminates. The Guardian 100 does not allow rolls and therefore does not display the roll icon.

FLEXFLAT, FLEXROLL AND OTHER ALGORITHMS

FlexFlat and FlexRoll are two features that enable the option for subjects to place their hands or fingers anywhere on the platen. For example, if the user is instructed to do a roll, he may place his finger on the left or right side to start, or the bottom or top of the platen. Other software without the FlexFlat or FlexRoll feature will dictate where the user places their fingers on the platen, which can take time, cause confusion or not be ergonomically comfortable for the subject.

The algorithm used to capture a series of images then stitch them together for a clean roll is sophisticated and advanced. The HID L Scan Essentials SDK cleans the areas around a fingerprint which helps with matching and other forensic activities. And if the platen becomes dirty, the software can instruct the user to clean the platen, or if it is just slightly dirty, it will remove some dirty pixels from the final image.

These algorithms are available across all HID tenprint products (with the exception of Guardian 100, which does not allow rolls).

Choosing the Right Device for the Right Scenario

The main factors to consider when choosing the right tenprint device are as follows:

1. Is it important that the device is able to process a high throughput of subjects — capture and process fingerprints quickly or for a large number of people? Will there be a line of people at times, such that the goal will be to process them as quickly as possible?

2. Is it important that the subjects have the best possible user experience? For example, will the enrollee be enrolled for banking scenarios where customer service is extremely important?

3. How sensitive is the application use case to False Rejection or Acceptance Rates (FRR/FAR)? A higher quality of fingerprint image capture ensures better matching rate performance later.

4. Will the scanner be located in very humid or very dry climates?

5. Is the initial cost of the device a driving factor to solving the identity problem?

If the answer to number 5 is yes, we recommend the HID Patrol scanner. Otherwise, we recommend the Guardian 200 (or Guardian 100 if rolls are not a requirement).

The optical technology in the Guardian has several advantages. Because of the MDO and silicone membrane, it will capture better prints for very dry to very moist fingers. Patrol does not support MDO and may require drying of moist fingers. However, other competitive devices may require preconditioning of a subject's fingers, which translates to more time spent moistening or drying the fingers, potentially more attempts at making a quality image capture and thus negatively impacting the user experience and overall throughput.

Both the Guardian and Patrol scanners have strong, durable glass platen and have proven highly reliable. For example, a version of the Guardian is installed at all airports of entry and land borders to the United States. They have been in use 24 hours a day for over 10 years with very few issues.

Tenprint Collection Needs	Guardian 100	Guardian 200	Patrol
High Subject Volume Throughput/Processing	X	X	X
Handles Range of Finger Conditions	X	X	X
Moisture Discrimination Optics	X	X	
Rolled Finger Collection		X	X
On-Device Pictogram Workflow Indicators	X	X	
Fixed Mount/Cabinet or Desktop	X	X	X
Portability / Jumpkit	X	X	X
MOSIP Compliant			X

In conclusion, HID provides tenprint devices designed for ease of use and image accuracy as well as for the use cases across different markets. No "one-size fits all" scenario exists, so multiple offerings are needed to best fit your requirements.

Learn more about HID's tenprint readers >>

Explore HID's biometric technologies >>

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