System Requirements
V8.1 (2250)

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Contents

1.   Introduction

This document provides installation instructions for the following systems.

- Class Climate
- EvaExam
- EvaSys

All three systems share the same set of installation instructions.

We recommend installing or configuring a system that meets the recommended performance parameters.[1]

> **Note**:
>
> Class Climate or EvaSys can be used to deliver paper or online assessments. EvaExam can be used to deliver paper or online tests. In this document, the term *assessment* is used to refer collectively to the instrument being delivered.

> **Note**:
>
> Copy protection is assured by electronic activation.

> **Hint**:
>
> As an alternative to operating your system yourself, it can be hosted by Scantron Corporation. If Scantron hosts your system, you do not have to provide server hardware or IT resources. Scantron provides the server and maintains the system. For hosted systems, only the local Scanstation needs to be installed on a local workstation. For more information, contact your vendor.

1.1.   Type 1: Windows-Based Install

All major system components (Web server, Database, and VividForms Reader) are being installed on a single PC. Only the Scanstation can run on a separate PC.

The complete installation can be carried out on Windows 8 and Windows 10. As a rule, this installation type is not recommended for productive use. Workstation operating systems are not suitable to run web services. If such an installation is used, only one single user should work with the system and only paper-based assessments with little volume should be conducted.

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[1] All product names, brand names, and trademarks used in this manual belong to their respective owners and are used for information only.

This installation type can be useful if you want to run a test and development system, e.g. to test new software versions. To this end, Scantron Corporation offers special test licenses as part of the Enterprise Option.

1.2. Type 2: Server Installation

Note:
In general, this type is installed by Scantron Corporation as part of an installation service. If desired, you can also carry out the installation yourself. However, this requires installation training through Scantron Corporation in advance.

All central system components (Web server, Database, and VividForms Reader) are installed on a server. Only additional components like the Scanstation and VividForms Designer (if licensed) are installed on one or several workstations.

To restrict access to assessment data and differentiate between administrative users and participants of online assessments, you can use a second web server. By separating the load between two web servers you can also take benefit from performance improvements (see chapter 1.3 Type 3: Special Installation with Separate Online Server (Dual Server Option)).

The following table lists all necessary system requirements:

Component	Version	Server/Workstation
Existing Microsoft IIS Web Server	8.0 or higher	Server
MySQL Database	5.7	Server
MS SQL Database	2014 & 2016	Microsoft Corporation
Native Client	11	
Class Climate Server software	8.1	Server
VividForms Reader	2.2	Server
VividForms Designer	1.5	Workstation
Scanstation	3.6	Workstation

Table 1: Class Climate Components

Supported Server Systems			
Windows Server 2012	Windows Server 2012 R2	Windows Server 2016	Windows Server 2019
☑	☑	☑	☑

Table 2: Supported Server Systems for server installations

Supported Workstation Systems		
	Windows 8.x	Windows 10
VividForms Designer	☑	☑
Scanstation	☑	☑

Table 3: Supported Server Systems for Workstation Components

Notes:

- Multiple Scanstations at the same location or different locations are supported. In general, data transfer takes place via HTTPS upload. In exceptional cases, data can also be transferred via FTP (due to missing encryption) or by writing into a directory.

- If any preinstalled software (Web Server, Database server, etc.) is running on the server that will host Class Climate, problems may arise during the installation. We strongly recommend using a dedicated server for Class Climate. If this is not possible, notify Scantron Corporation about any preinstalled software.

- Using an MS SQL Database instead of a MySQL Database is technically possible, however not recommended. Under normal usage, it will lead to a performance decrease of about 20-25%. Under high system load caused by a very high number of online assessments, the performance decrease is even higher. If you still wish to install a MS SQL Database, please contact our Professional Services team.

1.3. Type 3: Special Installation with Separate Online Server (Dual Server Option)

This installation type uses two servers. The second server is provided only for online assessments.

With this installation type, you can restrict the access to assessment data to your internal network. Only online assessments are accessible internally and externally. This improves data security as well as performance due to the double web servers and resources on both servers. Both servers have to be scaled according to the requirements. For further information on load balancing, please refer to chapter 2.2.

Scantron Corporation, together with your IT professionals, will provide advice to determine the best configuration for your needs.

2. System Requirements for Class Climate (Windows)

2.1. Workstation Installation

These performance parameters are for a Class Climate system, which is used only for paper-based assessments with little volume.

Recommended performance parameters:

- Intel ® compatible CPU with at least 2.5 GHz
- 100 GB Hard drive (HDD with 7200 rpm or SSD)
- 4 GB of RAM
- 1 Gbit / s network

2.2. Server Installation

The performance parameters depend upon the intended use and the intended intensity of use. If you desire to do only paper assessments, the performance parameters will be less high than when intensively using online assessments. The performance capability furthermore depends on the webserver and database system.

2.2.1. Performance Parameters Depending on the Application Area

The following three graphs illustrate the load and demand on your servers for each phase of the evaluation period. On the x-axis, the time frame with the different phases of evaluation is displayed. On the y-axis, the server load is shown. The performance parameters must be defined according to the expected load, especially taking into regard the CPU cores and internal memory of the servers.

If you do paper assessments only, the load on the server can be estimated as low. Before the data capturing starts, there are small peaks caused by different administrative tasks. The data capture itself, i.e. the scanning and processing of forms, does not cause much load.

When creating reports and thereby aggregating different data, the load on the server will slightly rise. In this case, the size of your organization and the number of persons creating reports are the decisive factor.
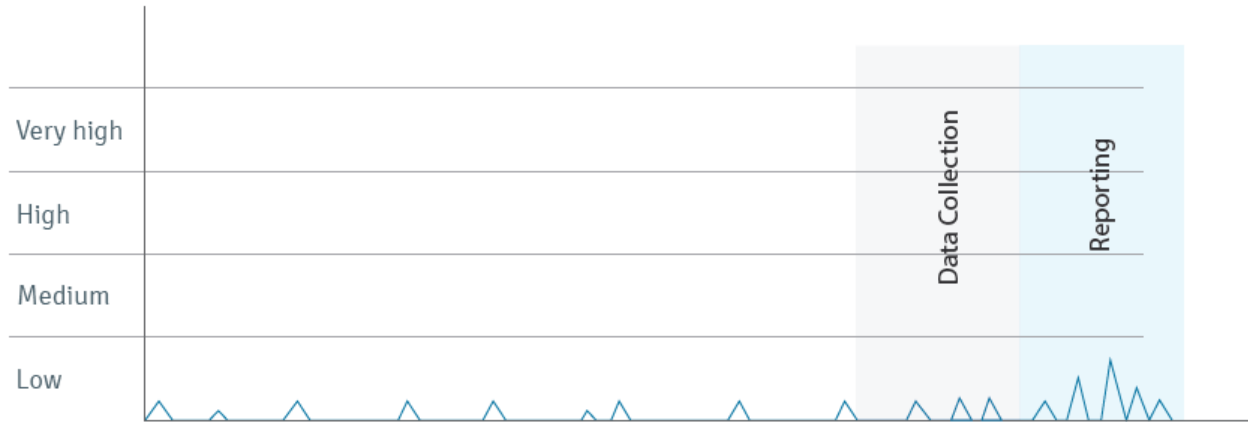
PAPER BASED SURVEYS

Figure 1: Server load caused by paper-based assessments throughout the evaluation period

When doing online assessments with PSWD dispatch, i.e. when participants are invited by email to take part in the online assessment, the system load in the preparation period equals the one for paper assessments.

During the data capture period, the system load rises due to the online assessment participants. Typically, there is a first peak after the participants have been invited and a second peak after they have been reminded to take part in the assessments. The load peaks decrease when doing further reminders, unless assessment time frames do not overlap and new invitations are sent out.

In the data capturing period, the load depends on the distribution of the assessment invitations and reminders over time and on the number of participants. During the reporting period, the load again decreases, so there is an increased demand on resources only during data capturing. As a consequence, the server can be scaled dynamically. Outside the data capturing phases you need resources only for the low workload (normal operation). During data capture, the server must be upgraded according to your needs. For further information on resources depending on the usage intensity, review the table corresponding to your setup, starting at 2.2.2.
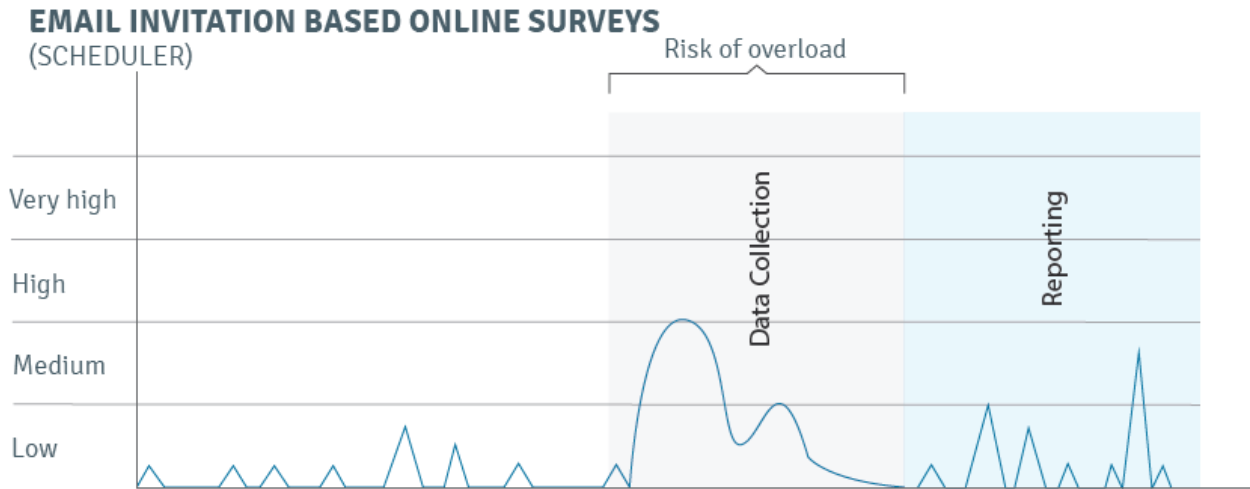
EMAIL INVITATION BASED ONLINE SURVEYS
(SCHEDULER)

Figure 2: Server load caused by online assessments with email invitations throughout the evaluation period

If you carry out your online assessments during your courses, i.e., if you do in-class online evaluations, the server load over time is generally similar to the one described above. However, because the time of taking part in the assessment is defined by the course time, the load concentrates during these times and thereby leads to a significantly increased demand for resources.

IN-CLASS ONLINE SURVEYS

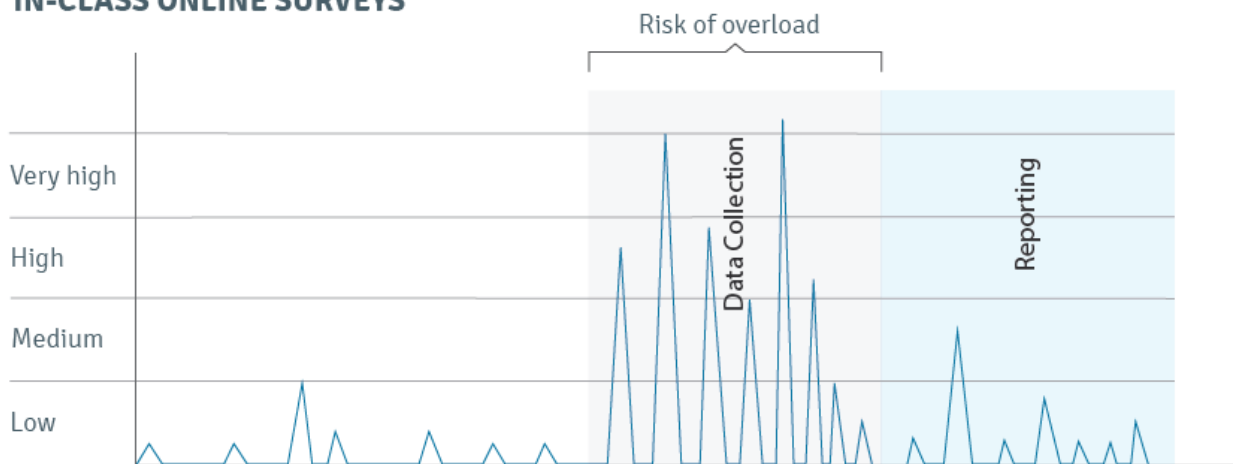**Figure 3: Server load caused in-class online assessments throughout the evaluation period**

In this scenario, there is a significantly higher difference between phases of low load and high load. To use your resources efficiently, it is highly recommended to apply low-performance parameters outside the data-capturing period, but increase them according to your requirements during the data-capturing period.

The number of participants accessing the online assessments at the same time can be very high when courses are large and evaluations take place in the same time period. Therefore, it is highly recommended to schedule the assessment times to avoid parallel assessment access and reduce load peaks.

During periods of high load, administrators and subunit administrators should not initiate system actions (such as data imports, report creation, and batch events). Also, do not use high resolution image files in online assessment templates or questionnaires.

To ensure successful data capture, the technical infrastructure for online assessments must also meet the requirements. This includes, for example, wireless network access points. If the performance of the WLAN access points is not sufficient for the simultaneous access of a correspondingly high number of participants, the use of mobile data or mobile internet can remedy the situation.

Integrations with Learning Management Systems (LMS) are another important factor when considering the server load. Depending on the kind of integration, the load can be quite different. If, for example, a message on open online assessments is shown each time a person logs into the Learning Management System, the server load increases. When using online assessments extensively with Learning Management System integration, allocate more resources than recommended in table 4.

The way that the Learning Management System communicates with Class Climate also plays an important role. During SOAP communication, only data is transferred. When using LTI connection, the HTML template is adapted and HTML files are delivered.

When using an LMS connection, we recommend upgrading the server by two CPU cores.

2.2.2. IIS web server and MySQL database

The following table provides a structured overview of various parameters when using Class Climate with an IIS web server and a MySQL database. The highest expected parameter will determine the recommended parameter for your Class Climate System. Please note that the performance parameters can be adapted dynamically according to the data capturing periods, as described above:

		Intensity of Use			
		Low	**Medium**	**High**	**Very High**
Parameters of use*	Number of active users within 30 minutes**	0 - 10	11 - 40	41 - 100	101 - 300
	Number of online assessment participants per hour	0 - 500	501 – 1,000	1,001 – 5,000	5,001 - 10,000
	Number of returns within one minute	0 - 20	21 - 50	51 - 100	101 - 150
Recommended performance parameters during normal operation	Number of CPU cores	2	4	6	8
	RAM	4 GB	8 GB	10 GB	12 GB
	Capacity of the hard drive	100 GB		200 GB	
Recommended performance parameters during data capture	Number of CPU cores	4	8	12	16
	RAM	8 GB	16 GB	20 GB	24 GB
	Capacity of the hard drive	100 GB		200 GB	

*The parameter of use highest to expect determines the recommended performance parameter for the Class Climate System.

** Active users include admins, report creators, and instructors that use active accounts.

<u>Example:</u>
Low number of users at the same time

+ medium number of returns at the same time

+ high number of online assessments per hour

= recommended performance parameter: high system usage

Table 4: Recommended performance parameters depending on the intensity of use for IIS web server and the MySQL database

Estimates of participants per hour are based on an even distribution within an hour. If peaks are expected, increase the CPU cores and the RAM, or even switch to the Dual Server Option (see chapter 1.3 Type 3: Special Installation with Separate Online Server (Dual Server Option)).

Usually, an even number of participants and respective returns are not very likely. However, these numbers in relation to the generated PSWDs give a good overview. Also, note

how many participants complete the assessment and how long it takes them to complete it.

On maximum load (e.g. 5,000 participants with 12 CPU cores and 20 GB RAM), you can expect idle times to exceed 20 seconds.

In general, CPU cores and the RAM can further increase the performance of the system. If the integration in Learning Management Systems creates additional load on the Class Climate server, or if many users work with the system at the same time, including users of active instructor accounts, it can be necessary to raise the performance parameters even higher than described in table 4. However, this depends very much on the parameters in use. It is recommended to monitor the CPU and RAM usage and to then increase these two, based on the observations made. You will also need to monitor the database CPU and RAM usage. Please contact your vendor for further information.

NOTE: The ratio of CPU cores to RAM should be approximately 1:1.2 for large systems and 1:2 for smaller systems. This means that bigger systems don't necessarily have to double the number of CPU cores.

2.2.3. IIS web server and MS SQL database

If an MS SQL data base is used, you must take into account further performance decreases. The performance depends on the specification of the database server and the latency between the two servers. The values in the table below include safety buffers.

		Intensity of use			
		Medium		**High**	
Parameters of use*	Number of active users within 30 minutes**	0 - 5	6 - 20	21 - 50	51 - 125
	Number of online assessment participants per hour	0 - 250	251 - 500	501 – 2,500	2,501 - 4,500
	Number of returns within one minute	0 - 10	11 - 25	26 - 51	51 - 75
Recommended performance parameters during normal operation	Number of CPU cores	2	4	Not supported	Not supported
	RAM	4 GB	8 GB	Not supported	Not supported
	Capacity of the hard drive	100 GB		Not supported	Not supported
Recommended performance parameters during data capture	Number of CPU cores	4	8	Not supported	Not supported
	RAM	8 GB	16 GB	Not supported	Not supported
	Capacity of the hard drive	100 GB		Not supported	Not supported

*The highest expected parameter of use determines the recommended performance parameter for the Class Climate System.

** Active users include admins, report creators, and instructors that use active accounts.

Example:
Low number of users at the same time

+ medium number of returns at the same time

+ medium number of online assessments per hour

= recommended performance parameter: medium system usage

Table 5: Recommended performance parameters depending on the intensity of use for a single server with IIS web server and MS SQL database

2.3. Dual Server Option (with IIS web server and MySQL database)

If you wish to restrict the access to assessment data to your internal network, but allow access to online assessments from outside your internal network, we recommend using a Dual Server Option with two separate web servers. The performance of the frontend server, on which the online assessments are carried out, is raised in comparison to a single server solution, even with the same number of CPU kernels, as the load is shared between the servers. The database runs on a server within your internal network. The frontend server only processes requests from online assessments.

The following table gives a structured overview of the different parameters when using Class Climate with an IIS web server, a MySQL database, and the Dual Server Option. The highest expected parameter will determine the recommend parameter for your Class Climate System:

		Usage Intensity			
		Low	**Medium**	**High**	**Very high**
Parameters of use*	Number of active users within 30 minutes**	0 - 10	11 - 40	41 - 100	101 - 300
	Number of online assessment participants per hour	0 - 500	501 – 1,000	1,001 - 5,000	5,001 - 10,000
	Number of returns within one minute	0 - 20	21 - 50	51 - 100	101 - 150
Recommended performance parameters main server	Number of CPU cores	2	4	4	4
	RAM	4 GB	8 GB	8 GB	8 GB
	Usage for online assessments	Yes		No	
	Capacity of the hard drive	100 GB		200 GB	
Recommended performance parameters Dual Server Option (Normal Operation)	Number of CPU cores	-	-	4	6
	RAM	-	-	8 GB	10 GB
	Capacity of the hard drive	-	-	50 GB	
Recommended performance parameters Dual Server Option during data capture	Number of CPU cores	-	-	8	12
	RAM	-	-	16 GB	20 GB
	Capacity of the hard drive	-	-	50 GB	

* The highest expected parameter of use determines the recommended performance parameter for the Class Climate System.

** Active users include admins, report creators, and instructors that use active accounts.

Example:
Low number of users at the same time
+ medium number of returns at the same time
+ high number of online assessments per hour
= recommended performance parameter: high system usage

Table 6: Recommended performance parameters depending on the intensity of use for Dual Server Option with IIS web server and MySQL database

Please also note the additional information in section 2.2.1. As with single-server systems, you can improve the performance by adding more CPU kernels and more internal memory, and adapt the performance parameters dynamically according to your evaluation periods.

2.4. Support for Virtualized Environments

Class Climate supports virtualized environments such as ESXi, Hyper-V, or XenServer. Virtual servers have to comply with the performance parameters as described in the system requirements.

> **Note**:
>
> If any preinstalled software (Web Server, Database Server, etc.) is running on the server that will host Class Climate, problems may arise during the installation. We strongly recommend using a dedicated server for Class Climate. If this is not possible, notify Scantron Corporation of any preinstalled software.

2.5. Supported Browsers

The following table lists all important browsers and differentiates between Class Climate users and online assessment participants:

Browser	Class Climate user (Backend)	Online assessment participants (Frontend)
Internet Explorer 10*	Not supported	Not supported
Internet Explorer 11	With limitations	Supported
Edge 41	Supported	Supported
Chrome 79**	Supported	Supported
Firefox 71**	Supported	Supported
Safari 13	With limitations	Supported ***

With limitations: Browsers are being tested with Class Climate. However, there can be optical limitations, and the system performance might decrease.

Supported: The corresponding browser can be used without further limitations.

Not supported: Browsers have not been tested to work with Class Climate and may experience visual limitations and reduced performance.

* Discontinued support for Windows version

** The current browser versions listed here at the time of Class Climate V8.1 development were tested. Scantron Corp. cannot guarantee the compatibility of newer browser versions, which are published by the manufacturers very regularly.

*** Please note that pop-up blockers, which you might not be able to turn off, may significantly restrict the use of Class Climate.

Table 7: Supported browsers for Class Climate

Adobe Acrobat Reader must be installed on the clients (PCs) of the users, to enable them to open the questionnaires and PDF reports. Do not use browser plugin-ins to open PDF documents. Browser plug-ins may not display a true image of the PDF document, which can cause issues when printing PDF questionnaires. The browser should be configured in a way that allows for opening PDF documents in Adobe Acrobat Reader.

3. Notes on System Security

Class Climate is a web-based application. Access may be required for both internal (intranet) and external users, particularly if you are conducting online assessments and the participants need access to the internet. If a separate online server is not provided (see chapter 1.3 Type 3: Special Installation with Separate Online Server (Dual Server Option)), you must ensure that the operating system configuration of the server meets the current security standards for internet servers.

In larger institutions and enterprises, there are often special guidelines in place. For questions about network security, contact your IT department. Additional security recommendations are noted below.

To be observed in the configuration of the operating system itself:

- Always implement current security updates.

- No unnecessary services running on the server, which could pose an additional risk potential.

- Separate network cards for internal and external network connections; no routing in the NT kernel.

- Mail service via an external mail server/relay.

- For additional information, please note the information in the "Class Climate Data Protection and Operational Security Paper."

Possibilities of Protection by Firewalls:

- Block all ports except the following:
  - Port 80 and 443
  - Port 3306 when using Dual Server Option
  - Port 1433 when using MS SQL
  - Port 25, 465 and 587 for mail dispatch

- Where applicable: NAT or Reverse Proxying

- Please block Memcached Port (TCP/UDP 11211) from connections other than localhost

4. Printer and Scanner Requirements

4.1. Printer Requirements

- Laser Printer

- Plain White Paper (weight: 24 to 39# Bond)

- We recommend printing the PDF document directly to the printer.

- Making photocopies may result in non-scannable forms.

- Do not use the printer's economy mode, which produces grey values.

- Duplex printing is preferable.

For more information, please consult the *Scanstation* manual.

4.2. Scanner (TWAIN) Requirements

The following scanners have been certified with VividForms Reader.

- iNSIGHT 20, iNSIGHT 30, iNSIGHT 4, iNSIGHT 4ES

- Canon DR 3080CII, DR 3080C, DR 3060, DR 9080, DR 5080, DR 5010

- Panasonic KV-S2055, KV-S2065, KV-S3065

- Fujitsu 4120 (5120 is not supported)

- Kodak i40 (special configuration of driver is required)

- Avision AV 220

Modern document scanners are usually adequate for operation with Class Climate if they meet the following requirements:

- Duplex scanning in black and white with 200 dpi resolution

- Multipage TIFF files with group IV compression

- Twain driver

- A scanner with a document feeder is required (flatbed scanners are not supported).

4.3.   Minimum System Requirements for Scanstations

- Intel® compatible processor with a minimum of 1.5 GHz

- 40 GB Hard Disk

- 2GB Memory

- 100 MBit/s Network

- USB port

- OS: Windows 8.x or Windows 10

4.4.   Multifunction Devices

It is possible to use multifunction devices to scan paper questionnaires. However, the use of a document scanner connected to the Scanstation is highly recommended. Document scanners can be better configured for the task, and the Scanstation provides comprehensive troubleshooting functions. If you wish to use a multifunction device, please note the following:

- Multifunction devices must be able to create flawless multi-page TIF files and automatically write them to a predefined directory, from which, the Scanstation automatically triggers further processing and passes the documents on to the Vivid-Forms reader.

- Before use, multifunction devices should be extensively tested to control quality, brightness, contrast, color depth, and resolution.

- As a rule, multifunction devices do not have TWAIN drivers, and therefore, cannot be operated directly with the Scanstation.

Note:

Before using multifunction devices, please contact Scantron to ensure correct operation.