

IBM OEM Storage Products  
WDS 3100/3200

FEATURES  
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- 108/216MB formatted capacity(512 bytes/sector)
- Industry standard interface: ANSI/SCSI-2
- Integrated controller
- Logical block addressing (LBA)
- Implied seeks
- SCSI disconnect and reconnect capability
- Interface Odd parity supported
- 1:1 interleave
- 1,7 Run-Length Limited (RLL) encoding
- Zone Bit Recording
- SCSI data transfer rate: up to 5 MB/Sec (synchronous)
- 32KB Segmented Look Ahead Buffer
- Command Queuing
- Reassignment of new defective sectors without need for reformat
- Auto Reassign Block
- Self diagnostics on power up
- Automatic retry and data correction on read errors
- No preventative maintenance required
- Media data transfer rate: 24/16.2Mbits/Sec
- Closed loop actuator servo (embedded sector servo)
- Rotary voice coil actuator
- Automatic actuator lock
- Dedicated head landing zone
- Average seek time = 12mS (physical ready to read)
- All axis (6 directions) mounting permitted
- MTBF 150,00 hours

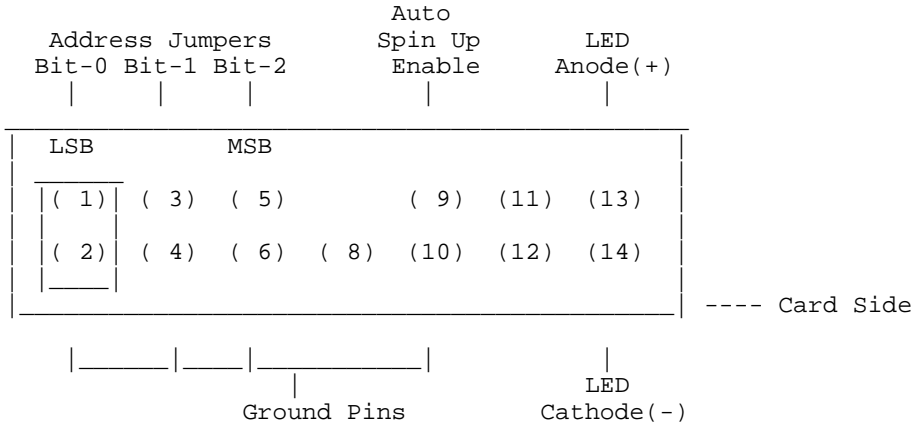
PERFORMANCE  
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	WDS-3100/3200	
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Media Read/Write data transfer rate in Mbits/Sec.	ID	OD
	16.2	24.0
Seek times (in Ms, averaged & inc settle)		
Track to Track		5.0mS
Average length		12mS
Full Length		25mS
Spindle Speed		4320RPM
Average Latency		6.94mS
Power On to Drive Ready	10Sec(ave), 20Sec(max)	
Power Off to Spindle stop	10Sec(ave), 20Sec(max)	

WARNING: This disk drive can be damaged by Electro-Static Discharge, please follow recommended ESD procedures before unpacking or handling the drive. Ask your Dealer for details if you need assistance.

OPTION BLOCK  
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A Bit is selected when a Jumper is in place



Example shows  
jumper on pins 1-2  
selecting SCSI-ID 1

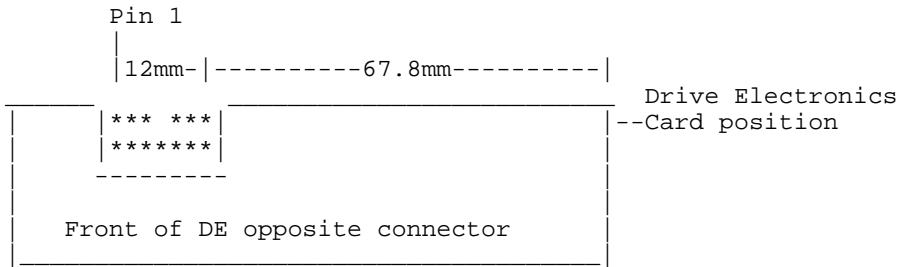
Jumper Settings  
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Jumpers may be fitted to select the following options:

	Pin Numbers
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Auto spin-up control	9-10
Device SCSI-ID selection (see table for details)	1-2,3-4,5-6
LED drive lines	13-14

Pins 8, 11, and 12 are reserved  
Pin 7 is key (missing)  
Jumper pin spacing is 2mm

SHIPPING DEFAULT SETTINGS  
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Mechanical Outline

The DEVICE SCSI-ID is set at 6 (ie jumpers on pins 3-4 and 5-6).

AUTO SPIN-UP is enabled (ie jumpers on pins 9-10).

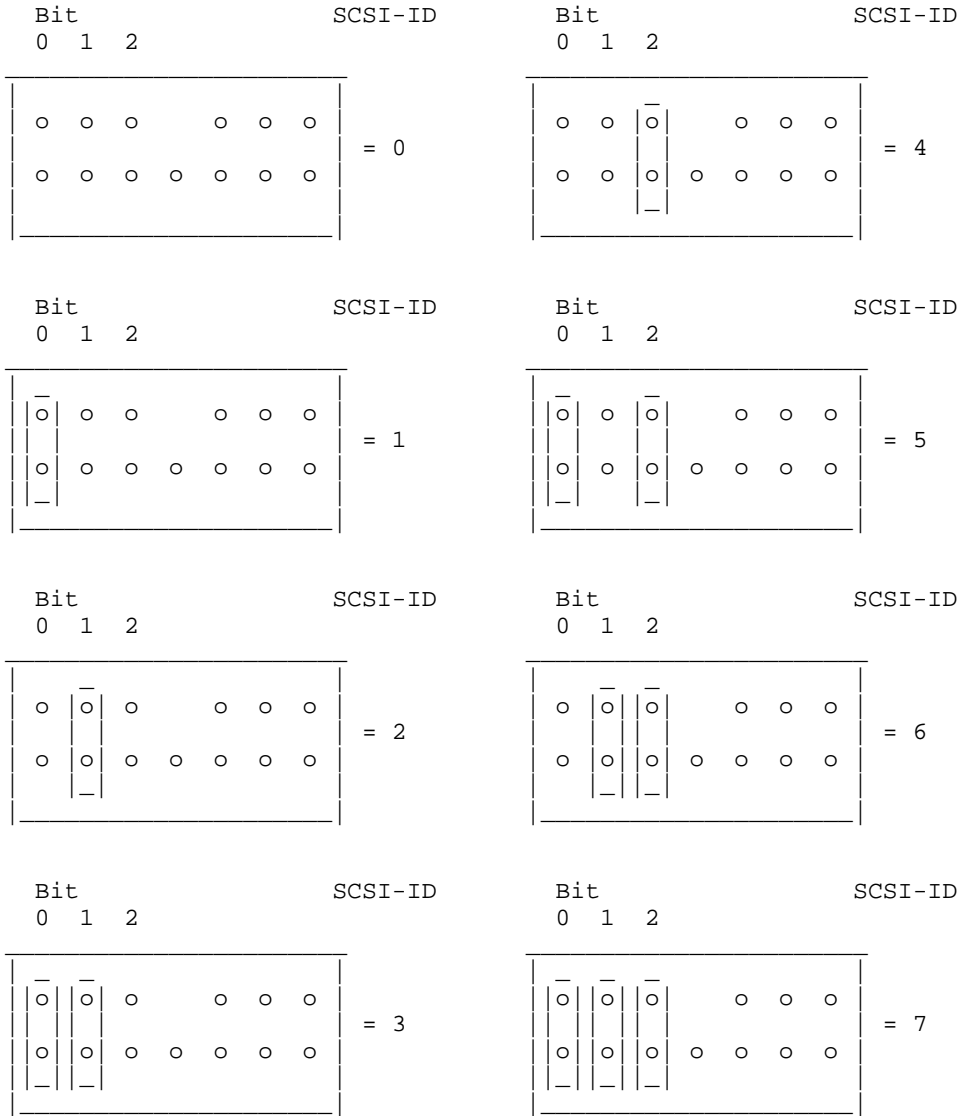
There are four ground pins 2, 4, 6, and 10.

Note: LED connections, pin 13 can source up to 18mA.  
Pin 14 can sink up to 100mA.

AUTO SPIN-UP, pin 9. If a jumper is fitted, the drive will spin-up automatically after power on reset completes.

If a jumper is fitted on pin 9, the drive will not spin-up unless the host system issues a 'Start Unit' command to the drive.

DEVICE SCSI-ID  
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Note: SCSI-ID 7 is usually reserved for the host system controller.

CHARACTERISTICS

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Control Electronics

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The drive is controlled by two micro-processors. One services the system interface and data-path handling, and another is for the drive servo control.

The control electronics perform the following major functions:

- Servo Control

Spindle motor control (Start/Stop and speed control).

Power-up sequence and Servo Initialization.

Servo closed loop calculations and VCM (Voice Coil Motor) control for Seek and Track following.

Monitors timeout or other servo related conditions.

Control Error Recovery Algorithm for Servo and Spindle areas.

Performs self-checkout and servo-related module tests (diagnostics).

1. ROM, On chip RAM.

2. Reset, initialize, and test Servo Hardware.

- Interface Control

Controls and interprets all interface signals between the host controller and the drive.

Controls data handling including Look Ahead Buffer control.

Controls read/write accessing of the media, including defect management and error recovery.

Performs self-checkout (diagnostics).

1. ROM, On chip RAM, External RAM, and Buffer RAM test.

2. Reset, initialize, and test SCSI I/F and HDC module.

Head/Disk/Spindle Assembly

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The head and disk assembly (HDA) is assembled in a clean room environment and contains the disks and actuator assembly. Air is constantly circulated and filtered through a high-efficiency filter when the drive is in operation. Venting of the HDA is accomplished via an absolute breather filter.

The spindle is driven directly by an in-hub, brushless DC motor.

The motor is dynamically balanced to ensure a low level of vibration.

Dynamic braking is used to quickly stop the spindle.

Actuator

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The read/write heads are mounted on the actuator, and connected to the read/write amplifier assembled on a flexible printed circuit (FPC) in the disk enclosure. The actuator is a swing-arm assembly driven by a voice coil motor.

The actuator assembly is balanced to allow vertical or horizontal mounting without adjustment.

When the unit is stopped (via a SCSI command or power off condition) the Actuator automatically moves the heads to a dedicated landing zone inside the data area, where the actuator is locked.

OPERATING ENVIRONMENT

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Humidity:

Operating Relative            8% to 90% non-condensing  
Non-Operating Relative       5% to 95% non-condensing

Wet Bulb Temperature:

Maximum Wet Bulb:  
Operating                      29.4 Degrees C non-condensing  
Non-Operating                 35 Degrees C non-condensing

Elevation:

Operating Altitude           -100 to 3000m

Temperature:

Operating                      5 to 55 Degrees C  
Storage                        0 to 65 Degrees C  
Shipping                       -40 to 65 Degrees C  
  
Temperature Gradient 15 Degrees C per hour (maximum)  
(Operating, Storage and Shipping)

Air Cooling Requirement

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The host system must provide sufficient air flow across the drive to maintain the temperature at less than 60 Degrees C (measured at the center of the drives' top cover).

Operating Vibration

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Due to the complexity of this subject we recommend that users contact the Distributor to discuss how to perform the necessary measurements if they believe this to be an area which requires evaluation.

Non-Operating Vibration

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The Drive will withstand the following continuous vibration levels with no degradation in performance:

- 2-200Hz @ 0.5G peak acceleration (for a resonance search).
- Resonance points: 1.5G zero to peak acceleration (for 15 mins).

Operating Shock

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The Drive will withstand (with no permanent damage or loss of data) a 10G half-sine wave shock pulse of 11ms duration.

Non-Operating Shock

The Drive will withstand (with no permanent damage or degradation in performance) a 75G half-sine wave shock pulse of 11ms duration.

DC POWER REQUIREMENTS

Nominal Supply Voltages	+5 Volts	+12 Volts
Maximum Ripple (0-20MHz)	100mV p-p	100mV p-p
Voltage Supply Tolerance	+5%/-5%	+10%/-8%
Power Supply Current (Amps Average)	+5 Volts	+12 Volts
Start Peak		1.02
Idle Average	0.57	0.2
Seek Peak	0.73	0.63
Seek Average	0.62	0.32

Note: Bus Termination (when fitted) requires 0.16Amps from the +5 volt supply.

ELECTROMAGNETIC COMPATIBILITY

The drive meets the following EMC requirements when installed in the user system and exercised with a random access routine at maximum data rate:

- United States Federal Communications Commission (FCC) Rules and Regulation Part 15, Subject J - Computer Devices "Class B Limits".
- European Economic Community (ECC) directive #76/889 related to the control of radio frequency interference and the Verband Deutscher Elektrotechniker (VDE) requirements of Germany (GOP).

PACKAGING: The drive must be protected against Electro-Static Discharge especially when being handled. The safest way to avoid damage is to put the the drive in an anti static bag before ESD wrist straps etc are removed.

Drives should only be shipped in approved containers, severe damage can be caused to the drive if the packaging does not adequately protect against the shock level induced when a box is dropped. Consult the dealer if you do not have an approved shipping container.

DATA ORGANIZATION

	WDS-3100	WDS-3200
Bytes per Sector	512	512

Total Data Sectors	211456	422912
BIOS Capacity of drive (MB(sectors x 512))	108.3	216.5
Sectors per Track		
ID	44	44
OD	66	66
Spare Sectors per Track		
ID	1	1
OD	1.5	1.5
Number of Data Heads	2	4
Number of Disks	1	2
Cylinder Organization	2009 Data 2 Spare 1 CE use 1 Secondary defect map 1 Primary defect map 1 SCSI cylinder 3 Manufacturing use	

MECHANICAL DATA  
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Dimensions

Height	19.9+-0.4mm
Width	101.6+-0.4mm
Depth	146.0+-0.6mm
Head Disk Enclosure depth	135.0+-0.4mm
Weight	410g maximum

Mounting Orientation  
The drive can be mounted in any axis (6 directions).

Mounting Screws  
Side : (6X) UNC 6-32  
Bottom : (4X) UNC 6-32

Note: Maximum screw lengths must not be exceeded.

ELECTRICAL INTERFACE SPECIFICATIONS  
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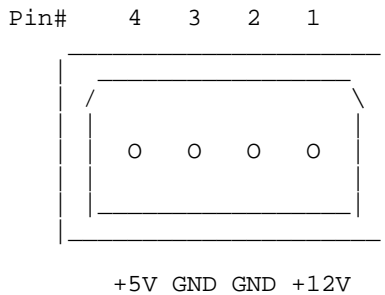
The IBM OEM Disk Drive uses single-ended drivers and receivers that permit cable lengths of up to 6 meters (19.68 feet).

CONNECTORS  
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The drive has two connectors: the 50 pin SCSI I/F connector and the standby 4 pin power connector.

Power  
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The DC power connector is designed to mate with AMP part number 1-480424-0 using AMP pins part number 350078-4 (strip) or part number 61173-4 or their equivalent. Pin assignments are below.



### SCSI Signal Connector

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The SCSI signal connector is a 50-pin connector, Molex part number 70248, meeting ANSI/SCSI specifications.

### SCSI Bus Terminators

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The file has internal SCSI bus terminators. The user is responsible for properly terminating and powering the SCSI bus in the using system.

For single-ended cable, a 50 conductor flat cable or a 25 signal twisted cable can be used with a maximum length of 6.0 meters (19.68 feet).

### MODE SELECT OPTIONS

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Certain 'Mode Select' parameters are alterable via the SCSI 'Mode Select' command. This allows several drive characteristics to be modified to optimize performance on any particular system. Refer to the 0661 SCSI Specification for detailed definition of Mode Select parameters.

The following Mode Sense Pages are supported:

#### Page 1 - Read/Write Error Recovery Parameters

- TB (Transfer Block)
- PER (Post Error)
- DTE (Disable Transfer on Error)
- DCR (Disable Correction)
- Read Retry Count
- Correction Span
- Write Retry Count

#### Page 2 - Disconnect/Reconnect Parameters

- Read Buffer Full Ratio
- Write Buffer Empty Ratio

#### Page 3 - Format Device Parameters

#### Page 4 - Rigid Disk Drive Geometry Parameters

Page 8 - Caching Parameters  
RCD (Read Cache Disable)

Page A - Control Mode Page  
Queue Algorithm Modifier  
QErr (Queue Error Management)  
DQue (Disable Queuing)

TROUBLESHOOTING

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- \* The drive reports status in response to the SCSI 'Sense' command and and this is a powerful troubleshooting tool on any drive whose failure mode still allows it to communicate.
  
- \* If the drive is interrupted by powering down during a format operation it will enter degraded mode. In this mode it will return a 'Unit Attention' condition to most SCSI commands.  
Issuing a 'Sense' Command immediately after issuing a 'Test Unit Ready' Command will return sense data which indicates that the drive is in degraded mode.  
The way to recover the drive is to issue the SCSI 'Format command and allow the drive to format to completion.

This data sheet is not a substitute for the full product specification, which should be used when detailed information is required.

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