

Desigo™ Insight

## High Availability Solution

**HA-300**  
**HA-500**

The High Availability Solution (HA) provides increased reliability and security for our building control technology:

- Uninterrupted monitoring of the physical servers
- Recognition of server failures using a “server heartbeat” (vSphere platform)
- Monitoring of the Desigo Insight service with a Desigo Insight heartbeat
- Immediate restart of the virtual systems without human intervention
- Switchover of the complete system in case of failure
- Management of geographically separate locations possible
- Supported by industry-proven software packages
- VMware vCenter server for server administration
- Support of classes AEC-3
- Support of Desigo PX, VISONIK and FS20 subsystems connected via IP
- Customized solutions to meet customer needs

## Use

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The demand for greater reliability and security in building control technology is continually increasing. The Desigo Insight building automation and control system can also be operated in a high availability environment under certain circumstances.

The complexity of the solution may vary depending on customer needs. As a general rule, the higher the required availability, the higher the investment costs for hardware and software as well as service.

One important decision is whether or not to distribute the High Availability Solution among more than physical location, since this decision also results in additional costs for switches and cabling.

Facilities where the installation of the HA Solution may be considered include:

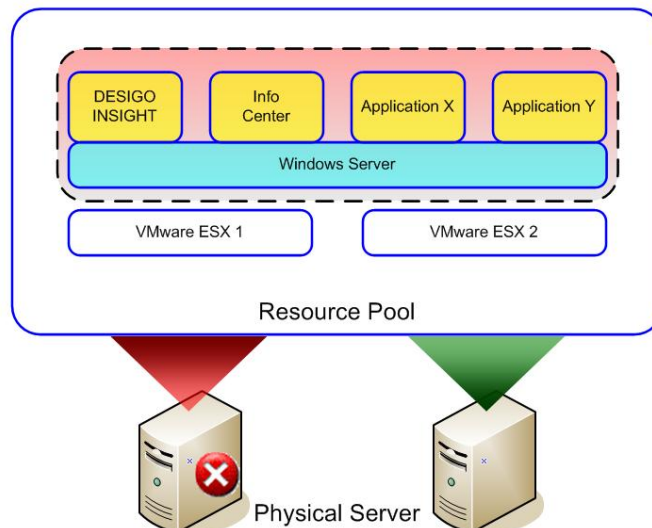
- Pharmaceutical sector
- Industrial plants where the loss of building control or building data would significantly impact regular business operations
- Warehouse operations requiring continuous monitoring of ambient conditions to protect valuable inventories
- High-tech production operations where the fast reaction to the alarm situation is critical for the operation of the production line.
- Commercial or government building plants where even the short-term loss of building control or building automation and control data would significantly impact the ability to serve customers (airports, hospitals, etc.) or affect the safety of human life

## Functions

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The High Availability part of the solution offers the following functions:

- Uninterruptable monitoring of all physical servers in a resource pool and restart of virtual machines impacted by a service failure
- Monitoring of the operating systems for failure and automated restart of impacted virtual machines



- Recognition of server failures using the "server heartbeat" (vSphere platform)
- Monitoring of Desigo Insight services (Desigo Insight heartbeat) and automatic restart of the Desigo Insight service or restarting the VMware in case of failure

- Nearly immediate restart without human intervention of the virtual systems in a different available server within the same resource pools
- VMware vCenter Server Foundation for server administration.

Restrictions

- Only Desigo PX subsystems are officially supported
- Only IP connections supported
- The forwarding of messages in case of failover is left for the customer IT to solve (not included as part of this solution)
- For more detailed restrictions see also documentation CM110797


**Type summary**

The following types of Desigo Insight High Availability Solution are available:

Type	Class	Desigo Insight	Comment
Standard	AEC-0	As of V2.35	
HA-300	AEC-3	As of V4.1	VMware HA only
HA-500	AEC-3	As of V4.1	VMware HA + Fault Tolerant

Note

A system is designated as available when it is able to fulfill its planned tasks. Availability refers to the probability that a system is functional within a specified timeframe (available). Availability is the measured ratio of idle time (= downtime) due to faults to overall system time and is divided into the following classes:

	Class	Description	Explanation
Low  High	AEC-0	Conventional	Operation may be interrupted, but data integrity is not essential
	AEC-1	Highly reliable	Operation may be interrupted, but data integrity must be ensured, however
	AEC-2	High availability	Operation may be minimally interrupted during main operating hours
	AEC-3	Fault resilient	Operation must be maintained during the main operating hours continuously
	AEC-4	Fault tolerant	Function must be continuously maintained, 24*7 operation
	AEC-5	Disaster tolerant	Function must be available under any circumstances

## Finding a solution

**Customer requirements** Use customer requirements to determine the solution type best tailored to the customer. You can then decide on hardware and software requirements on the next page after deciding on the solution type.

Customer requirements	Solution type		
	Standard	HA-300	HA-500
<b>System continued operation is guaranteed in case of the following failures:</b>			
<b>Desigo Insight</b>			
– when power outage is over	X	X	X
– when Desigo Insight is becomes unstable		X <sup>1</sup>	X <sup>1</sup>
– when one Desigo Insight dongle is defective	(X)	X	X
<b>Server</b>			
– when a processor fails on the production server		X <sup>2</sup>	X <sup>2</sup>
– when the motherboard fails on the production server		X <sup>2</sup>	X <sup>2</sup>
– when the hard disk controller fails on the production server		X <sup>2</sup>	X <sup>2</sup>
– when a hard disk drive fails on the production server		X	X
– when a network card fails on the production server		X	X
– when the IT network fails on the production server (no connectivity)		X <sup>2</sup>	X <sup>2</sup>
– when the operating system fails on the production server		X <sup>2</sup>	X <sup>2</sup>
– when the production server is switched off		X <sup>2</sup>	X <sup>2</sup>
– when the production server has no power		X <sup>2</sup>	X <sup>2</sup>
– when both servers fail		-	-
– when standby server fails		X <sup>3</sup>	X <sup>3</sup>
<b>Server storage</b>			
– when a hard disk fails in the storage system		X	X
<b>IT network</b>			
– when a network switch fails		X	X
<b>General</b>			
– when water or fire damage occurs in the production room (depending on topology)		X <sup>2</sup>	X <sup>2</sup>
– when water or fire damage occurs in the standby room (depending on topology)		X <sup>3</sup>	X <sup>3</sup>

<b>Probability of data loss for trend, log and archive data when unavailable:</b>			
– High	X		
– Medium			
– Small		X	
– Minimum			X
<b>Non-availability of Desigo Insight during a fault.</b>			
– Greater than 5 minutes	X		
– Up to 5 minutes		X	
– Uninterrupted			X
<b>My rough costs available for IT infrastructure:</b>			
– EUR 0	X		
– More than EUR 30,000		X	
– More than EUR 100,000			X

<sup>1</sup> Desigo Insight server restart controlled by Siemens script

<sup>2</sup> Failover controlled by VMware

<sup>3</sup> High availability capabilities no longer active

## Solution requirements

The table outlines requirements for each of the solutions. Optional extensions are possible depending on customer desires.

Requirement for the given solution	Solution type		
	Standard	HA-300	HA-500
<b>What is required for the corresponding solution:</b>			
<b>Hardware requirements</b>			
– Standard PC Desigo Insight	1		
– Application server (vSphere compatible)		3	3
– Rack <sup>1</sup>		2	2
– NAS		1	
– NAS or SAN infrastructure		1	1
– UPS <sup>1</sup>		2	2
– AnywhereUSB		2	2
– IP addresses to AnywhereUSB (1 per device)		2	2
– Switch min. 1GB		2	2
– FibreChannel infrastructure			1
– Min. Network cable (required ports)	1	4	6
– Min. IP address to network cable (ports)	1	4	4
– Desigo Insight Dongle	1	2	2
<b>Software requirements:</b>			
<b>Desigo Insight</b>			
– Program license	1	1	1
– Redundant license		1	1
<b>Server</b>			
– SQL Server for Desigo Insight <sup>1</sup>		1	1
– Windows Server 2012 R2 (Desigo Insight Server / VM) <sup>3</sup>		2	2
– Windows Server 2008 R2 SP1 or later (vCenter Server 6.0) <sup>5</sup>		1	1
– VMware vSphere 6.0 Essentials Plus		1	
– VMware Virtual Center Server 6.0 Foundation license <sup>2</sup>			1
– VMware vSphere 6.0 Standard license (1 for each host)			2
– VMware vSphere Client		1	1
<b>Free software</b>			
– Microsoft Windows PowerShell 4		1	1
– vSphere 6.3 PowerCLI		1	1
<b>Service agreements</b>			
– VMware vSphere 6.0 Essentials Plus license (SnS) <sup>4</sup>		1	
– VMware virtual Center Server 6.0 Foundation license (SnS) <sup>4</sup>			1
– VMware vSphere 6.0 Enterprise license (SnS) <sup>4</sup>			2

<sup>1</sup> Optional depending on customer wish

<sup>2</sup> Depending on used vSphere hosts and amount of processors

<sup>3</sup> Check Microsoft licensing policy for virtualized environments

<sup>4</sup> Service and subscription (VMware term)

<sup>5</sup> Check the required version with your local VMware supplier

## Solutions

### Standard

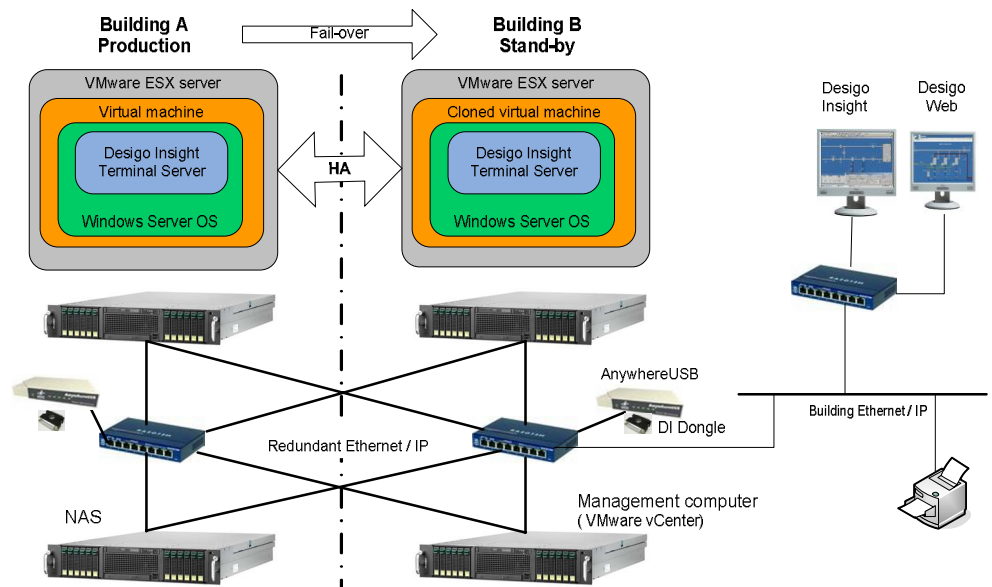
The standard solution refers to implementations based on hardware with a higher degree of reliability and/or lesser MTBF (Mean Time Between Failures), based on a desktop or terminal server installation. Refer to the appropriate documentation for additional information.

### HA-300

The HA-300 solution is for customers requiring a very high level of hardware availability (AEC-3), in those cases where a failure would mean a high degree of data loss. It is based on two independent hardware systems and supplemental redundant network connections. A management computer assures monitoring and notification functions. This management computer must be set up on a dedicated server machine. Data is maintained constantly synchronized, and the only possibility of data loss is during the short period of switching from the production to the standby server (usually less than 5 minutes).

The standby server takes over in short order when the production server fails and assumes 100% of the duties of the production server.

The production server is not impacted by a failure of the standby server or management computer. High availability functionality is however no longer active, until the standby server is back online.



### Hardware

- Application servers (hosts) must be vSphere compatible (according to the VMware compatibility list)
- The Designo Insight dongle must be connected to an external USB interface (the vSphere hosts do not recognize the USB interface on the server per default)
- Redundant software license with dongle
- We recommend placing the management computer next to the standby server
- Cabling and switching are not part of this solution
- Anywhere USB connected over Ethernet
- All alarm receivers connected over Ethernet

### Software

The following information is required for proper software installation:

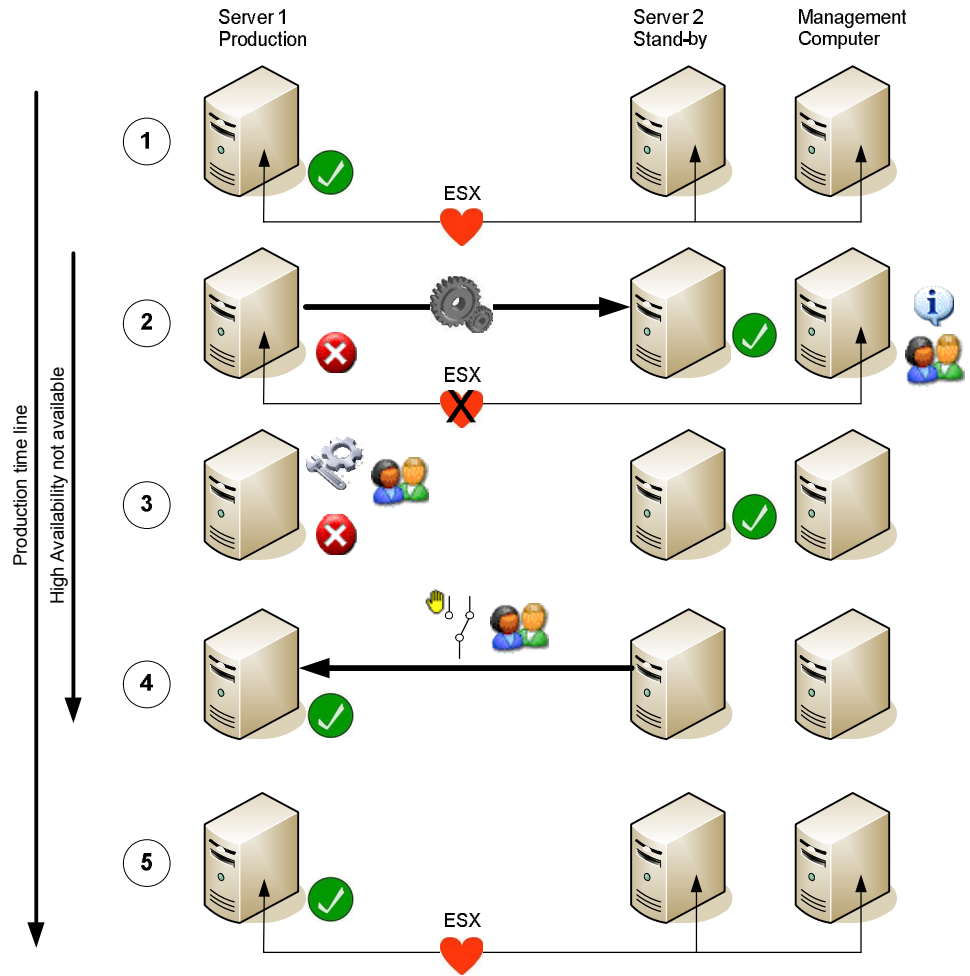
- Customer's IT infrastructure
- Know-how of Microsoft servers
- Know-how of VMware vSphere platform and virtualization technology in general
- Know-how of NAS systems and storage technology
- Anywhere USB connected over Ethernet
- All alarm receivers connected over Ethernet

Operation

Knowledge must be acquired of VMware vSphere platform software to operate and monitor the actual HA solutions, so that the operator can manually switch back to the production server for a successful failover

Host Faults

A vSphere heartbeat monitors Server 1 during normal operations {1}. In the event of a hardware error {2}, the solution automatically switches over to Server 2 after about 5 minutes. Server 2 assumes full functionality during troubleshooting {3}. You must manually switch over to Server 1 {4}. High availability is once again guaranteed after switched over and is monitored with the heartbeat {5}



Note: The drawing depicts functions only and is not meant to be a technical illustration. NAS is not part of this illustration.

Hint: Forwarding of information via email or SMS is not part of this solution.

Desigo Insight faults

A dedicated Powershell script monitors the Desigo Insight heartbeat generated by the Desigo Insight service. The Desigo Insight service restarts when the heartbeat fails. The VMware for the production server restarts for its part when the Desigo Insight service fails to restart after a few attempts. The script itself does not change over to the standby server.

Data backup

This solution is not to be applied as a data backup solution. Project data backup and archiving must be resolved separately from the High Availability solution.

Documentation

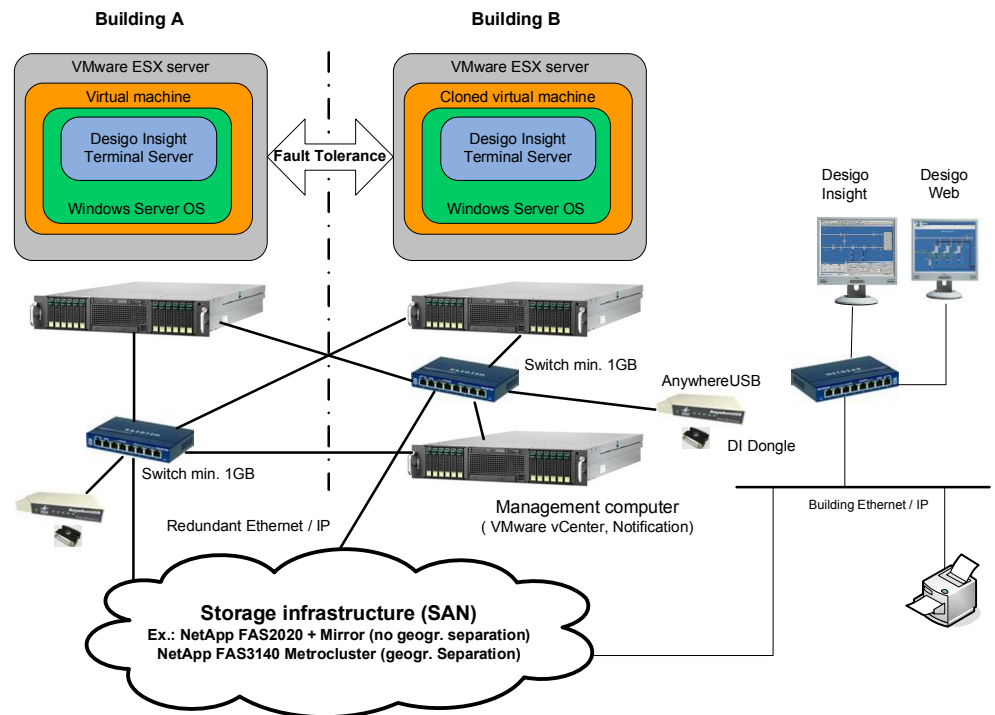
Installing High Availability, Installation instructions

CM110797en



## HA-500

HA-500 is for customers requiring a very high level of hardware availability (AEC-3) where a failure would mean a high degree of data loss. The solution is only suitable for customers with an existing or planned storage infrastructure (SAN) environment.



### Hardware

- Application servers (hosts) must be vSphere compatible and, in order to benefit from the Fault Tolerance module, must be built around 64-bit CPU (see VMware compatibility list!)
- The management computer should be a high-performance machine, equivalent to the application server, and can be implemented physically in an external machine or virtually in the vSphere host.
- The Designo Insight dongle must be connected to an external USB interface (the vSphere hosts do not recognize the USB interface on the server per default).
- Redundant software license with dongle.
- If a physical management computer is used, and when the vSphere hosts are separated geographically, we recommend having it located next to the standby vSphere host.
- Cabling and switching are not part of this solution.
- Installation and servicing of the SAN is not a part of this solution.
- Anywhere USB connected over Ethernet
- All alarm receivers connected over Ethernet

### Software

The following knowledge background is required for the software installation:

- Customer's IT infrastructure (especially the SAN infrastructure, its configuration and operation).
- Microsoft server.
- VMware vSphere platform.

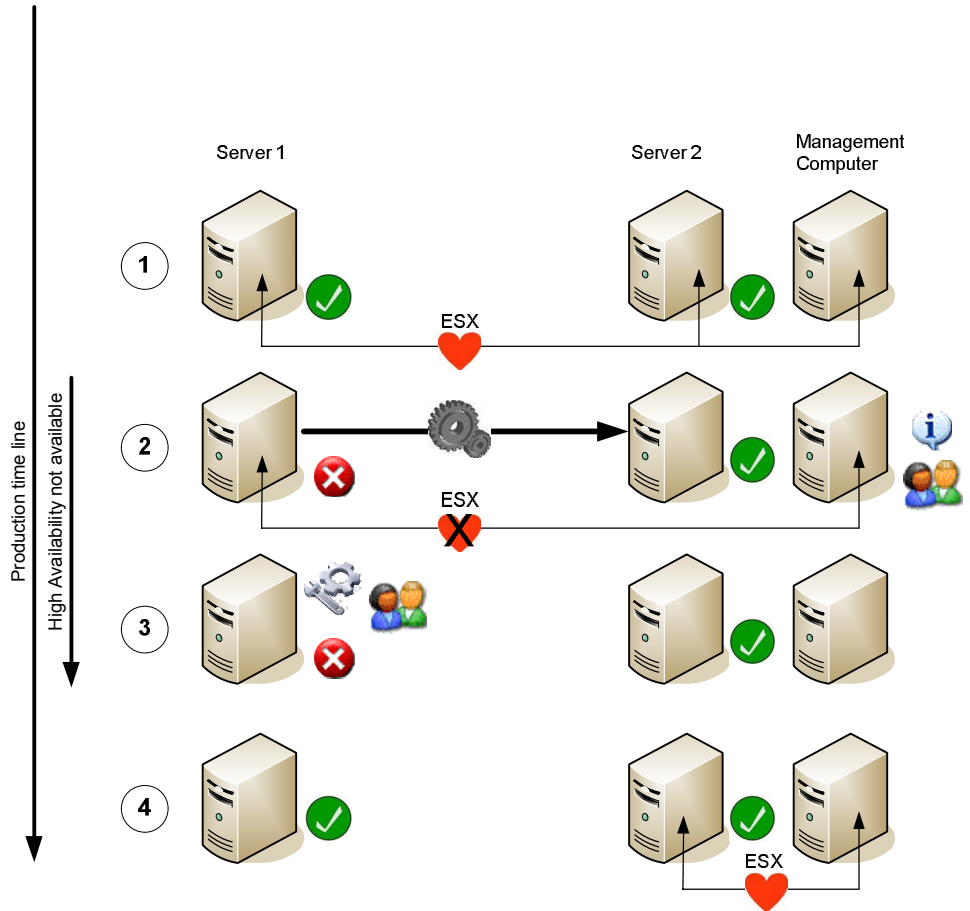
### Operation

Know-how of the operation of VMware vSphere hosts and the vSphere virtualization platform is required to operate and monitor the HA solution.

### ESX Faults

A vSphere heartbeat monitors Server 1 during normal operations {1}. In the event of a hardware error {2}, the solution automatically switches over to Server 2 immediately without downtime. Server 2 assumes full functionality during

troubleshooting {3}. High availability is once again guaranteed after the complete backup and is monitored with the heartbeat {4}.



Note: The drawing depicts functions only and is not meant to be a technical illustration. SAN is not part of this illustration.

Hint: Forwarding of information via email or SMS is not part of this solution.

Designo Insight faults

A dedicated Powershell script monitors the Designo Insight heartbeat generated by the Designo Insight service. The Designo Insight service restarts when the heartbeat fails. The VMware for the production server restarts for its part when the Designo Insight service fails to restart after a few attempts. The script itself does not changeover to the standby server.

Data backup

Data backup using the (customer-supplied) SAN is not a part of the Siemens solution and must be resolved and maintained by the customer.

Documentation

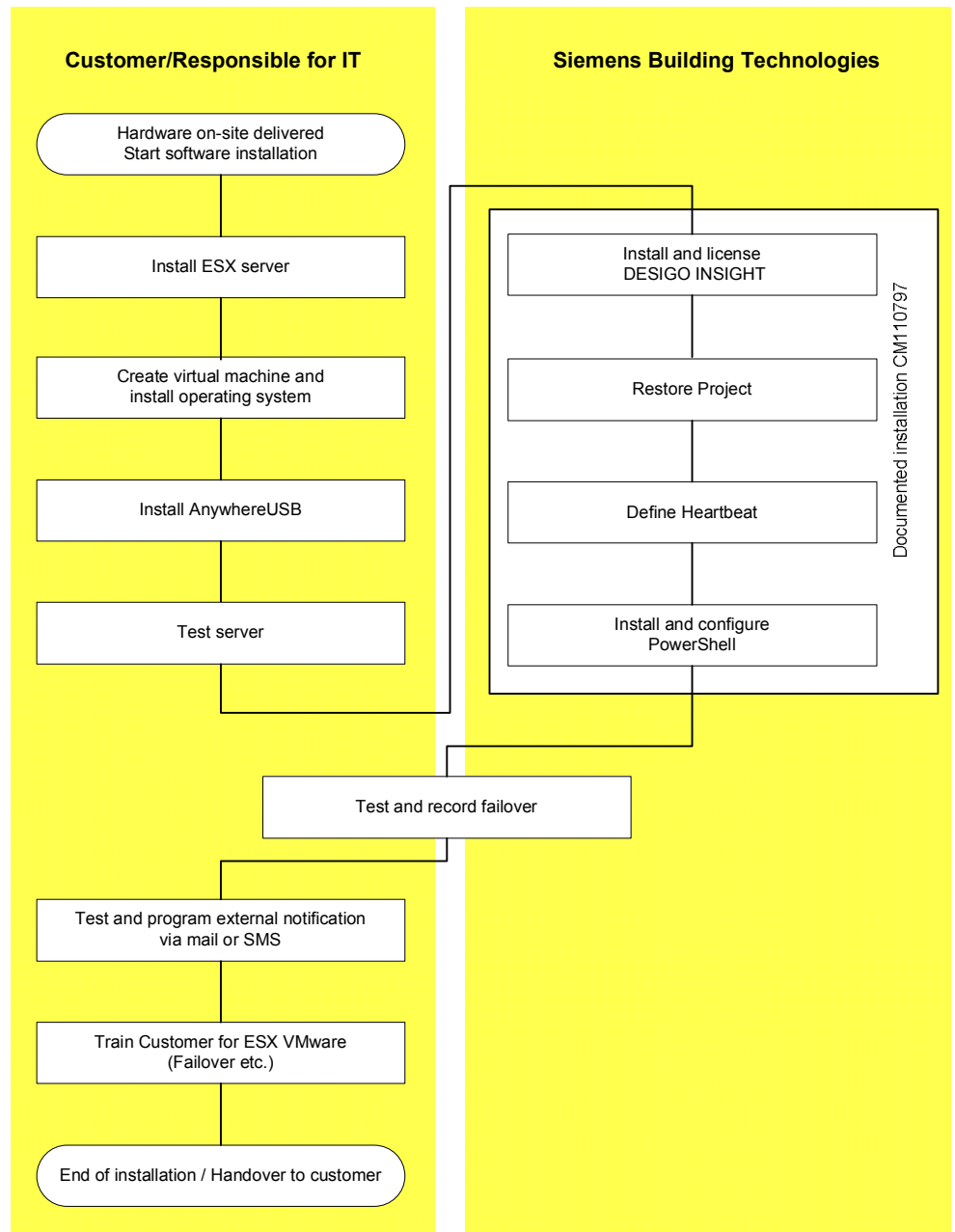
Installing High Availability, Installation instructions CM110797en

Restrictions

**Check chapter 3.2 of document CM110797en, paragraph "Restrictions and hints" for details.**

## Responsibility

Responsibility for hardware and software delivery as well as scope of service and warranty for customers must be clarified for each project and detailed in writing in a contract.



## Ordering

The High Availability Solution cannot be ordered as a complete solution at CPS HQ. We recommended using a local partner to supply the hardware and to install hardware and software components. The local partner should then assume the appropriate warranties on the supplied products.

A second Desigo Insight dongle is required for the HA-300 and HA-500 solutions. Please contact the responsible Desigo Insight Product Manager to acquire the second dongle.

## Equipment combinations

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**Hardware requirements** The following information should be viewed as minimum requirements that must be satisfied for trouble-free operation:

Application server

- Quad-core machine @ 3 GHz minimum. Server must be **VMware vSphere compatible**.
- 16 GB RAM minimum
- 60 GB minimum of storage in a RAID 1 scheme for the operating system
- Redundant power supply
- Redundant network card
- DVD-RW drive
- 19" rack if desired

Management server

- The same hardware requirements apply as for the application server.

NAS / SAN

- The hardware requirements are not a part of this documentation.

AnywhereUSB

### AnywhereUSB®

Overview

Specs

Documentation



[Larger View](#)

- Network-enabled USB hub
- Access and monitor USB peripheral devices over TCP/IP network
- Works with existing POS or other application software
- [Live video feed with Watchport®/V](#)

AnywhereUSB is a network-enabled USB hub. It is the first remote networking solution to utilize [RealPort® USB](#), Digi's patented USB Over IP® technology, making it easy to connect USB devices anywhere on a wired or wireless LAN, while eliminating the need for locally-attached host PCs.

AnywhereUSB/5 provides five USB ports, which deliver the same Plug and Play user experience as onboard USB ports. Software drivers are loaded onto a host PC or server, enabling remote devices to communicate with the host, without changing existing application software. Peripheral devices can be centrally managed and monitored from a remote server or PC via an IP address.

AnywhereUSB is compatible with bulk or interrupt type\* USB devices such as bar-code scanners, printers, fingerprint scanners, mice, pole displays, card readers, USB flash drives and more. [Watchport®/V2](#) USB camera (click [here](#) to see a live video feed), [Watchport® sensors](#) and [Edgeport®](#) USB-to-serial converters are also fully compatible with AnywhereUSB.

- Switches
- 1 Gbit/s bandwidth minimum for HA-300, smart switches with spanning tree protocol (STP) capability.
  - 10 Gbit/s bandwidth in case of HA-500 due to the requirements of the Fault Tolerant module.

Cabling standard	Standard	Ethernet Gigabit
	HA-300	Ethernet Gigabit
	HA-500	FibreChannel infrastructure or equivalent providing at least 10 Gbit/s bandwidth

### Software license requirements

Standard

Supplier	Product	Type	Quant.
Microsoft	Windows Server	Windows Server 2012 R2	1

HA-300

Supplier	Product	Type	Quant.
Microsoft	Windows Server	Windows Server 2012 R2(OS for Desigo Insight VM)	2 <sup>1</sup>
Microsoft	Windows Server	Windows Server 2008 R2 SP1 or newer (OS for vCenter Server 6.0) <sup>2</sup>	1
VMware	vSphere 6.0	Essentials Plus	1 (for 3 hosts)

HA-500

Supplier	Product	Type	Quant.
Microsoft	Windows Server	Windows Server 2012 R2 (OS for Desigo Insight VM)	2 <sup>1</sup>
Microsoft	Windows Server	Windows Server 2008 R2 SP1 or newer (OS for vCenter Server 6.0) <sup>2</sup>	1
VMware	vSphere 6.0	Standard	2 (for 2 hosts)
VMware	vSphere 6.0	vCenter Server Foundation (max. 3 hosts)	1

<sup>1</sup> Be sure that the amount of licenses does not violate the license requirements of Microsoft! It is recommended to contact a Microsoft representative to check the required amount of licenses for virtualized environments.

<sup>2</sup> This license is not required in case that the vCenter Server Appliance is used. Contact your local VMware reseller for details.

### Ordering

#### VMware

The following VMware software is required for the HA-300 and HA-500 solutions. Click the link below to find a local partner:

[http://www.vmware.com/company/office\\_locations.html](http://www.vmware.com/company/office_locations.html)

#### AnywhereUSB

The HA-300 and HA-500 solutions require the network-enabled USB hub AnywhereUSB from Digi International, Inc. Click the link below to find a local partner:

<http://www.digi.com/>

## Server hardware

The appropriate hardware is required in each case for the for the Standard, HA-300 and HA-500 solutions. Click the link below to find a local sales partner for Fujitsu (optional):

<http://www.fujitsu.com/global/>

## Costs

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List prices	All prices are recommended prices for the respective suppliers and are non-binding and subject to availability and change.
Desigo Insight	<p>The Standard solution requires no additional delivery from I BT CPS other than the standard Desigo Insight. A redundant license to the standard Desigo Insight license with a second dongle for the plant is required for the HA-300 and HA-500 solutions. It is invoiced at a flat rate. Please contact the responsible Desigo Insight Product Manager.</p> <p>To obtain the Microsoft Windows Powershell script required to monitor Desigo Insight heartbeat, contact Head Quarters CPS Customer Support in Zug.</p>
VMware licensing model	For details including support contract costs, see the VMware site at <a href="http://www.vmware.com/products/vsphere/pricing.html">http://www.vmware.com/products/vsphere/pricing.html</a>

### **Required for both HA-300 and HA-500 solution: the vCenter Server**

VMware vCenter Server Foundation gives users all the benefits of Virtual Center designed to serve the needs of a midmarket or smaller infrastructure wanting to manage 3 or fewer physical servers. The vCenter Server is already included in the vSphere 6.0 Essentials Plus bundle (HA300), but must be ordered separately for HA500:

- Provision, monitor and manage your virtualized environment through a single interface
- Optimize resources, ensure high availability to all applications in virtual machines

### **Required vSphere functionalities for the HA-300 solution:**

- VMware vSphere 6.0
- VMware Symmetric Multi Processing (vSMP)
- VMware vCenter Server Agent.
- VMware Consolidated Backup.
- VMware Update Manager.
- VMware High Availability (HA).

### **Required vSphere functionalities for the HA-500 solution:**

- VMware vSphere 6.0
- VMware vCenter Server Agent
- VMware Virtual Symmetric Multi-Processing (vSMP)
- VMware Update Manager (Guest and Host)
- VMware VMotion + Storage VMotion
- VMware High Availability (HA)
- VMware Fault Tolerant module (FT)

## Notes