



# IBM System Storage SAN Volume Controller Storage Engine enhancements include improved performance capabilities and support optional solid-state devices

## Table of contents

<a href="#">1 Overview</a>	<a href="#">8 Publications</a>
<a href="#">2 Key prerequisites</a>	<a href="#">10 Technical information</a>
<a href="#">2 Planned availability date</a>	<a href="#">15 Terms and conditions</a>
<a href="#">2 Description</a>	<a href="#">17 Prices</a>
<a href="#">7 Product number</a>	<a href="#">20 Order now</a>

## At a glance

For enterprises seeking to improve the cost effectiveness, flexibility, productivity, and availability of their storage infrastructure, the IBM® System Storage™ SAN Volume Controller (2145-CF8) provides a combined hardware and software storage virtualization system designed to centralize and consistently manage and operate heterogeneous storage environments.

The SVC Solution can help:

- Simplify storage infrastructures and reduce costs by combining the capacity from multiple disk storage systems into pools, which are more simply managed from a central point.
- Get more out of existing storage assets by improving utilization, automating, provisioning, and by making storage more accessible to host applications.
- Improve administrator productivity.
- Avoid storage-related causes of application downtime, including data migrations.

The new IBM System Storage SAN Volume Controller Storage Engine can help improve throughput 1.5-2x compared to earlier versions, adds 8 Gbps FC support, triples cache size to 24 GB per engine, and adds integrated support for solid-state devices.

This solution includes a Common Information Model (CIM) Agent, enabling unified storage management based on open standards for units that comply with CIM Agent standards.

For ordering, contact your IBM representative, an IBM Business Partner, or IBM Americas Call Centers at 800-IBM-CALL (Reference: YE001).

## Overview

The IBM System Storage SAN Volume Controller Storage Engine (machine type 2145 Model CF8) is the hardware component of the IBM System Storage SAN Volume Controller. The components of the SAN Volume Controller (SVC) solution include highly specialized software, storage engines installed in pairs, and power connection equipment such as Uninterruptible Power Supply (UPS).

The SAN Volume Controller's storage engine is based on the IBM System x3550M2 hardware platform. With four 8 Gbps Fibre Channel ports and 24 GB of cache in each

engine, it is designed to provide substantially improved performance and scalability compared with prior SVC engines.

The IBM System Storage SAN Volume Controller Storage Engine now provides scale-out high performance solid-state device support with the ability to have up to four solid-state devices installed directly into each SVC hardware engine.

Another enhancements features two power supply units (PSUs) standard on the IBM System Storage SAN Volume Controller Storage Engine to support dual power inputs to the SVC Storage Engine.

### **Feature exchange**

None

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## **Key prerequisites**

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The full interoperability matrix for SAN Volume Controller solution is available at

<http://www.ibm.com/storage/support/2145>

The IBM System Storage SAN Volume Controller Storage Software must be ordered separately. For additional details, refer to Software Announcement [209-261](#), dated October 20, 2009.

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## **Planned availability date**

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November 6, 2009

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## **Description**

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The IBM System Storage SAN Volume Controller Solution is designed to incorporate specialized software, storage engines SVC Storage Engines installed in pairs, a System Storage Productivity Center console or hardware master console, and UPSs. The IBM System Storage SAN Volume Controller hardware configuration consists of a cluster of IBM 2145 servers, called SVC Storage Engines. Each SVC Storage Engine is a node; two nodes make up a node pair (I/O Group); up to four I/O Groups constitute a SAN Volume Controller cluster. The cluster is scalable from one to four node pairs (I/O Groups), and is supported by dual read/write cache. This design is intended to avoid single points of failure and support concurrent maintenance.

### **IBM System Storage SAN Volume Controller Storage Engine (2145-CF8)**

IBM System Storage SAN Volume Controller Storage Engine is based on the IBM System x3550 M2, has an Intel® Core Xeon® 5500 Series quad-core processor, two power supply units (PSUs), 24 GB of cache, and four 8 Gbps Fibre Channel host bus adapter (HBA) ports for attachment to the SAN. The IBM System Storage SAN Volume Controller Storage Engine Model CF8 auto-negotiates the fabric speed on a per-port basis and is not restricted to run at the same speed as other node pairs in the cluster.

The IBM System Storage SAN Volume Controller Storage Engine can be added in pairs to an existing cluster of Model 8F2, Model 8F4, Model 8G4, Model 8A4, or Model CF8 engines up to the maximum of four node pairs. Because the IBM System Storage SAN Volume Controller Storage Engine Model 4F2 cannot run SVC V5 software that comes preloaded on the IBM System Storage SAN Volume Controller Storage Engine Model CF8, a unique procedure is required to migrate from the Model 4F2 to the Model CF8 in an existing cluster. Refer to the support Web page and SVC documentation for details

<http://www.ibm.com/storage/support/2145>

One UPS - single (#8115) must also be ordered for each SVC Storage Engine.

The SVC Storage Engine is shipped with preloaded SVC Storage Software V5.1.0 (ordered separately). The IBM System Storage SAN Volume Controller hardware will not be shipped without a companion order for the software. For a description of the software and ordering procedures, refer to Software Announcement [209-261](#), dated October 20, 2009.

The storage engines must be installed in pairs to enable load sharing and failover protection. Four optical fiber cables are required by each engine in the cluster for connection to the Fibre Channel switches in the SAN. These cables are not provided as part of the engine, but may be ordered by feature number.

Each SVC Storage engine has two Ethernet ports for connection via Ethernet LAN to the System Storage Productivity Center or master console that provides configuration and error reporting, or for other functions as designated. These connections need to be aggregated through an Ethernet hub or switch. The Ethernet hub or switch and cabling are not included as part of the SAN Volume Controller.

IBM System Storage SAN Volume Controller Storage Engine Model CF8 engines can replace all earlier models of the SVC Storage Engines in a cluster without disrupting applications running on the host. If replacing a Model 4F2 engine (32-bit hardware), unique procedures are required to perform the migration. Refer to the support Web page and SVC documentation for details

<http://www.ibm.com/storage/support/2145>

To have the new nodes replace existing nodes in an existing configuration, you must order feature number 3905 for one, and only one, of the replacement nodes that are being ordered. Feature number 3905 directs the service representative to remove the old nodes from the existing rack.

## **SVC V5.1 software capabilities with IBM System Storage SAN Volume**

### **Controller Storage Engine 2145-CF8 hardware engine**

With the option to use 8 Gbps LW SFPs in the IBM System Storage SAN Volume Controller Storage Engine 2145-CF8, SVC V5.1 introduces the ability to split a SVC I/O group across long distances. Careful attention should be paid to the LW SFP hardware you use in the IBM System Storage SAN Volume Controller Storage Engine to ensure it matches the supported LW SFPs, and that your SAN meets documented requirements before implementing such a configuration. Refer to the support Web page and SVC documentation for details

<http://www.ibm.com/storage/support/2145>

### **System Storage Productivity Center**

IBM System Storage Productivity Center, must be ordered via AAS regardless of whether SVC V5 is ordered via AAS or Passport Advantage®.

### **Code preload**

#### ***Storage Engine Preload (#0010)***

This feature provides the required IBM System Storage SAN Volume Controller Storage Software that must be preloaded by IBM on the SVC Storage Engine. It must be included with each SVC Storage Engine ordered. This feature is plant-installed only.

### ***Storage Engine Preload PA (#0017)***

Specifies that the software order be fulfilled via Passport Advantage. This feature must be included in the order for the first SVC Storage Engine ordered for a cluster (#3001), unless the software order is to be fulfilled via AAS (#0018). The order for SVC Storage Software V5 must be placed separately via Passport Advantage. This feature is plant-installed only and is mutually exclusive of feature numbers 0018 and 0019.

### ***Storage Engine Preload AAS (#0018)***

Specifies that the software order be fulfilled via AAS. This feature must be included in the order for the first SVC Storage Engine ordered for a cluster (#3001), unless the software order is to be fulfilled via Passport Advantage (#0017). The order for SVC Storage Software V5 must be placed separately via AAS. This feature is plant-installed only and is mutually exclusive of feature numbers 0017 and 0019.

### ***Site secondary cluster (#0019)***

This feature is for administrative purposes only and specifies that the order for a new cluster is not for the first cluster to be installed at the customer site; it specifies that this is for a subsequent cluster to be installed at the same site. Specifying feature number 0019 will verify that no software is to be ordered; that is, that a software license is already in effect for a cluster installed at the customer site. This feature is plant-installed only and is mutually exclusive of feature numbers 0017 and 0018.

## **Miscellaneous features**

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### ***JEMT Indicator (#0021)***

This feature is used to indicate an IBM internal order for machine under the Joint Engineering Manufacturing Test (JEMT) program. It is for administrative purposes only.

### ***STG Lab Services (#1888)***

This feature provides one day of Storage and Technology custom services and consulting. The STG Lab Services team must be contacted by the IBM account team, prior to placing the order for this feature, to allow the work to be completed by these services to be sized. STG Lab Services can be contacted at

[http://www.ibm.com/systems/services/labservices/labservices\\_storage.html](http://www.ibm.com/systems/services/labservices/labservices_storage.html)

Based on the sizing, this feature must be ordered in a quantity equal to the number of days estimated in the sizing.

## **Engines**

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### ***Initial Storage Engine (#3001)***

Feature number 3001 is used to indicate the first SVC Storage Engine of a new SAN Volume Controller cluster. It must be included for one, and only one, SVC Storage Engine in a new cluster order. An order for the SVC Storage Software V5 (5639-VC5 or 5639-VW2) must be placed when feature number 3001 is ordered. This feature also provides the publications included with the first SVC Storage Engine in the cluster. This feature is plant installed only.

### ***Additional Storage Engine (#3002)***

Feature number 3002 is used to indicate all additional SVC Storage Engines of a SAN Volume Controller cluster and for all SVC Storage Engines to be added to an existing (already installed) SAN Volume Controller cluster. When ordered as part of a new cluster, the number must be an odd number (1, 3, 5, or 7); when ordered to add

to an existing cluster, the number must be even (2, 4, or 6). This feature is plant installed only.

### ***SVC engine removal (#3905)***

Feature number 3905 indicates that installed engines are to be removed from the rack by an IBM service representative. This feature should be specified only for an engine that is intended to replace a currently installed engine. The feature may be specified for only one replacement engine per order of replacements.

### ***Solid-State Device Attachment (#4500)***

This is an optional feature that is required if you are installing one or more 146 GB solid-state devices (#4601) on the IBM System Storage SAN Volume Controller Storage Engine Mode CF8. The Solid-State Device Attachment consists of a SAS adapter, and an internal connector cable, all installed on the Model CF8 hardware engine. Only one Solid-State Device Attachment feature (#4500) can be installed per Model CF8 engine. This feature is both plant- and field-installed.

### ***146 GB Solid-State Device (#4601)***

This is an optional feature to install 146 GB solid state devices directly on the IBM System Storage SAN Volume Controller Storage Engine Model CF8 hardware engine. The Solid-State Device Attachment feature (#4500) must be ordered with one or more 146 GB Solid-State Devices (#4601). Up to a quantity of four of this feature code number 4601 can be ordered per Model CF8 hardware engine, and for data protection it is advised that they be ordered in the same quantity for each Model CF8 engine in a node pair. For example, if you are ordering a 4-node cluster, but you want to have 146 GB solid state capacity too, you should order two 146 GB Solid-State Device features (#4601), one on each of two nodes in that 4-node cluster. Another example is if you wish to configure 292 GB usable capacity on an SVC 4-node cluster. Two of the nodes can be ordered without feature numbers 4500 and 4601. Each of the other two nodes in the cluster should be configured with quantity equal to one of feature number 4500 and quantity equal to two of feature number 4601. These nodes should be paired together when configuring the SVC cluster so that the solid-state devices are mirrored for data protection. To maximize usable SSD capacity, you may optionally mirror the solid-state devices to other storage managed by the SVC that is not necessarily on solid-state devices. This approach is only suggested for workloads with primarily read I/Os since write I/O performance will be dependent on the non-SSD storage. In any case, mirroring the solid-state devices is strongly advised for data protection.

Refer to the support Web page and SVC documentation for details

<http://www.ibm.com/storage/support/2145>

This feature is both plant- and field-installed.

## **Cables, interfaces, and power**

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### ***5 m Fiber Optic Cable LC-LC (#5305)***

This feature provides one 5-meter, fiber optic cable with LC connectors on each end. Four of this feature may be ordered with each SVC Storage Engine. This feature is both plant and field ordered but customer-installed.

### ***25 m Fiber Opt Cable LC-LC (#5325)***

This feature provides one 25-meter, fiber optic cable with LC connectors on each end. Four of this feature may be ordered with each SVC Storage Engine. This feature is both plant and field ordered but customer-installed.

### **8 Gpbs LW SFP (#5608)**

SVC V5.1 introduces the ability to split a SVC I/O group across long distances. The 8 Gpbs LW SFP feature number 5608 is currently the only supported hardware for use in these configurations. Your SAN must also meet documented requirements before implementing such a configuration. Refer to the support Web page and SVC documentation for details

<http://www.ibm.com/storage/support/2145>

This feature is both plant and field ordered but customer-installed.

### **Uninterruptible Power Supply (UPS) (#8115)**

In the event of a power failure, the UPS can provide temporary power while the contents of the SAN Volume Controller cache and cluster information is written to the internal disk drive of each node of the SAN Volume Controller.

The UPS monitors the condition of its battery to enable planned maintenance actions to be performed. Each UPS provides an independent source of power to the node to which it is connected. It must not be used for any other purpose.

The UPS - single feature (#8115) provides one UPS for one SVC Storage Engine of the IBM System Storage SAN Volume Controller cluster. One UPS - single (#8115) must be ordered for each engine of a cluster, both for the initial engine (#3001) and for additional engines (#3002). Note that the UPS that is feature number 8115 of a previous SVC Storage Engine model (for example, 2145-8F4) is not compatible for use in place of the UPS that is feature number 8115 of the current SVC Storage Engine model (2145-CF8).

Each UPS - single (#8115) requires a 200 - 240 V, minimum 5 amp power source; the UPS - single (#8115) is protected by its own 10 amp circuit breaker. UPSs of a node pair (I/O group) should be connected to separate circuits to provide added redundancy.

A power cord to connect the UPS to a standard PDU ships standard with the UPS. A country-specific power cord to connect to an alternate power source must also be ordered with the UPS.

This feature may be mixed with UPS feature number 8100 in a SAN Volume Controller configuration only for configurations running SVC Storage Software V2, or later. For configurations running SVC Software V1, UPS feature number 8100 must be used; V1 does not support feature number 8115.

For clusters of two or six engines, the use of UPS - single (#8115) may result in a lower-price solution. UPS feature number 8100 supported up to four nodes.

This feature is both plant- and field-installed.

### **Redundant AC Power (#8300)**

This is an optional feature that is designed to enhance reliability by accepting power from two separate circuits. Each Redundant AC Power switch can be used to supply power to one or two SVC UPSs (#8115). The preferred configuration is one Redundant AC Power switch for each SVC UPS (each SVC storage engine). If two SVC UPSs are powered by a single Redundant AC Power switch, the two nodes must not be in the same I/O group. In the event of the failure of either of the input circuits, power continues to be provided to the SVC UPS by the redundant circuit.

This feature is designed to provide power to UPS feature number 8115 only; it must not be used for any other purpose.

Each of the two power sources are required to be 200 - 240 V, minimum 5 amp, 50/60 Hz, single phase, and to have IEC320-C19 type outlets. The power cable

(cord), between the Redundant AC Power switch and each connected SVC UPS, is rated at 10 amps.

Each input circuit for the Redundant AC Power switch must be protected by a circuit breaker with maximum rating of 16 amps. Where the Redundant AC Power switch is used to supply a single UPS, a circuit breaker with a minimum rating of 5 amps is required; if two UPSs are being powered then a breaker with a minimum rating of 7 amps is required.

Power cords to connect the redundant ac power switch to a standard PDU ships standard with the switch. The redundant ac power switch connects to a rack PDU only. There are no separate country-specific power cords for the switch.

This optional feature is both plant- and field-installable.

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## Accessibility by people with disabilities

### For hardware offerings

The following features support use by people with disabilities:

- Controls and latches are operable with one hand and minimal dexterity.
- The keys on the panel are tactilely discernible without activating them.

A U.S. Section 508 Voluntary Product Accessibility Template (VPAT) containing details on accessibility compliance can be requested at

[http://www.ibm.com/able/product\\_accessibility/index.html](http://www.ibm.com/able/product_accessibility/index.html)

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## Business Partner information

If you are a Direct Reseller - System Reseller acquiring products from IBM, you may link directly to Business Partner information for this announcement. A PartnerWorld® ID and password are required (use IBM ID).

<https://www.ibm.com/partnerworld/mem/sla.jsp?num=109-536>

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## Reference information

For more information on the SAN Volume Controller V5 software that is preloaded on the 2145-CF8, refer to Software Announcement [209-261](#), dated October 20, 2009.

For IBM System Storage Productivity Center ordering information, refer to [109-730](#), dated October 20, 2009.

For IBM statement on compliance with European Union Directive on Restriction of the use of certain Hazardous Substances in Electrical and Electronic Equipment (2002/95/EC) (RoHS), visit

<http://www.ibm.com/ibm/environment>

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## Product number

Description	Machine Model	Feature	Plant/ Field	CSU
SVC Storage Engine	2145	CF8		
Storage Engine Preload	2145	CF8	0010	Plant No
Storage Engine Preload PA	2145	CF8	0017	Plant No
Storage Engine Preload AAS	2145	CF8	0018	Plant No
Site secondary HW cluster	2145	CF8	0019	Plant No
JEMT Indicator	2145	CF8	0021	Plant No

STG Lab Services	2145	CF8	1888	Both	No
Initial Storage Engine	2145	CF8	3001	Plant	No
Additional Storage Engine	2145	CF8	3002	Plant	No
SVC engine removal	2145	CF8	3905	Both	No
Solid-State Device Attachment	2145	CF8	4500	Both	No
146GB Solid-State Device	2145	CF8	4601	Both	No
5 m Fiber Optic Cable LC-LC	2145	CF8	5305	Both	Yes
25 m Fiber Opt Cable LC-LC	2145	CF8	5325	Both	Yes
IBM 8Gbps LW SFP	2145	CF8	5608	Both	Yes
UPS - Single	2145	CF8	8115	Both	No
Redundant AC Power	2145	CF8	8300	Both	No

UPS (#8115) POWER (LINE) CORDS:

UPS-8115 Power Cord (#1) U.S. 250v/10A 6 ft	2145	CF8	9714	Both	No
UPS-8115 Power Cord (#2) US/Japan/S.America 9 ft	2145	CF8	9715	Both	No
UPS-8115 Power Cord (#3) Eur,Mid-East,Africa	2145	CF8	9716	Both	No
UPS-8115 Power Cord (#4) Austral,N.Z.	2145	CF8	9717	Both	No
UPS-8115 Power Cord (#5) Eur,Africa	2145	CF8	9718	Both	No
UPS-8115 Power Cord (#6) Eur,Den	2145	CF8	9719	Both	No
UPS-8115 Power Cord (#7) Pakistan,S.Africa	2145	CF8	9720	Both	No
UPS-8115 Power Cord (#8) Switz,Liechtenstein	2145	CF8	9721	Both	No
UPS-8115 Power Cord (#9) Chile,Italy,Ethiopia	2145	CF8	9722	Both	No
UPS-8115 Power Cord (#10) Israel	2145	CF8	9723	Both	No
UPS-8115 Power Cord (#11) Thailand	2145	CF8	9724	Both	No
UPS-8115 Power Cord (#12) Argentina	2145	CF8	9725	Both	No
UPS-8115 Power Cord (#13) China	2145	CF8	9726	Both	No
UPS-8115 Power Cord (#14) Taiwan	2145	CF8	9727	Both	No

CSU = Customer setup

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## Education support

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Courses regarding SAN Volume Controller planning, usage, and benefits can be found at

<http://www.ibm.com/training/global>

Search on coursecode = SN82G or coursecode = SN83G or select your country/region, then search on course code.

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## Publications

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The following publications are shipped as hardcopy with the product.

Title	Order number
IBM System Storage SAN Volume Controller Model 2145-CF8 Hardware Installation Guide	GC52-1356
IBM System Storage SAN Volume Controller Hardware Maintenance Guide	GC27-2226

IBM System Storage SAN Volume Controller Troubleshooting Guide	GC27-2227
IBM System Storage SAN Volume Controller Software Installation and Configuration Guide	SC23-6628
IBM System Storage SAN Volume Controller Read First	GC26-7951
IBM Systems Safety Notices	G229-9054
IBM System Storage SAN Volume Controller Customer Documentation (CD containing all documentation)	SK5T-8802

Additional copies of the above listed publications will be available on November 6, 2009.

You can use the following options to order or download additional copies.

- To view online information and link to a download site, visit the IBM SAN Volume Controller Information Center at  
<http://publib.boulder.ibm.com/infocenter/svcic/v3r1m0/index.jsp>

### **THE IBM Publications Center**

Hardcopy of selected SAN Volume Controller publications are available for a fee from the IBM Publications Center, as well as free softcopy publications. The Publications Center is a worldwide central repository for IBM product publications and marketing material with a catalog of 70,000 items. Extensive search facilities are provided. Payment options for orders are via credit card or customer number. A large number of publications are available online in various file formats, and they can all be downloaded free of charge.

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<http://www.ibm.com/shop/publications/order>
- To directly download publications in PDF format, visit the IBM product support Web site  
<http://www.ibm.com/storage/support/2145>
- Call the Publications Support Group at 800-879-2755, and select option 1.
- Contact your IBM representative

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## **Services**

### **Global Technology Services**

IBM services include business consulting, outsourcing, hosting services, applications, and other technology management.

These services help you learn about, plan, install, manage, or optimize your IT infrastructure to be an On Demand Business. They can help you integrate your high-speed networks, storage systems, application servers, wireless protocols, and an array of platforms, middleware, and communications software for IBM and many non-IBM offerings. IBM is your one-stop shop for IT support needs.

For details on available services, contact your IBM representative or visit

<http://www.ibm.com/services/>

For details on available IBM Business Continuity and Recovery Services, contact your IBM representative or visit

<http://www.ibm.com/services/continuity>

For details on education offerings related to specific products, visit

<http://www.ibm.com/services/learning/index.html>

Select your country, and then select the product as the category.

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## Technical information

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### Specified operating environment

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#### *Physical specifications*

##### **SVC Storage Engine**

- Width: 440 mm (17.3 in)
- Depth: 737 mm (29 in)
- Height: 43 mm (1.7 in)
- Weight: 14.0 kg (30.3 lb)

##### **UPS - single (#8115)**

- Width: 440 mm (17.3 in)
- Depth: 578 mm (22.8 in)
- Height: 44 mm (1.73 in)
- Weight: 19 kg (42 lb)

**Note:** These dimensions represent a single UPS.

##### **Redundant AC Power (#8300)**

- Width: 192 mm (7.6 in)
- Depth: 221 mm (8.7 in)
- Height: 44.5 mm (1.75 in)
- Weight: 2.6 kg (5.7 lb)

To assure installability and serviceability in non-IBM industry-standard racks, review the installation planning information for any product specific installation requirements.

#### **Operating environment**

##### **SVC Storage Engine**

- Temperature (operating)
  - 10° to 35° C (50° to 95° F) at 0 to 914 m (0 to 3,000 ft)
  - 10° to 32° C (50° to 90° F) at 914 to 2,133 m (3,000 to 7,000 ft)
- Temperature (powered off):
  - 10° to 43° C (50° to 109° F)
- Temperature (storage):
  - 1° to 60° C (34° to 140° F) at 0 to 2,133 m (0 to 7,000 ft)
- Temperature (shipping):
  - -20° to 60° C (-4° to 140° F) at 0 to 10,668 m (0 to 35,000 ft)

- Electrical power: 200 - 240 V ac, 3.8 A, 50/60 Hz
- Relative humidity (operating and powered off): 8% to 80%
- Relative humidity (storage): 5% to 80%
- Relative humidity (shipping): 5% to 100% (including condensation but excluding rain)
- Wet bulb
  - Wet bulb (operating temp): 23° C
  - Wet bulb (powered off temp): 27° C
  - Wet bulb (storage and shipping temp): 29° C
- Noise level: 6.5 bels LwAd - when operating in a 2146 system rack

**Note:** The noise emission level stated is the declared (upper limit) sound power level, in bels, for a random sample of machines. All measurements are made in accordance with ISO 7779 and reported in conformance with ISO 9296.

### **UPS - single (#8115)**

**Note:** The specifications for the UPS are taken from specifications provided by the manufacturer; they are presented for reference only. For use in the SAN Volume Controller environment, the UPS has been programmed to shut down outside of the range of 200 - 240 V.

- Temperature (operating)
  - 0° to 40° C (32° to 104° F) at 0 to 1,500 m (0 to 4,921 ft) above sea level
- Temperature (operating)
  - 0° to 35° C (32° to 95° F) at 1,500 to 3,000 m (4,921 to 9,842 ft) above sea level
- Temperature (powered off)
  - 0° to 40° C (32° to 104° F) at 0 to 1,500 m (0 to 4,921 ft) above sea level
- Temperature (storage and shipping)
  - -15° to +55° C (5° to 131° F) at 0 to 1,500 m (0 to 4,921 ft) above sea level
- Relative humidity (operating and powered off)
  - 5% to 95%
- Relative humidity (storage)
  - 5% to 95%
- Relative humidity (shipping)
  - 5% to 95% (noncondensing)
- Wet bulb
  - Wet bulb (operating temp): 23° C
  - Wet bulb (powered off temp): 27° C
  - Wet bulb (storage and shipping temp): 29° C
- Noise level
  - 5.2 bels LwAd - Declared (upper limit) A-weighted sound power level 36 dB A-weighted sound pressure level (bystander positions).

**Note:** The noise emission levels are reported in conformance with ISO 9296 with measurements made according to ISO 7779.

### **Redundant AC Power (#8300)**

- Temperature (operating)
  - 15° to 32° C (59° to 90° F) at 0 to 2133 m (0 to 7,000 ft)
- Relative humidity (operating and powered off)
  - 20% to 80%

- Temperature (powered off): 10° to 43° C (50° to 109° F)
- Temperature (storage): 1° to 60° C (34° to 140° F) at 0 to 2,133 m (0 to 7,000 ft)
- Temperature (shipping): -20° to 60° C (-4° to 140° F) at 0 to 10,668 m (0 to 35,000 ft)
- Relative humidity (storage): 5% to 80%
- Relative humidity (shipping): 5% to 100% (including condensation but excluding rain)
- Wet bulb
  - Wet bulb (operating temp): 23° C
  - Wet bulb (powered off temp): 27° C
  - Wet bulb (storage and shipping temp): 29° C
- Electrical power: 200 - 240 V ac, 10 A, 50/60 Hz

### **Hardware requirements**

#### **UPS - single (#8115) requirements**

Each UPS - single (#8115) in the cluster must be provided a single-phase 200 - 240 volt, minimum 5 amp, 50 or 60 Hz power source. It is not required, but recommended that the UPS for each node of a node pair be on a separate, independent, circuit to provide added redundancy in the system structure.

A power cord to connect the UPS (#8115) to a standard PDU ships standard with the UPS.

In addition, a country-specific power cord must be specified by feature number for connection to wall-type outlets should the rack not have a compatible PDU or if the PDU has wall-type outlets. One of the following power cord specify features is required to connect the UPS to the alternate power source.

Each power cord feature provides one country-specific power cord. Countries supported by these features include:

- UPS-8115 Power Cord (#1) (#9714)
  - Provides power cords for U.S., Canada, Mexico, others.
  - Six feet (1.8 m), unshielded, rated 250 V/15 A.
  - Attached plug (NEMA L6-15P) designed for 200 - 240 V ac input.
  - Part number: 39M5115
- UPS-8115 Power Cord (#2) (#9715)
  - Provides power cords for U.S., Bahamas, Barbados, Bermuda, Bolivia, Brazil, Canada, Cayman Islands, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Japan, Korea (South), Liberia, Mexico, N. Antilles, Nicaragua, Panama, Peru, Philippines, Saudi Arabia, Suriname, Taiwan, Trinidad, Venezuela.
  - Nine feet (2.8 m), unshielded, rated 250 V/15 A.
  - Attached plug (NEMA L6-15P) designed for 200 - 240 V ac input.
  - Part number: 39M5116
- UPS-8115 Power Cord (#3) (#9716)
  - Provides power cords for Antigua, Bahrain, Brunei, Channel Islands, China (Hong Kong S.A.R.), Cyprus, Dubai, Figi, Ghana, India, Iraq, Ireland, Kenya, Kuwait, Malawi, Malaysia, Malta, Nepal, Nigeria, Polynesia, Qatar, Sierra Leone, Singapore, Tanzania, Uganda, UK, Yemen, Zambia.
  - Nine feet (2.8 m), unshielded, rated 250 V/10 A.
  - Attached plug (BS 1363/A) designed for 200 - 240 V ac input.
  - Part number: 39M5151
- UPS-8115 Power Cord (#4) (#9717)

- Provides power cords for Argentina, Australia, China (PRC), New Zealand, Papua New Guinea, Paraguay, Uruguay, Western Samoa.
- Nine feet (2.8 m), unshielded, rated 250 V/10 A.
- Attached plug (AS/NZS C112) designed for 200 - 240 V ac input.
- Part number: 39M5102
- UPS-8115 Power Cord (#5) (#9718)
  - Provides power cords for Afghanistan, Albania, Algeria, Andorra, Angola, Austria, Belgium, Benin, Bulgaria, Burkina Faso, Burundi, Cameroon, Central African Rep., Chad, China (Macau S.A.R.), Czech Republic, Egypt, Finland, France, French Guiana, Germany, Greece, Guinea, Hungary, Iceland, Indonesia, Iran, Ivory Coast, Jordan, Lebanon, Luxembourg, Malagasy, Mali, Martinique, Mauritania, Mauritius, Monaco, Morocco, Mozambique, Netherlands, New Caledonia, Niger, Norway, Poland, Portugal, Romania, Senegal, Slovakia, Spain, Sudan, Sweden, Syria, Togo, Tunisia, Turkey, former USSR, Vietnam, former Yugoslavia, Zaire, Zimbabwe.
  - Nine feet (2.8 m), unshielded, rated 250 V/10 A.
  - Attached plug (CEE 7-VII) designed for 200 - 240 V ac input.
  - Part number: 39M5123
- UPS-8115 Power Cord (#6) (#9719)
  - Provides power cords for Denmark.
  - Nine feet (2.8 m), unshielded, rated 250 V/10 A.
  - Attached plug (DK2-5a) designed for 200 - 240 V ac input.
  - Part number: 39M5130
- UPS-8115 Power Cord (#7) (#9720)
  - Provides power cords for Bangladesh, Burma, Pakistan, South Africa, Sri Lanka.
  - Nine feet (2.8 m), unshielded, rated 250 V/10 A.
  - Attached plug (SABS 164) designed for 200 - 240 V ac input.
  - Part number: 39M5144
- UPS-8115 Power Cord (#8) (#9721)
  - Provides power cords for Switzerland, Liechtenstein.
  - Nine feet (2.8 m), unshielded, rated 250 V/10 A.
  - Attached plug (1011-S2450 7) designed for 200 - 240 V ac input.
  - Part number: 39M5158
- UPS-8115 Power Cord (#9) (#9722)
  - Provides power cords for Chile, Ethiopia, Italy, Libya, Somalia.
  - Nine feet (2.8 m), unshielded, rated 250 V/10 A.
  - Attached plug (CEI 23-16) designed for 200 - 240 V ac input.
  - Part number: 39M5165
- UPS-8115 Power Cord (#10) (#9723)
  - Provides power cords for Israel.
  - Nine feet (2.8 m), unshielded, rated 250 V/10 A.
  - Attached plug (SI 32) designed for 200 - 240 V ac input.
  - Part number: 39M5172
- UPS-8115 Power Cord (#11) (#9724)
  - Provides power cords for Thailand.
  - Nine feet (2.8 m), unshielded, rated 250 V/10 A.
  - Attached plug (NEMA 6-15P) designed for 200 - 240 V ac input.
  - Part number: 39M5095
- UPS-8115 Power Cord (#12) (#9725)
  - Provides power cords for Argentina.

- Nine feet (2.8 m), unshielded, rated 250 V/10 A.
- Attached plug (IRSM 2073) designed for 200 - 240 V ac input.
- Part number: 39M5068
- UPS-8115 Power Cord (#13) (#9726)
  - Provides power cords for China.
  - Nine feet (2.8 m), unshielded, rated 250 V/6 A.
  - Attached plug (GB 2099.1) designed for 200 - 240 V ac input.
  - Part number: 39M5206
- UPS 8115 Power Cord (#14) (#9727)
  - Provides power cords for Taiwan.
  - Nine feet (2.8 m), unshielded, rated 250 V/10 A
  - Attached plug (CNS 10917-3) designed for 200 - 240 V ac input
  - Part number: 39M5254

### **Ethernet connection**

Every IBM System Storage SAN Volume Controller must be connected via Ethernet to a System Storage Productivity Center or master console. Multiple clusters can be managed by a single System Storage Productivity Center or master console. Therefore, at least the first cluster installed in a SAN must include an SSPC (machine type 2805) or master console.

Fibre Channel and Ethernet cabling is not included as part of the hardware provided by IBM. These are the responsibility of the customer. Each SVC Storage Engine requires four fiber optic cables. Fiber optic cables may be optionally ordered with the SVC Storage Engines by feature number.

### **Software requirements**

The SVC Storage Engines require that SVC Storage Software V5 (5639-VC5 or 5639-VW2), or later, be ordered at the same time the initial order for the engines of a cluster is placed.

The software can be ordered via the AAS ordering system or the Passport Advantage system. The appropriate hardware feature that indicates the desired fulfillment system (#0017 for Passport Advantage, #0018 for AAS) must be included in the hardware order for the initial engine to be installed at a customer location (for 5639-VC5) or to install the initial engine in a cluster for 5639-VW2 (SVC Entry Edition Software). When using or ordering SVC software 5639-VC5, only one software order and license is required for each customer location. For SVC Entry Edition Software (5639-VW2), a software license is required for each SVC cluster.

For additional details, refer to Software Announcement [209-261](#), dated October 20, 2009.

### **Limitations**

The maximum number of SVC Storage Engines supported in a SAN Volume Controller cluster is eight.

For limitations of the IBM System Storage SAN Volume Controller Solution, imposed by the SVC Storage Software, refer to Software Announcement [209-261](#), dated October 20, 2009.

Additional limitations and configuration guidelines may apply, as listed under Configuration Requirements and Guidelines at

<http://www.ibm.com/storage/support/2145>

## Planning information

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### **Customer responsibilities**

One 220 V power source is required for each UPS feature. Use of separate, independent circuits for the power sources for each node of a node pair is recommended to enhance redundancy within the system.

### **Redundant AC Power (#8300)**

Each of the two power sources are required to be 200 - 240 V, minimum 5 amp, 50/60 Hz, single phase, and to have IEC320-C19 type outlets.

Each input circuit for the Redundant AC Power switch must be protected by a circuit breaker with maximum rating of 16 amps. Where the Redundant AC Power switch is used to supply a single UPS, a circuit breaker with a minimum rating of 5 amps is required; if two UPSs are being powered then a breaker with a minimum rating of 7 amps is required.

### **SVC engine removal (#3905)**

The SVC engine removal feature should be considered if the engines being ordered will be installed as replacements for currently installed engines. This feature allows the IBM Customer Engineer to physically remove the old engine from its rack.

You are responsible for downloading or obtaining from IBM, and installing designated Machine Code (microcode, basic input/output system code (called "BIOS"), utility programs, device drivers, and diagnostics delivered with an IBM machine) and other software updates in a timely manner from an IBM Internet Web site or from other electronic media, and following the instructions that IBM provides. You may request IBM to install Machine Code changes; however, you may be charged for that service.

### **Cable orders**

**Cables:** LC-LC fiber optic cables required by the SVC Storage Engines are supplied by the customer. Fiber optic cables can, optionally, be ordered by feature number.

### **Direct customer support**

For technical support or assistance, go to

<http://www.ibm.com/support>

and select appropriate country, or contact your IBM representative for additional assistance.

### **Security, auditability, and control**

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This product uses the security and auditability features of the preloaded application software.

The customer is responsible for evaluation, selection, and implementation of security features, administrative procedures, and appropriate controls in application systems and communications facilities.

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## Terms and conditions

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**Volume orders:** Contact your IBM representative.

### **IBM Global Financing**

Yes

**Warranty period**

One year

**Warranty service**

If required, IBM provides repair or exchange service depending on the types of warranty service specified for the machine. IBM will attempt to resolve your problem over the telephone, or electronically via an IBM Web site. You must follow the problem determination and resolution procedures that IBM specifies. Scheduling of service will depend upon the time of your call and is subject to parts availability.

Service levels are response-time objectives and are not guaranteed. The specified level of warranty service may not be available in all worldwide locations. Additional charges may apply outside IBM's normal service area. Contact your local IBM representative or your reseller for country- and location-specific information.

**On-site Service**

IBM will repair the failing machine at your location and verify its operation. You must provide a suitable working area to allow disassembly and reassembly of the IBM machine. The area must be clean, well lit, and suitable for the purpose.

The service level is 24 hours per day, 7 days a week, same-day response.

- 9 hours per day, Monday through Friday, excluding holidays, next-business-day response
- 9 hours per day, Monday through Friday, excluding holidays, 4-hour average, same-business-day response
- 24 hours per day, 7 days a week, 4-hour average response
- 24 hours per day, 7 days a week, 2-hour average response

**Usage plan machine**

No

**IBM hourly service rate classification**

Four

When a type of service involves the exchange of a machine part, the replacement may not be new, but will be in good working order.

**Field-installable features**

Yes

**Model conversions**

No

**Machine installation**

Installation is performed by IBM. IBM will install the machine in accordance with the IBM installation procedures for the machine. In the United States, contact IBM at 1-800-IBM-SERV (426-7378). In other countries, contact the local IBM office.

The *Machine Installation Guide* specifies site preparation, physical requirements and installation (operating) environment, and any cabling included in the installation along with the approximate installation time in hours. Customer requests for installation of items not covered in the installation guide may be performed at IBM's hourly service rate designated for the machine.

## **Graduated program license charges apply**

No

## **Licensed machine code**

IBM Machine Code is licensed for use by a customer on the IBM machine for which it was provided by IBM under the terms and conditions of the IBM License Agreement for Machine Code, to enable the machine to function in accordance with its specifications, and only for the capacity authorized by IBM and acquired by the customer. You can obtain the agreement at

[http://www.ibm.com/systems/support/machine\\_warranties/](http://www.ibm.com/systems/support/machine_warranties/)

You may also obtain updated code by contacting your IBM representative.

## **Educational allowance**

A reduced charge is available to qualified education customers. The educational allowance may not be added to any other discount or allowance.

The educational allowance is 15% for the products in this announcement.

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## **Prices**

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Description	Machine type	Model number	Feature number
SVC Storage Engine	2145	CF8	
Storage Engine Preload	2145	CF8	0010
Storage Engine Preload PA	2145	CF8	0017
Storage Engine Preload AAS	2145	CF8	0018
Site secondary HW cluster	2145	CF8	0019
JEMT Indicator	2145	CF8	0021
STG Lab Services	2145	CF8	1888
Initial Storage Engine	2145	CF8	3001
Additional Storage Engine	2145	CF8	3002
SVC engine removal	2145	CF8	3905
Solid-State Device Attachment	2145	CF8	4500
146 GB Solid-State Device	2145	CF8	4601
5 m Fiber Optic Cable LC-LC	2145	CF8	5305
25 m Fiber Opt Cable LC-LC	2145	CF8	5325
IBM 8Gbps LW SFP	2145	CF8	5608
UPS - single	2145	CF8	8115
Redundant AC Power	2145	CF8	8300
UPS (#8115) Power Cords:			
UPS-8115 Power Cord (#1) U.S. 250V/10A 6 ft	2145	CF8	9714
UPS-8115 Power Cord (#2) US/Japan/S.America 9 ft	2145	CF8	9715
UPS-8115 Power Cord (#3) Eur, Mid-East, Africa	2145	CF8	9716
UPS-8115 Power Cord (#4) Austral, N.Z.	2145	CF8	9717
UPS-8115 Power Cord (#5) Eur, Africa	2145	CF8	9718
UPS-8115 Power Cord (#6) Eur, Den	2145	CF8	9719
UPS-8115 Power Cord (#7) Pakistan, S. Africa	2145	CF8	9720
UPS-8115 Power Cord (#8) Switz, Liechtenstein	2145	CF8	9721
UPS-8115 Power Cord (#9) Chile, Italy, Ethiopia	2145	CF8	9722

UPS-8115 Power Cord (#10) Israel	2145	CF8	9723
UPS-8115 Power Cord (#11) Thailand	2145	CF8	9724
UPS-8115 Power Cord (#12) Argentina	2145	CF8	9725
UPS-8115 Power Cord (#13) China	2145	CF8	9726
UPS-8115 Power Cord (#14) Taiwan	2145	CF8	9727

	Machine Model Mach/Mod/Feat	Field Install Only	Plant Install Only	MES Remov	CSU
Storage Engine Preload	2145/CF8/0010	N	Y	N	N
Storage Engine Preload PA	2145/CF8/0017	N	Y	N	N
Storage Engine Preload AAS	2145/CF8/0018	N	Y	N	N
Site secondary HW cluster	2145/CF8/0019	N	Y	N	N
JEMT Indicator	2145/CF8/0021	N	Y	N	N
STG Lab Services	2145/CF8/1888	N	N	N	N
Initial Storage Engine	2145/CF8/3001	N	Y	N	N
Additional Storage Engine	2145/CF8/3002	N	Y	N	N
SVC engine removal	2145/CF8/3905	N	N	N	N
Solid-State Device Attachment	2145/CF8/4500	N	N	N	N
146GB Solid-State Device	2145/CF8/4601	N	N	N	N
5 m Fiber Optic Cable LC-LC	2145/CF8/5305	N	N	N	Y
25 m Fiber Optic Cable LC-LC	2145/CF8/5325	N	N	N	Y
IBM 8Gbps LW SFP	2145/CF8/5608	N	N	N	Y
UPS - single	2145/CF8/8115	N	N	N	N
Redundant AC Power	2145/CF8/8300	N	N	N	N
UPS-8115 Power Cord (#1)	2145/CF8/9714	N	N	N	N
UPS-8115 Power Cord (#2)	2145/CF8/9715	N	N	N	N
UPS-8115 Power Cord (#3)	2145/CF8/9716	N	N	N	N
UPS-8115 Power Cord (#4)	2145/CF8/9717	N	N	N	N
UPS-8115 Power Cord (#5)	2145/CF8/9718	N	N	N	N
UPS-8115 Power Cord (#6)	2145/CF8/9719	N	N	N	N
UPS-8115 Power Cord (#7)	2145/CF8/9720	N	N	N	N
UPS-8115 Power Cord (#8)	2145/CF8/9721	N	N	N	N
UPS-8115 Power Cord (#9)	2145/CF8/9722	N	N	N	N
UPS-8115 Power Cord (#10)	2145/CF8/9723	N	N	N	N
UPS-8115 Power Cord (#11)	2145/CF8/9724	N	N	N	N
UPS-8115 Power Cord (#12)	2145/CF8/9725	N	N	N	N
UPS-8115 Power Cord (#13)	2145/CF8/9726	N	N	N	N
UPS-8115 Power Cord (#14)	2145/CF8/9727	N	N	N	N

Machine type	Model	Feature number	Description	U.S. List Price
2145	CF8		IBM System Storage SVC Storage Engine	\$16,500.00
2145	CF8	0010	Storage Engine Preload	N/C
2145	CF8	0017	Storage Engine Preload - PA	N/C
2145	CF8	0018	Storage Engine Preload - AAS	N/C
2145	CF8	0019	Site Secondary HW Cluster	N/C
2145	CF8	0021	JEMT Indicator	N/C
2145	CF8	1888	STG Lab Services	\$2,500.00
2145	CF8	3001	Initial Storage Engine	N/C
2145	CF8	3002	Additional Storage Engine	N/C
2145	CF8	3905	SVC Engine Removal	\$2,000.00
2145	CF8	4500		\$1,121.00

			Solid-State Device Attachment	
2145	CF8	4601	146GB Solid- State Device	\$26,999.00
2145	CF8	5305	5 m Fiber Optic Cable LC-LC	\$170.00
2145	CF8	5325	25 m Fiber Optic Cable LC- LC	\$260.00
2145	CF8	5608	IBM 8Gbps LW SFP	\$499.00
2145	CF8	8115	UPS - Single Engine	\$1,000.00
2145	CF8	8300	Redundant AC Power	\$860.00
2145	CF8	9714	UPS-8115 Power Cord (#1) U.S. 6 ft	\$0
2145	CF8	9715	UPS-8115 Power Cord (#2) US/Jap/ SAf 9 ft	\$0
2145	CF8	9716	UPS-8115 Power Cord (#3) EMEA/Afr	\$0
2145	CF8	9717	UPS-8115 Power Cord (#4) Aus/NZ	\$0
2145	CF8	9718	UPS-8115 Power Cord (#5) Eur/Africa	\$0
2145	CF8	9719	UPS-8115 Power Cord (#6) Eur/Den	\$0
2145	CF8	9720	UPS-8115 Power Cord (#7) Pakis/Safr	\$0
2145	CF8	9721	UPS-8115 Power Cord (#8) Swz/Leich	\$0
2145	CF8	9722	UPS-8115 Power Cord (#9) Ch/It/Eth	\$0
2145	CF8	9723	UPS-8115 Power Cord (#10) Israel	\$0
2145	CF8	9724	UPS-8115 Power Cord (#11) Thailand	\$0
2145	CF8	9725	UPS-8115 Power Cord (#12) Argentina	\$0
2145	CF8	9726	UPS-8115 Power Cord (#13) China	\$0
2145	CF8	9727	UPS-8115 Power Cord (#14) Taiwan	\$0

## Maintenance charges

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For additional information on maintenance and pricing, please contact your IBM Sales Representative or your IBM Business Partner, or call 1-800-IBM-CALL (1-800-426-2255).

For ServiceElect (ESA) maintenance service charges, contact IBM Global Services at 888-IBM-4343 (426-4343).

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