SIEMENS

Desigo™ CC V5.0

System Limits

System Description

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About this Document

Purpose

This manual describes the Desigo CC management platform and gives the reader an overview of the system limits and the approvals and the recommended system configurations.

Scope

This document applies to Desigo CC Version 5.0

Target Audience

Sales Representatives are the first contact to the customer's buying center who establish the relationship. During pre-sales, they present the system to potential customers, focusing on unique selling propositions and benefits in order to acquire the project.

Sales Engineers provide pre- and post-sales technical advice and high-level support on product applications and solutions. They are often the key point of contact for clients, answering questions, providing technical advice and designing solutions. They have extensive knowledge of the products as well as the applications and network environments.

Project Engineers are responsible for planning and configuring a customer project. They provide the parameterization of products, devices, and systems and are responsible for general system troubleshooting. They have the appropriate training to their function and to the products, devices, and systems to be configured. They are familiar with the applied operating system(s) and the related network environment.

Field Engineers are responsible for commissioning at the customer site. They are trained appropriately to their function and to the products, devices, and systems to be installed. They are trained with the applied operating system(s) and the related network environment. Field engineers are responsible for infrastructure troubleshooting (for example, hardware, communication, network, and so on).

How to use it

This document provides the guidelines and illustrates the limits, restrictions and tools for sizing the hardware platforms on which Desigo CC can run properly, depending on project requirements. It shall help to design the system.

Liability Disclaimer

We have checked the contents of this manual for agreement with the hardware and software described. Since deviations cannot be precluded entirely, we cannot guarantee full agreement. However, the data in this manual are reviewed regularly and any necessary corrections included in subsequent editions. Suggestions for improvement are welcome.

Document Identification

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Table of Contents

1 Introduction

This document provides information about limits, restrictions and tools that will help to dimension projects with Desigo CC.

Desigo CC is a memory-based management platform. A **system object** allocated in memory represents each physical or logical entity in the system.

Hardware requirements for Desigo CC Server depend primarily on the number of system objects it shall manage (system size).

The current Desigo CC version supports up to 150,000 system objects per system (project). However, up to 1,500,000 system objects could be reached with a distributed system configuration where several Desigo CC systems are running at the same time.

Another, although minor, factor that impacts Desigo CC dimensioning is the number and type of clients.

Finally, the required disk storage space needs to be considered. Disk storage space is needed for historic data kept in the SQL server and for project data, including attachments and documents.

2 Management System Server

Ensure that the project in the Management System Server does not reach any of the system restrictions listed in the following table. In case of a distributed system, see section Distributed System Configurations [→ 11].

Desigo CC	
Topic	System Limits
Maximum number of objects handled by the Management System Server	150,000 (requires HW Category LS, restricted to 2 languages)
Maximum number of Installed Clients	10
Maximum number of Windows Apps	30
Maximum number of Flex Clients	40
Maximum number of active Web service sessions	10 (if IIS runs on Windows 10) 100 (if IIS runs on Windows Server 2012 R2/2016/2019)
Maximum number of FEPs	5
Maximum number of drivers per FEP	40
Maximum number of drivers per Server. See note below	Local: 20 (in a Server) Total: 100 (split between the local Server and a minimum of 2 FEPs)
Maximum number of VMS Servers connected	1 Only one Video API instance can operate with a VMS system. Multiple Desigo CC projects running video on the same machine are not supported. Multiple Video API instances in parallel are not allowed
Maximum number of archived energy datapoints in Powermanager extension	300 It does not affect the meter integrations outside of Powermanager or non-accumulative parameters (e.g. Voltage).
Maximum of tags exposed by the OPC Server	40,000
Maximum number of integrated OPC Servers per OPC Client driver	20
Maximum name length of OPC tags integrated via OPC Client driver	100
Maximum of objects exposed by the BACnet Server	20,000
Max. number of SORIS objects per SORIS driver	10,000
Minimum network throughput for Windows App using VPN	Minimum 512 kbps up/6 Mbps down (ADSL) Maximum Latency: 100 ms
Alarm load (rate of new alarms)	Desigo CC has been tested for the alarm loads defined below. Do not exceed: Constant load of 1 alarm per second on average 10 alarms per second on average over a period of 20 minutes 50 alarms per second over a period of 20 seconds (alarm burst) (The test was measured with one alarm burst per hour). "Alarm per second" indicates a new event/fault/alarm and includes the handling cycle until it is closed later. If Operating Procedures (OPS) are used during event handling, the maximum load is reduced depending on the complexity of the OPS.

Desigo CC	
	Notification can digest the alarm load even if every event is generating a notification to be sent out.
Maximum number of active events per system	10,000
Assisted treatment	Maximum number of active operating procedures: 10,000 Each operating procedure can have up to nine steps
Maximum number of Activity logs per day	1,000,000
Maximum number of Event records per day	1,000,000
Maximum number of Trend records per day	4,200,000
Maximum number of reactions defined	800
Maximum number of reactions that can be executed simultaneously	320
Graphics performance	Following results represent the time until the background and all symbols in the graphic page are fully rendered and updated on the client. Results on category CL machines with HQ library symbols are: Floor Plan with Fire 500 detectors: approx. 7 seconds Air Handling Unit Graphic with 52 BA symbols: approx. 2 seconds. These results are based on the experience obtained in a controlled lab environment. Results might be different depending on deployment type, subsystems used and implementation of graphics engineering.

Each driver adds approximately 25 seconds to the overall startup time on a system installed in a LS hardware category. For hardware category definitions, refer to section Hardware Category Definitions [→ 17].

2.1 Notification System

The following system limits are specific to Notification:

Scope	System Limits	Comments
Recipient users	20,000	Engineered recipient users with recipient user devices of any kind
Templates	200	Engineered incident and notification templates
System devices	2,500	Engineered devices

Determine the Notification system size based on the required number of devices to be integrated with Notification:

Service Class	Device Type	Small	Medium	Large
Max. number of running Mass Notification drivers on main Desigo CC server (use FEP for more drivers)		5	5	5
Sign support	Adaptive display	100	200	300
Sign support	Prolite displays	100	200	300
Media display support	Media display devices	100	200	300
Audio zone support	Multi Zone Audio device	20	60	150
Audio zone support	Single Zone Audio device	20	60	150
PBX Extended (shared with Dial-	Hot Line device	10	30	48

Service Class	Device Type	Small	Medium	Large
In)				
Desktop messaging support	Desktop Notification device	5,000	10,000	20,000
Hosted messaging support	Bulk Notification Email	5,000	10,000	20,000
Hosted messaging support	Bulk Notification SMS	5,000	10,000	20,000
Hosted messaging support	Bulk Notification phone calls	5,000	10,000	20,000
Local network messaging support	SMTP Email device	1,000	1,000	1,000
Facebook support	Facebook device	3	3	3
Twitter support	Twitter device	3	3	3
RSS support	Web Feed Published Device	3	3	3
Input monitoring	ASCII Input device	100	100	100
Input monitoring	Digital Input device	100	100	100
RSS support	Web Feed Input device	5	5	5
Relay support	Relay Output device	100	200	200
Cellular modem support	GSM Gateway device	50	50	50

3 Distributed System Configurations

Given all the variants that could exist in distributed system configurations, it is impossible to test and give precise limits for all the possible scenarios. Tests have been performed for some scenarios with a constant load of five alarms per second. Here are the conclusions and comments based on these tests:

Hierarchical		
Number of supervised systems	30	
Total amount of system objects	1,500,000	
	Per supervisor system	Per supervised system
Maximum number of remote installed clients / FEPs	2 (no FEPs)	10 (max. 5 FEPs)
Maximum number of remote Windows Apps	20	30
Maximum number of Flex clients	40	40

In hierarchical configurations, the supervisor server should not contain any kind of integration (either local, or via FEP). This statement becomes more important the bigger the amount of system objects in the supervisor is. The limits indicated in the table above have been tested with no subsystems or FEPs connected to the supervisor.

Fully meshed	
Number of systems	7
Total amount of system objects	1,000,000
Maximum number of remote installed clients per system / FEPs	2
Maximum number of remote windows apps per system	20
Maximum number of remote Flex clients per system	40

Network requirements for distribution	
Network bandwidth	≥1Gbps
Network latency between servers	≤10ms

If the number of servers in a distributed system configuration is bigger than five, the use of SQL Server Standard edition is recommended.

Note that the minimum hardware requirements defined in section Hardware Category Definitions [→ 17] still apply with the following remarks:

- For supervising servers (hierarchical topology) or any server in a meshed topology, 64 GB RAM are required.
- In virtual environments with lower clock frequencies in the processor, lower performances can be expected, and overall system size limits are reduced

Hybrid topologies

Hybrid topologies have not been considered in this document and have not been tested. However, feasibility and design of such topologies can be consulted through Customer Support.

Segmented topologies

In segmented topologies, up to three systems can be connected in fully meshed configuration within the same server machine. In this case the amount of RAM (64GB) and physical cores (4) typically required for machines hosting one only system, need to be multiplied by the number of systems. Example: A server with three systems in segmented topology would require 192GB RAM and 12 physical cores.

4 Recommendations for Remote Clients

If system configuration requires remote client connectivity, the recommended hardware and software configuration for the different types of clients is described below:

4.1 Installed Clients

Installed Client	
Description	Statically installed, highest performance in local network.
Recommended hardware category	**CL** (See Hardware Category Definitions [→ 17])
Recommended software environment	Windows 10 Professional and Enterprise
Network requirements	Local network: Preferred for: Control Rooms and regular engineering and commissioning, including data import. Mostly single subnet 100 Mbps upload/download Latency less than 10 ms
	Corporate networks across site to site connectivity: Different subnets (often secured with firewalls/DMZ): Minimum 10 Mbps up/down
	Remote connection via VPN: Recommended only for casual remote operation and casual remote engineering (no data import) Multiple subnets Minimum 10 Mbps upload/download Latency less than 100 ms

4.2 Windows App Clients

Windows App Client	
Description	Client software can be statically or temporarily downloaded via Desigo CC Web Server.
Recommended hardware category	**CL** (See Hardware Category Definitions [→ 17])
Recommended software environment	Windows 10 Professional and Enterprise
Network requirements	Local network Multiple subnets 100 Mbps upload/download Latency less than 10 ms
	Corporate networks across sites, using SHDSL site-to-site connectivity: Different subnets (often secured with firewalls/DMZ): Minimum 2 Mbps up/down
	Remote connection via VPN, using ADSL Recommended for casual remote operation and casual remote engineering (no data import) Multiple subnets Minimum 512 Kbps upload/6 Mbps download Latency less than 100 ms

4.3 Flex Clients

Flex Clients	
Description	Client running in a Web browser, based on HTML5 technology. It supports operator workflows for event management, system management, graphics, and commanding.
Recommended hardware category	**CL** (See Hardware Category Definitions [→ 17])
Recommended software environment	Windows 10 Professional and Enterprise Chrome
Network requirements	Local network Multiple subnets 100 Mbps up/down Latency less than 10 ms
	Corporate networks across sites, using SHDSL site-to-site connectivity: Different subnets (often secured with firewalls/DMZ): Minimum 2 Mbps up/down
	Remote connection through VPN, using ADSL Wide area network Multiple subnets Minimum 512 kbps up/6 Mbps down (ADSL) Latency less than 100 ms

5 Front End Processors (FEPs)

If system configuration requires distribution of field network connectivity, the recommended hardware and software configuration for FEP is described below.

Front End Processor (FEP)	
Description	Enhancement of connectivity capacity with distributed field network drivers
Recommended hardware category	**MS** (See Hardware Category Definitions [→ 17])
Recommended software environment	Windows 10 Professional and Enterprise, 64-bit
Network requirements	Local network Single subnet 100 Mbps upload/download Latency less than 10 ms
Recommendation	Max 40 drivers per FEP. Total per system: 100 (see IT Environment Compatibility) Max 5 FEP

6 System Dimensioning Tool

Desigo CC covers a wide variety of deployments so that is impossible to set simple rules for determining the system size. Therefore, a system-dimensioning tool is available that estimates system size and disk storage space based on the information available at the time of the offer, for example, the number and type of physical data points and the expected contents of the History Data Base.

When the required configuration and the number and type of clients have been entered, the system-dimensioning tool verifies the feasibility of the system, calculates the number of system objects, and suggests the appropriate hardware category for the server, the required storage space for the project and the version and the disk space required for the SQL server.

The above example refers to a system with 30,000 BACnet points and 12,000 Fire detectors, with enough storage for 3 years of trends and activity logs online.

To obtain the latest version of the System Dimensioning Guide Calculator, see the Siemens Intranet:
https://wse04.siemens.com/content/P0011294/cc/Intranet/Forms/AllItems.aspx

Or the Siemens Extranet: http://www.siemens.com/bt/partner-extranet
(Click the “Download” button on the start page and then select “Tools and software”).

7 Hardware Category Definitions

This section provides minimum hardware specifications to run Desigo CC given a certain amount of system objects. The amount of system objects consumed by a single system can be calculated by using the Desigo CC dimensioning tool described in section.

The use of this tool is specially needed to calculate the correct amount of disk space needed when the system is using Long Term Storage / archiving functionality.

7.1 Minimum Requirements for Physical Machines

Hardware	Client (Category: CL)	Small or Medium-Sized Server / FEP (Category: MS)	Large-Sized Server (Category: LS)
System Object Count Range	Not Applicable	≤50K	>50K & ≤150K
Processor	• Minimum 8th, 9th, or 10th generation Intel Core i5 or equivalent • Minimum 2.8 GHz (base clock speed) • Minimum 2 cores per running system	• Minimum 8th, 9th, or 10th generation Intel Core i7 or equivalent OR • Intel Xeon Platinum, Gold, W, or E-22xx with minimum CPU Mark* of 13,000, or equivalent • Minimum 2.9 GHz (base clock speed) • Recommended 4 cores per running system on typical sites • Recommended 6-8 cores per running system on sites running large numbers of Advanced Reports (>1,000 daily).	
RAM	8GB	16GB	32GB
		Distributed Systems: 64GB for • Supervisor in a Hierarchical topology • Each server in a Meshed topology	
Hard disk	1 SSD: 256GB	1 SSD: 512GB to 2TB.	
Network card	Gigabit speed		

Processors

- Desigo CC uses single and multi-threaded components
- Desigo CC Data Manager, Event Manager, and Distribution Manager (if distribution is deployed) are processor intensive at startup
- Four cores per project are recommended on typical sites.
- Additional cores will not improve performance, except for sites running large numbers of Advanced Reports (>1,000 daily).

Potential effects of not meeting specifications:

- Slower application startup
- Slower graphics loading (integrated graphics only)
- Slower report generation

RAM

- Testing has shown non-distributed systems with more than 100,000 system objects are optimized with 32 GB RAM. Less RAM will reduce performance; adding additional RAM will not significantly enhance performance.
- Additional RAM is needed to help cache the partner systems on distributed systems.

Potential effects of not meeting specifications:

- Slower runtime execution of commands, screen changes, graphics loading
- Inability to load large projects or partner system data into memory

Hard disk

- Storage needed depends on project size, data collection, and data retention requirements. See sizing calculator for recommendation.
- Minimum for servers with smaller projects and short retention requirements is 512GB.
- Exceeding storage capacity will require either deletion of some data, or use of long-term storage to move data offline
- SSDs are strongly recommended over standard hard drives due to 100X faster speeds. The Desigo CC Data Manager, used for field panel communication, needs the higher read/write speed for best performance.

Potential effects of not meeting specifications:

- Limited short and long-term storage
- Delays in read/write activities, such as trending, report generation, etc.
- Required data deletion or use of offline storage (long-term storage functionality)

Network card

- In addition to the network adaptor speed, the network itself must be low latency to support all required communications between the server, clients, field panels, and other servers in a distribution Additional RAM is needed to help cache the partner systems on distributed systems.

Potential effects of not meeting specifications:

- Slower communication to/from clients, field panels, and distributed servers

Typically, customer installations are very vital over the whole lifecycle. We recommend providing for reserves for the future and consider a higher hardware category than originally designed.

We recommend using the latest generation of processor available. The use of more cores does not lead to better performance.

The recommendations provided here are based on tests executed on hardware products available at the time of the release of the current version of Desigo CC.

Compatibility and performance using other software and hardware that might become current at some future point cannot be guaranteed. In such cases, contact your local support for further information.

Standard hardware configurations defined above are available to Siemens RSS / BP organizations. Contact your local procurement manager for further information.

With Video integration:

Minimum recommended machine for clients or servers is MS

A dedicated graphic card with 2GB RAM

For further information regarding hardware specifications, especially for virtualization or recording scenarios, see the specifications of the VMS vendors.

UL/ULC Compliance

For UL/ULC compliance, all computers in the system (Server, Clients and FEP) must be UL864 listed (Comark computer). Refer to section UL/ULC Listed Machines [→ 22] for UL/ULC computer information.

Carefully read section Distributed System Configurations [→ 11] to learn about the specific hardware requirements in case of distributed systems.

For system being part of a distributed topology, carefully read Distributed System Configurations [→ 11].

Installation on an embedded PC is only supported for Desigo CC Compact products as well as Desigo CC Connect. These are the minimum hardware specifications:

Hardware Type	**Embedded PC**
Category Name	EP
Limit System Objects	10,000
Processor	Celeron N2930 or equivalent >= 1.83GHz 4 cores
RAM	8GB
Hard disk	1 x 64GB SSD
Network card	Gigabit speed

In case of installation of an embedded PC, SQL Server needs to be configured to limit the amount of RAM taken from the system to 1GB RAM

Internal tests to support these specifications have been performed on following hardware: SIMATIC IPC227E with **Windows 10 IoT LTSB 2016**

7.2 Minimum Requirements for Virtual Machines

Hardware	Client (Category: CL)	Small or Medium-Sized Server / FEP (Category: MS)	Large-Sized Server (Category: LS)
System Object Count Range	Not Applicable	≤50K	>50K & ≤150K
Processor	• Minimum 8th, 9th, or 10th generation Intel Core i5 or equivalent • Minimum 2.8 GHz (base clock speed) • Minimum 2 vCPUs assigned to the VM	• Minimum 8th, 9th, or 10th generation Intel Core i7 or equivalent OR • Intel Xeon Platinum, Gold, W, or E-22xx with minimum CPU Mark* of 13,000, or equivalent • Minimum 2.9 GHz (base clock speed) • Recommended 4 vCPUs assigned to the VM • Recommended 6-8 vCPUs assigned to the VM on sites running large numbers of Advanced Reports (>1,000 daily). • Recommended 8 vCPUs on sites running large MNS systems	
RAM	8GB	16GB	32GB
		Distributed Systems: 64GB for • Supervisor in a Hierarchical topology • Each server in a Meshed topology	
Hard disk	1 SSD: 256GB	1 SSD: 512GB to 2TB	
Network card	Gigabit speed		

Processors

● Desigo CC uses single and multi-threaded components

● Desigo CC Data Manager, Event Manager, and Distribution Manager (if distribution is deployed) are processor intensive at startup

● Four vCPUs per project are recommended on typical sites.

● Additional vCPUs will not improve performance, except for sites running large numbers of Advanced Reports (>1,000 daily) or large MNS systems.

Potential effects of not meeting specifications:

● Slower application startup

● Slower graphics loading (integrated graphics only)

● Slower report generation

RAM

● Testing has shown non-distributed systems with more than 100,000 system objects are optimized with 32 GB RAM. Less RAM will reduce performance; adding additional RAM will not significantly enhance performance.

● Additional RAM is needed to help cache the partner systems on distributed systems.

Potential effects of not meeting specifications:

● Slower runtime execution of commands, screen changes, graphics loading

● Inability to load large projects or partner system data into memory

Hard disk

● Storage needed depends on project size, data collection, and data retention requirements. See sizing calculator for recommendation.

● Minimum for servers with smaller projects and short retention requirements is 512GB.

● Exceeding storage capacity will require either deletion of some data, or use of long-term storage to move data offline

● SSDs are strongly recommended over standard hard drives due to 100X faster speeds. The Desigo CC Data Manager, used for field panel communication, needs the higher read/write speed for best performance.

Potential effects of not meeting specifications:

● Limited short and long-term storage

● Delays in read/write activities, such as trending, report generation, etc.

● Required data deletion or use of offline storage (long-term storage functionality)

Network card

● In addition to the network adaptor speed, the network itself must be low latency to support all required communications between the server, clients, field panels, and other servers in a distribution Additional RAM is needed to help cache the partner systems on distributed systems.

Potential effects of not meeting specifications:

● Slower communication to/from clients, field panels, and distributed servers

UL/ULC Compliance

For UL/ULC compliance, the use of virtual machines is limited to VMware.

Refer to the virtualization software specifications to indicate the hardware requirements for the Virtual Machine hosts.

Ensure you have a read/write speed to storage of >=150 MBps

If you cannot provide this processor speed or dedicated vCPUs are not available during runtime due to overprovisioning, degraded performance can be expected.

If multiple virtualized clients share the same network resources, application specific limitations might apply. Example: It is not possible to transport a large amount of video streams over a single network connection.

For system being part of a distributed topology, carefully read Distributed System Configurations [→ 11].

7.3 UL/ULC Listed Machines

The following table provides a mapping of the Desigo CC Hardware Categories to the available UL/ULC listed computers. After determining the required hardware category with the System Dimensioning Guide Calculator, the appropriate UL/ULC listed computer model number(s) can be determined by locating the corresponding Hardware Category in the table below.

The UL/ULC computers are sold as a Hardware/Software Server Packages or as Hardware Only as defined below.

Refer to the Desigo CC V4.0 Delivery Release for detailed ordering information.

Category Name	CL	MS	LS
Model numbers for hardware / software server package	UHW-CATA-PKG-SM	UHW-CATB-PKG-SM – OR – UHW-CATB-PKG-LM	N/A
Model numbers for hardware only	UHW-CATA-01	UHW-CATB-01	UHW-CATC-01 – OR – UHW-CATD-01

You can use Hardware Only computers for Server, Client, or Front End Processor (FEP) configurations as indicated in Section 2.1.1 [→ 17] and 2.1.2 [→ 17].

8 Monitors

Monitor Resolution

For graphical user interface operation on Installed, Windows App, Flex Clients, a minimum resolution of 1600 x 900 pixels is required but full HD (1920x1080) is recommended.

Multiple-Monitor Management

Desigo CC Installed or Windows App Client can make use of multiple monitors, when available, and any system window, such as System Manager, Investigative Treatment, or Help, can be moved from the default monitor to a second monitor. The Summary bar remains on the primary monitor and cannot be moved.

The current system window settings in the multiple monitors are not retained when closing the client session

9 Tablets

Tablets for Flex Client operation require a minimum size of 9.7 inches. iPad Pro or Microsoft Surface Pro are recommended.

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