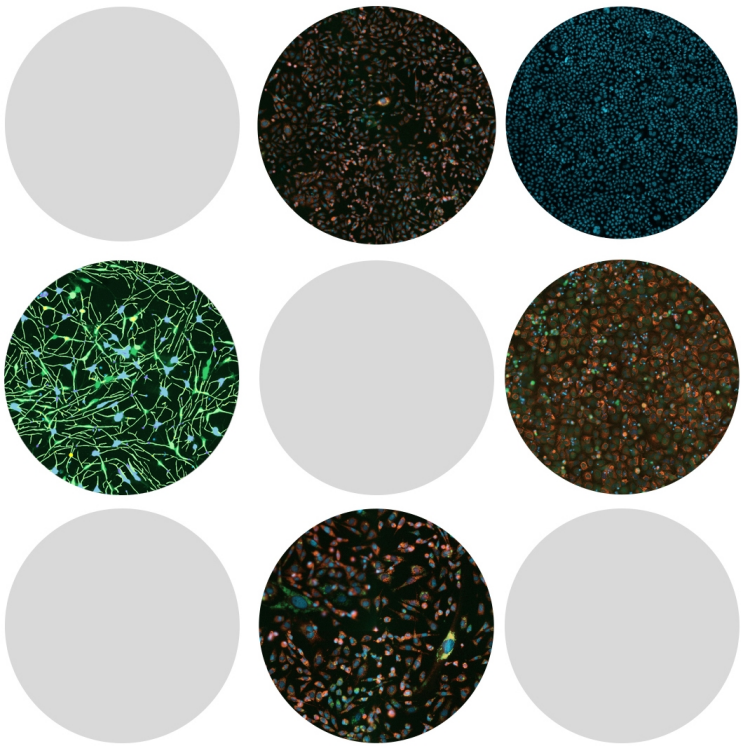

CellReporterXpress

Image Acquisition and Analysis Software

Version 2.0

IT Configuration Guide

MOLECULAR DEVICES

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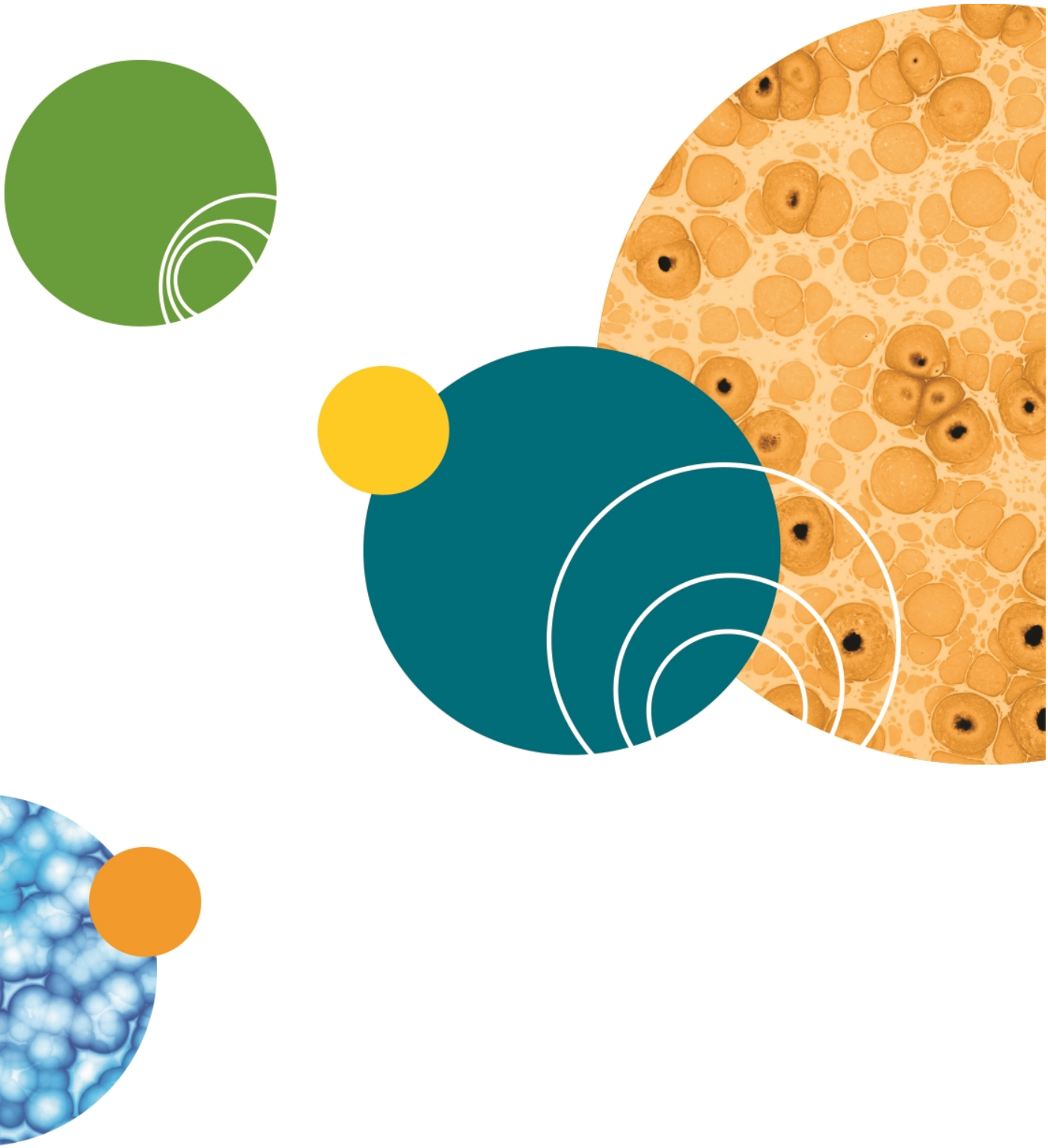
Product manufactured by Molecular Devices, LLC.
3860 N. First Street, San Jose, California, 95134, United States of America.
Molecular Devices, LLC is ISO 9001 registered.

Contents



Chapter 1: CellReporterXpress Image Acquisition and Analysis Software

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The Molecular Devices® CellReporterXpress Image Acquisition and Analysis Software is the user interface for the Molecular Devices ImageXpress® Pico Automated Cell Imaging System.

The CellReporterXpress Software integrates image acquisition and analysis into a unified workflow. Along with the imaging device, the CellReporterXpress Software is part of a system that streamlines automated imaging to offer a simplified solution for scaling up microscopy. Its features include:

- A web-based interface that runs on many browsers, including those found on iPads and Android tablets.
- Over 25 predefined experimental protocols.
- High-powered analysis tools equivalent to those found in desktop applications.
- Easy-to-manage data with no requirement to configure a database.
- A simplified user interface that is easy to learn and easy to use.

Terminology

This guide uses the following terminology:

- **Imaging Device**: The instrument used by the CellReporterXpress Software to capture images, which is the ImageXpress® Pico Automated Cell Imaging System.
- **Host Computer**: The computer running the core CellReporterXpress Software services: MD.CoreService, MD.DataService, and MD.WebService. The host computer communicates with the imaging device, remote clients, and any computers used for analysis operations and storage operations. The host computer requires the license software and hardware.
- **Remote Client**: A remote computer that uses a supported browser to display the user interface and interact with the CellReporterXpress Software.
- **Analysis Operations**: The process of making measurements on images. Analysis can occur on the host computer or on one or more separate computers. Analysis operations are carried out by the Analysis Service (MD.AnalysisService).
- **Storage Operations**: The process of writing and reading data during image acquisition and analysis. Data storage can be managed by the host computer or by one or more separate computers. Computers running data storage operations must have edit access to defined storage locations (for example, network drives). Data storage operations are carried out by the Location Service (MD.LocationService).

Obtaining Support

Molecular Devices is a leading worldwide manufacturer and distributor of analytical instrumentation, software, and reagents. We are committed to the quality of our products and to fully supporting our customers with the highest level of technical service.

Our Support website, www.moleculardevices.com/support, has a link to the Knowledge Base with technical notes, software upgrades, safety data sheets, and other resources. If you still need assistance, click **Request Support** to submit a request to our technical support representatives.

To find regional support contact information, visit www.moleculardevices.com/contact.

Documentation

Review the product documentation on the Knowledge Base, including installation guides and user guides. In addition, online Help is available within the CellReporterXpress Software. Press **F1** to access Help for the active screen.

Technical Support

You can contact Molecular Devices Technical Support by phone or submit a support request through the Knowledge Base. To find regional support contact information, visit www.moleculardevices.com/contact.

You will need the instrument serial number and the software system ID.

Additional Resources

Web-based microscopy courses:

- www.leica-microsystems.com/science-lab
- www.ibiology.org/ibioeducation/taking-courses/ibiology-microscopy-short-course.html

The Molecular Probes Handbook offers advice on fluorescent probes and can help you determine if there are better stains available for your analysis:

- www.lifetechnologies.com/us/en/home/references/molecular-probes-the-handbook.html

Product Documentation

The following guides are available in the Knowledge Base on the Molecular Devices Support website at www.moleculardevices.com/support:

- *CellReporterXpress Installation Guide*
- *CellReporterXpress IT Configuration Guide*
- *CellReporterXpress User Guide*
- *ImageXpress Pico Installation Guide*
- *ImageXpress Pico User Guide*

In addition, the CellReporterXpress Software includes context-sensitive Help that you can access from within the software. Just press the **F1** key from within the software to view Help for the current page.

Tip: Molecular Devices recommends that you review the documentation before installing or using the ImageXpress Pico System or the CellReporterXpress Software.

About This Guide

This guide is intended for IT professionals who will be supporting the installation and configuration of the CellReporterXpress Software. You can configure the CellReporterXpress Software to perform operations on a single computer or on multiple computers. This guide contains critical information that helps you configure a system to best meets the needs of your users.

Use this guide along with the *CellReporterXpress Installation Guide*.

The information in this guide is subject to change without notice. Molecular Devices recommends that you review the guide on the Knowledge Base for the most up-to-date information.

Chapter 2: Typical System Configurations

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To determine the best configuration for the CellReporterXpress Software, consider the needs of your users along with your networking constraints and hardware availability.

Typical configurations for the CellReporterXpress Software include the following:

- Standalone Configuration, see page 10
- Network Configuration, see page 11
- Server Configuration, see page 12

Standalone Configuration

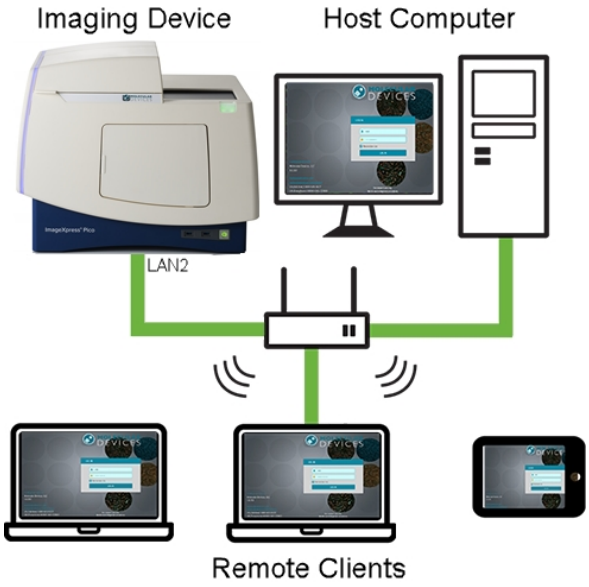
A standalone configuration is the simplest configuration. It uses a direct Ethernet connection between the imaging device and the host computer. The CellReporterXpress Software runs on the host computer in a local browser. All CellReporterXpress Software components and services (specifically MD.CoreService, MD.DataService, MD.WebService, MD.LocationService, and MD.AnalysisService) are installed on the host computer, which performs all analysis and data storage operations.

Note: You can also use a network connection between the host computer and the imaging device. In a network connection, the imaging device appears on the network with the prefix "IXP-" followed by the serial number.

To set up a standalone configuration, run the CellReporterXpress Installation and Configuration Utility on the host computer and perform a **Complete** installation. See the *CellReporterXpress Installation Guide* for details.

Network Configuration

A network configuration is more advanced than a standalone configuration. In a network configuration, the imaging device and the host computer are each set up on a network connection. The CellReporterXpress Software runs on the host computer in a local browser. All CellReporterXpress Software components and services (specifically MD.CoreService, MD.DataService, MD.WebService, MD.LocationService, and MD.AnalysisService) are installed on the host computer, which performs all analysis and data storage operations. In addition, the installation includes a component that enables you to set up remote clients, such as another computer or a tablet device, to connect to the host computer.



To set up a network configuration, do the following:

1. Run the CellReporterXpress Installation and Configuration Utility on the host computer and perform a **Complete** installation.
2. Run the CellReporterXpress Installation and Configuration Utility on all Windows remote clients and perform a **Client Workstation** installation.

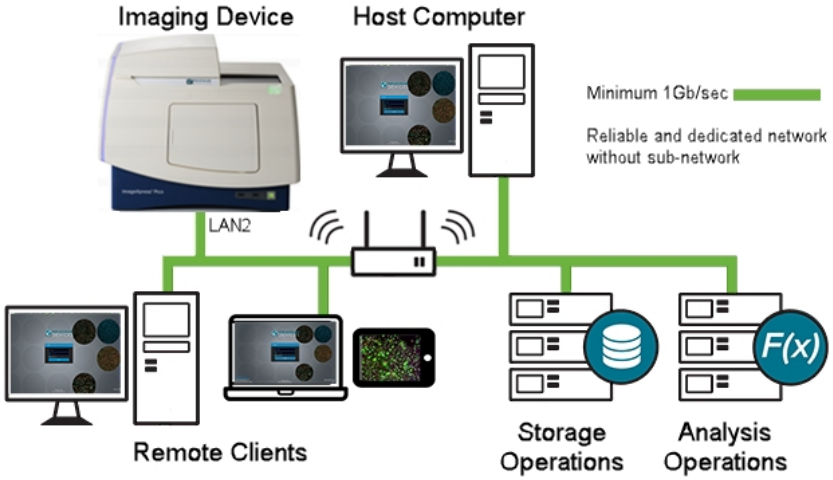
See the *CellReporterXpress Installation Guide* for details.

Note: Non-Windows remote clients connect to the CellReporterXpress Software through a supported browser. No installation is required. See Remote Clients on page 23 for details.

Server Configuration

A server configuration, which is the most advanced configuration, can enhance the performance of your imaging system. In a server configuration, CellReporterXpress Software functionality is distributed across several computers on your network. The host computer runs all the core services (specifically MD.CoreService, MD.DataService, MD.WebService), but you can set up more powerful computers to perform analysis operations (MD.AnalysisService) and storage operations (MD.LocationService). As with the network configuration, other computers and tablets can connect to the host computer as clients to communicate with the imaging device (or even multiple imaging devices).

Tip: For optimal data transfer, Molecular Devices recommends using a sustainable network connection with a speed of at least 1 Gb/s.



To set up a server configuration, do the following:

1. Run the CellReporterXpress Installation and Configuration Utility on the host computer and perform a **Server** installation.
2. Run the CellReporterXpress Installation and Configuration Utility on one or more storage operations computers and perform a **Data Storage** installation.
3. Run the CellReporterXpress Installation and Configuration Utility on one or more analysis operations computers and perform an **Analysis Station** installation.
4. Run the CellReporterXpress Installation and Configuration Utility on all Windows remote clients and perform a **Client Workstation** installation.

See the *CellReporterXpress Installation Guide* for details.

Note: Non-Windows remote clients connect to the CellReporterXpress Software through a supported browser. No installation is required. See Remote Clients on page 23 for details.

Chapter 3: System Requirements

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Host Computer

In a standalone configuration or a network configuration, the host computer performs all analysis and storage. In these configurations, the host computer must meet the following minimum specifications:

Item	Minimum Requirement	Notes
Operating System	Microsoft Windows 10 (64-bit)	Pro, Enterprise, and Education editions are supported.
CPU Speed	2.4 GHz	
Logical Processors	10	10 logical processors supports 4 concurrent analyses. For each additional concurrent analysis that you want to perform, add 2 logical processors.
RAM	12 GB	12 GB of RAM supports 4 concurrent analyses. For each additional concurrent analysis that you want to perform, add 2 GB of memory.

Note: In a standalone configuration, where the instrument is directly connected to the host computer, you may also need to connect the host computer to your network. In this case, connect the host computer to the network using a second Ethernet port, a wireless connection, or a USB-to-Ethernet adapter. Do not use a wireless connection or a USB-to-Ethernet adapter to connect the host computer to the instrument.

In a server configuration, analysis and storage operations can be performed remotely. In these configurations, the host computer must meet the following minimum specifications:

Item	Minimum Requirement	Notes
Operating System	Microsoft Windows 10 (64-bit)	Pro, Enterprise, and Education editions are supported.
CPU Speed	2.4 GHz	
Logical Processors	2	
RAM	4 GB	

Supported Browsers for Remote Clients

In a network configuration or a server configuration, you can connect to the host computer using other computers and tablets as remote clients. The remote client can be any desktop, a laptop, or an iPad or Android tablet with a screen size of at least 9 inches.

Remote clients use a browser to communicate with the host computer. The following browsers are supported:

Operating System	Minimum Browser Version
Microsoft Windows	Google Chrome 60 (64-bit) or Mozilla Firefox 58 (64-bit)
Apple macOS 10.12 or higher	Google Chrome 60 or Apple Safari 11.0
Apple iOS 11.2 or higher	Apple Safari
Google Android	Google Chrome 59
Linux	Google Chrome 60

Chapter 4: Software License

The license to run the CellReporterXpress Software on the host computer is comprised of a software component and a hardware component. The license determines how many users/clients can connect to the CellReporterXpress Software at once, how many concurrent analyses can be run, and the availability of specific analysis algorithms.

Software Component

The software component consists of files located in the `%ProgramData%\Molecular Devices\CellReporterXpress` folder.

CAUTION! Do not move, modify, or delete the license files.

If you need to reinstall the license files, run the CellReporterXpress Installation and Configuration Utility again. You can also download the license files from Molecular Devices at:

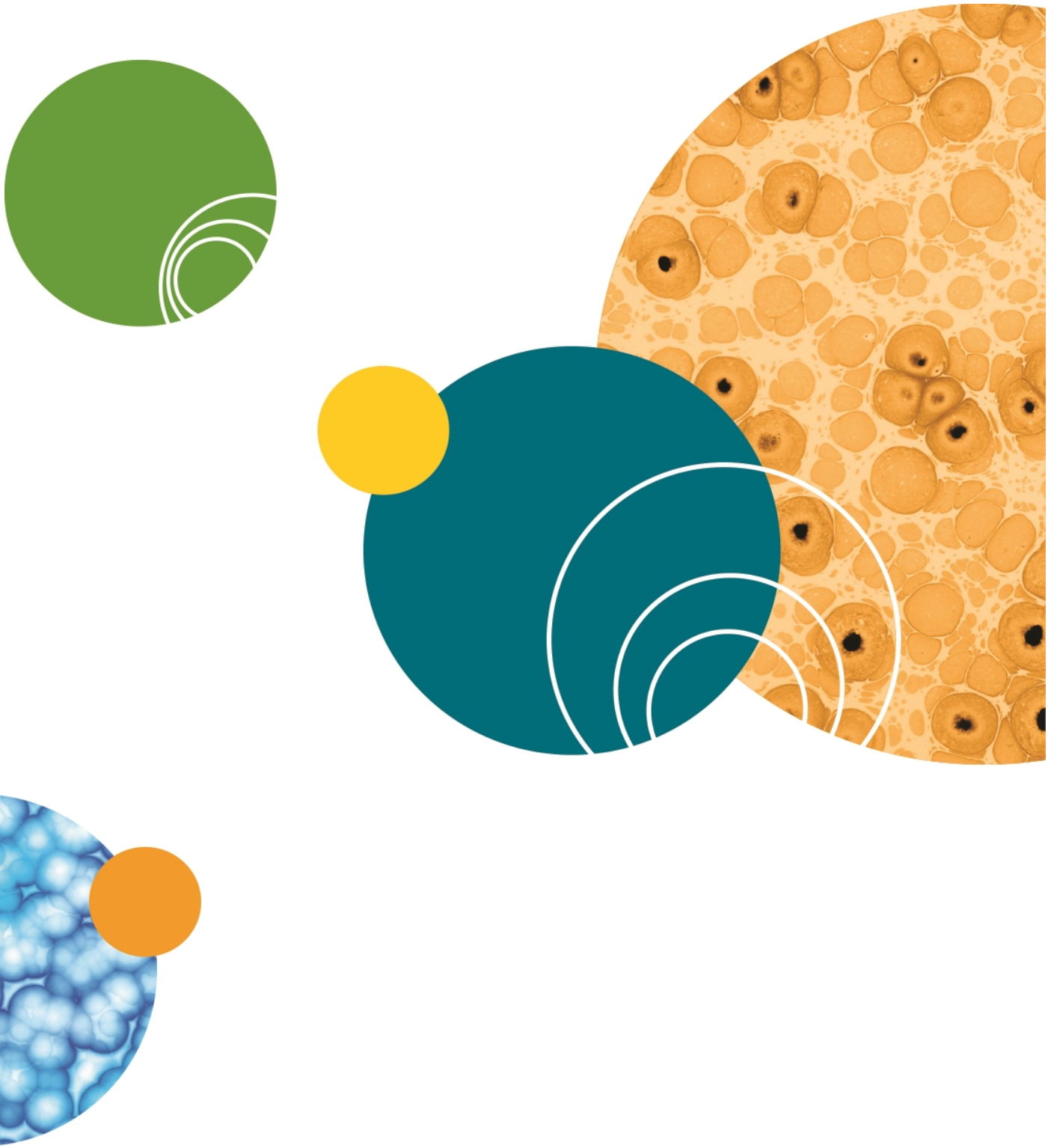
http://www.meta.moleculardevices.com/software/crx/authorize/

Note: If the host computer is not connected to the Internet, download the license files to another computer that is connected to the Internet and then copy them to the host computer.

Hardware Component

The hardware component is a SafeNet Sentinel USB hardware key (typically called a "dongle") that is specific to your copy of the CellReporterXpress Software.

The dongle must be inserted in the host computer to install or run the CellReporterXpress Software.



Chapter 5: Pre-Installation Considerations

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The CellReporterXpress Software installation procedures are described in the *CellReporterXpress Image Acquisition and Analysis Software Installation Guide*. Before installing the CellReporterXpress Software, review the topics in this section and plan accordingly.

Antivirus Software

Antivirus software settings may need to be modified to prevent slowdown of the CellReporterXpress Software. Stringent antivirus settings can affect the rate of data or image transfer operations.

CAUTION! Molecular Devices is not responsible for viruses or security attacks on the host computer. It is your responsibility to keep the antivirus software configuration current to avoid security risks and virus threats to the host computer.

A service exclusion prevents antivirus software from scanning the execution process of a service as well as the files the service accesses. If you are using Windows Defender, the CellReporterXpress Installation and Configuration Utility will attempt to add the required exclusions and settings during installation.

Note: It is possible to that your network policy may prevent the CellReporterXpress Installation and Configuration Utility from adding the required exclusions and settings.

If you are not using Window Defender or if your network policy does not allow the CellReporterXpress Installation and Configuration Utility to modify exclusions, do the following:

- Create an exclusion for the following services in the `%Program Files%\Molecular Devices` folder:
  - MD.CoreService (`MolDev.CoreService.exe`)
  - MD.DataService (`MolDev.DataService.exe`)
  - MD.WebService (`MolDev.WinHost.exe`)
  - MD.AnalysisService (`MolDev.AnalysisService.exe`)
  - MD.LocationService (`MolDev.LocationService.exe`)
- Create an exclusion for any paths used to store experiments.
- Enable auto updates for virus definitions to increase system security.
- Provide the ability to disable virus scanning for troubleshooting purposes.

Windows Updates and Security Patches

CAUTION! Molecular Devices recommends that you apply Windows security patches as they become available.

For any computer running a CellReporterXpress Software service (that is, a host computer or a computer used for remote analysis operations or remote storage operations), disable automated Windows updates to prevent interrupting the CellReporterXpress Software or restarting the computer at an inconvenient time. Instead, configure Windows to automatically download updates and patches, but not apply them; you can apply them manually at a time when users will not be not affected.

Note: When a Windows update or security patch has been applied, confirm that the network configuration (firewall settings, antivirus exceptions, and so on) has not been changed.

Power Plan and Sleep Settings

Set the Power Plan and Sleep Settings for the host computer as follows:

- Power plan: **High performance**
- Screen Sleep: **Never**
- Computer Sleep: **Never**

File Compression and Encryption

File encryption and compression can affect data access and data analysis. Molecular Devices does not guarantee performance of the CellReporterXpress Software on encrypted computers or on computers with automatic compression. If you must use encryption, Molecular Devices recommends using a block-level encryption (for example, Microsoft BitLocker), which does not impact performance as much as file-level encryption.

Storage Performance

Molecular Devices recommends that the internal drive on any computer used for storage operations have a minimum SATA III interface. External drives must use a USB 3 interface.

Network Locations

Molecular Devices recommends that you do not use mapped drives for storage. Instead, use a server configuration and set up an external computer for remote storage operations. See Server Configuration on page 12 for details.

Network Performance

To ensure optimal data transfer, Molecular Devices highly recommends using a reliable, sustainable, and dedicated network connection of at least 1 Gb/s. Unreliable, non-dedicated networks and communication through firewalls may degrade data transfer performance. Wireless connections can be used for remote client access.

In addition, the following conditions must be met:

- All computers in the configuration should use gigabit-capable switches, routers, and category 6 cabling.
- The CellReporterXpress Software supports both remote and direct Ethernet connections between the host computer and the imaging device. If you experience issues with remote connections (due to firewall or network issues), Molecular Devices recommends using a direct Ethernet connection.
- The host computer and any computers used for external storage or analysis operations must use static IP addresses. If you use connections by computer name, verify that you can ping each computer in the configuration from the host computer. If you use Dynamic Host Configuration Protocol (DHCP) and a computer's IP address changes after restarting, the components used on that computer may require re-assignment for the CellReporterXpress Software to work properly.

  CAUTION! Molecular Devices recommends that you do not change the computer name or IP address of the host computer or any computer used for external analysis operations or external storage operations after establishing connections. Any change in host computer configuration (for example, switching network connections or connecting to a different network) can interrupt normal system operation. In such cases, a computer reboot is usually required for a computer system to adapt to new network settings. Similarly, remote clients may need to be reconfigured to locate the host computer.

- Client computers and tablets that connect to the host computer must use routable IP addresses and DNS resolvable name paths.
- In a server configuration using external computers for storage operations or analysis operations, all firewalls and routers must allow data transfer between all applicable computers using the default ports.

  CAUTION! If firewalls block the default ports, system communication can fail.

Firewalls and Ports

The network connections between the host computer, imaging device, remote clients, and external computers require that all firewalls and routers be configured to allow data transfer between all applicable ports. The following table describes the default ports used for communication:

Configuration	Port	Computer	Direction	Notes
All	UDP 3702	Host Computer	Inbound and Outbound	For auto detection of the imaging device.
All	TCP 8091 TCP 9090	Host Computer	Outbound	For communication with the imaging device. If the imaging device is behind a firewall, these ports should be forwarded to the imaging device's IP address.
All	TCP 80	Host Computer	Inbound	For remote client connections to the host computer.
Server (with external analysis operations)	TCP 12325	Analysis Computer	Inbound	For communication between the host computer and the computer running analysis operations (MD.AnalysisService).
		Host Computer	Outbound	
Server (with external storage operations)	TCP 12324	Storage Computer	Inbound	For communication between the host computer and the computer running storage operations (MD.LocationService).
		Host Computer	Outbound	
Server (with external storage and analysis operations)	TCP 12323	Host Computer	Inbound	For communication between the host computer and the computers running analysis operations (MD.AnalysisService) and storage operations (MD.LocationService).
		Analysis Computer	Outbound	
		Storage Computer	Outbound	

Note: If any of these ports are already in use by other software, contact Molecular Devices for details on changing the ports used by the CellReporterXpress Software.

Note: During a Client Workstation installation or when installing the MD Import/Export Service (Imex.exe), a Windows Security Alert may appear noting that "Windows Firewall has blocked some features of this app". In that case, allow access on private networks and domain networks.

.NET Framework

.NET Framework 4.6.2 or later must be installed on all computers where you plan to install the CellReporterXpress Software. Note that .NET Framework 4.6.2 is included as part of Windows 10.

User accounts

Installation and Update

During installation and updates, the CellReporterXpress Software requires administrator privileges on all applicable computers.

Running Services

CellReporterXpress Software services are installed to run as user “Local System” and require extensive read-write-modify access.

Remote clients do not require special privileges on the host computer.

User Accounts

The CellReporterXpress Software uses Windows user accounts integrated into the host computer. If you want to use LDAP authentication, integrate the services into Windows authentication of the host computer.

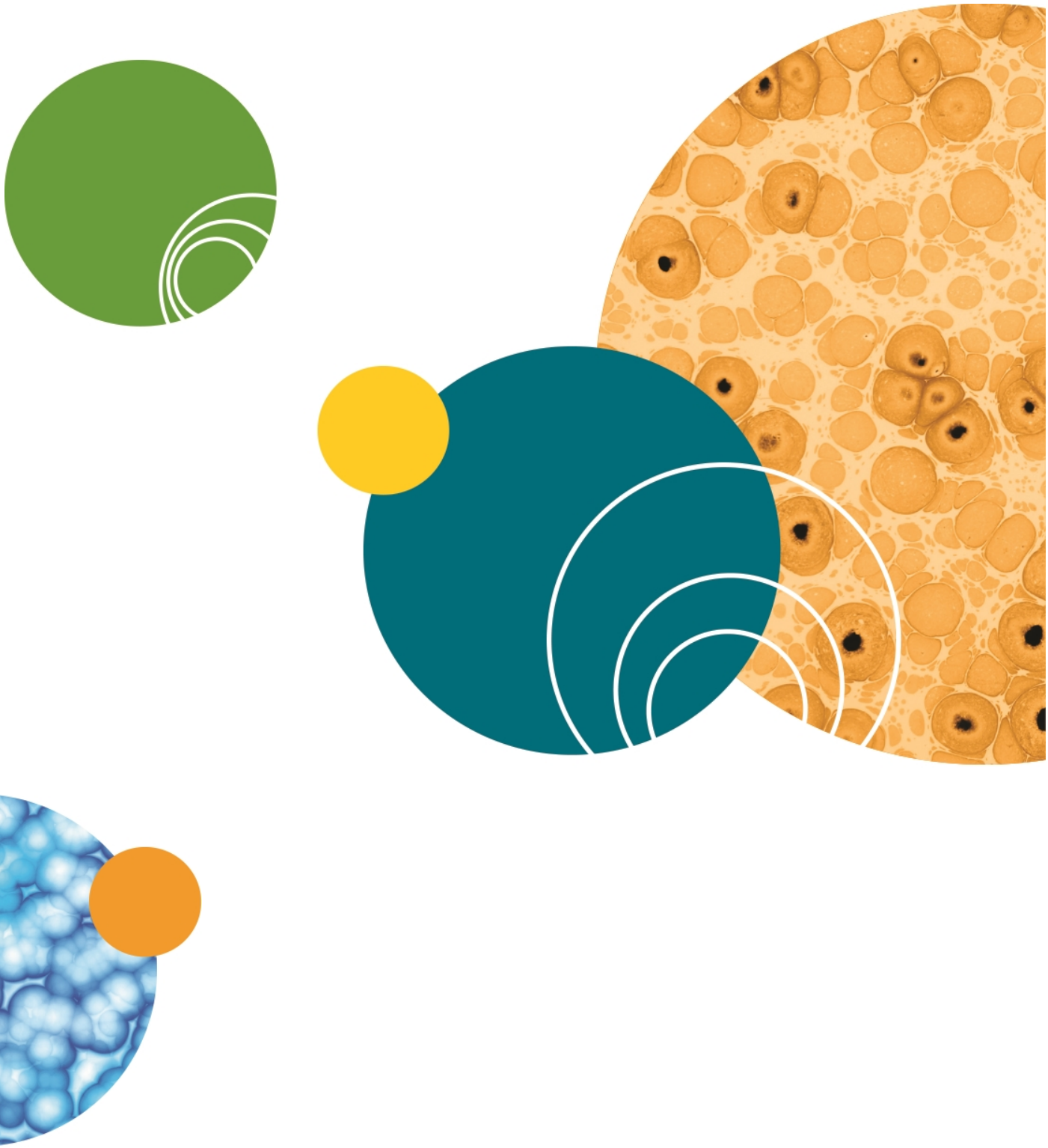
The CellReporterXpress Software uses personal customization settings to enhance the user experience by storing individual user preferences. Molecular Devices strongly recommends using individual user accounts.

Backups

The host computer can use backup solutions for remote storage. It is your responsibility to back up the files generated by the CellReporterXpress Software.

Decimal Separator

The CellReporterXpress Software requires that the Region settings on the host computer use a period as the decimal separator. Many European countries use a comma as a decimal separator. If the Region settings on the host computer use something other than a period as the decimal separator, you must change the setting accordingly.



Chapter 6: External System Considerations

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Before setting up remote clients or external computers for analysis and storage operations, review the topics in this section and plan accordingly.

Remote Clients

After installing the CellReporterXpress Software on the host computer, you can use the CellReporterXpress Installation and Configuration Utility to install a remote client on another Windows computer. The installation program creates a shortcut that enables you to easily access CellReporterXpress using Google Chrome.

Remote clients on non-Windows computers, Windows computers using Mozilla Firefox, or tablets can connect to the CellReporterXpress Software through a supported browser. No installation is required. The following browsers are supported:

Operating System	Minimum Browser Version
Microsoft Windows	Google Chrome 60 (64-bit) or Mozilla Firefox 58 (64-bit)
Apple macOS 10.12 or higher	Google Chrome 60 or Apple Safari 11.0
Apple iOS 11.2 or higher	Apple Safari
Google Android	Google Chrome 59
Linux	Google Chrome 60

Note: To connect with an iPad or Android tablet, the screen size must be at least 9 inches.

To connect the remote client to the CellReporterXpress Software on the host computer, enter either the IP address or the host computer name along with the port being used by the remote client (by default, 80) in the following format:

```
http://address:port
```

For example, if the host computer is named CellReporterXpress, enter:

```
http://CellReporterXpress:80
```

Or, if the IP address of the host computer is 10.133.30.151, enter:

```
http://10.133.30.151:80
```

Note: The CellReporterXpress Software is designed to enable multiple remote clients to simultaneously connect to the host computer. However, be aware that only one user at a time can access the imaging device.

External Analysis Computers

Analysis operations are performed by any computer in your configuration that runs MD.AnalysisService. While the CellReporterXpress Software license limits the number of analysis processes running concurrently, there is no limit to the number of computers running analysis operations. When you set up multiple computers for external analysis operations, the CellReporterXpress Software determines which computers perform analysis.

Analysis operations are best performed by computers with fast CPUs and sufficient RAM. Each concurrent analysis uses two logical processors and a minimum 2 GB of RAM. For example, to run eight concurrent analyses, a computer requires 16 logical processors and at least 16 GB of RAM. Additional RAM and processors may be used as overhead by the operating system.

To enable communication between the host computer and external analysis computers, be sure to open ports 12323, 12324, and 12325. See Firewalls and Ports on page 20 for details.

External Storage Computers

There is no limit to the number of computers running the storage operations and no limit to the number of mapped storage locations. If the CellReporterXpress Software will be used by multiple groups, Molecular Devices suggests organizing storage by group.

Image Storage

The amount of necessary storage space depends on several variables. To calculate the approximate storage requirement for images belonging to a plate, multiply the following:

- number of wells
- number of images per well
- number of wavelengths
- image size (approximately 8 MB)
- pyramid storage factor (typically 1.5)

Note: The number of images collected per well depends on the area of the well to be covered. Using higher magnification requires more images to cover a significant area.

For example, for an experiment with a 96-well plate and 3 wavelengths collecting 2 images per well, calculate:

$$96 \times 3 \times 2 \times 8 \times 1.5 = 6{,}912$$

So approximately 7 GB of storage is required.

Analysis Storage

Typical storage requirements for an analysis can vary from 10 – 100% of image storage.

Appendix A: Firewall and Antivirus Settings

The CellReporterXpress Installation and Configuration Utility modifies Windows Firewall and Windows Defender for its services. If you are using other software for firewall and antivirus protection, configure changes for the services and ports listed in the following table.

Note: All services are installed in the `%Program Files%\Molecular Devices` folder.

Service Name and Executable File	Description	Requires Write Access	Exposed Port	Notes
MD.WebService MolDev.WinHost.exe	Provides the interface for the CellReporterXpress Software.	No	TCP 80	Can be used as local port or a remote client (computer or tablet) to connect to the CellReporterXpress Software.
			TCP 12322	For internal communication with all other services.
MD.DataService MolDev.DataService.exe	Manages all data (images, measurements, and metadata).	Yes	TCP 12321	For communication with the Location service and the Core service.
MD.CoreService MolDev.CoreService.exe	Controls all other services.	No	TCP 12323	For communication with all other services.
MD.LocationService MolDev.LocationService.exe	Manages storage of all data (images, measurements and metadata).	Yes	TCP 12324	Can be set to run locally and not to expose port. Works with the file system.
MD.AnalysisService MolDev.AnalysisService.exe	Performs analysis of image files.	Yes	TCP 12325	Can be set to run locally and not to expose port.
ImagingDevice	Communicates with the imaging device.	Yes	TCP 8091 UDP 3702 TCP 9090	For use by Molecular Devices support only.

Contact Us

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Visit our website for a current listing of worldwide distributors.

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