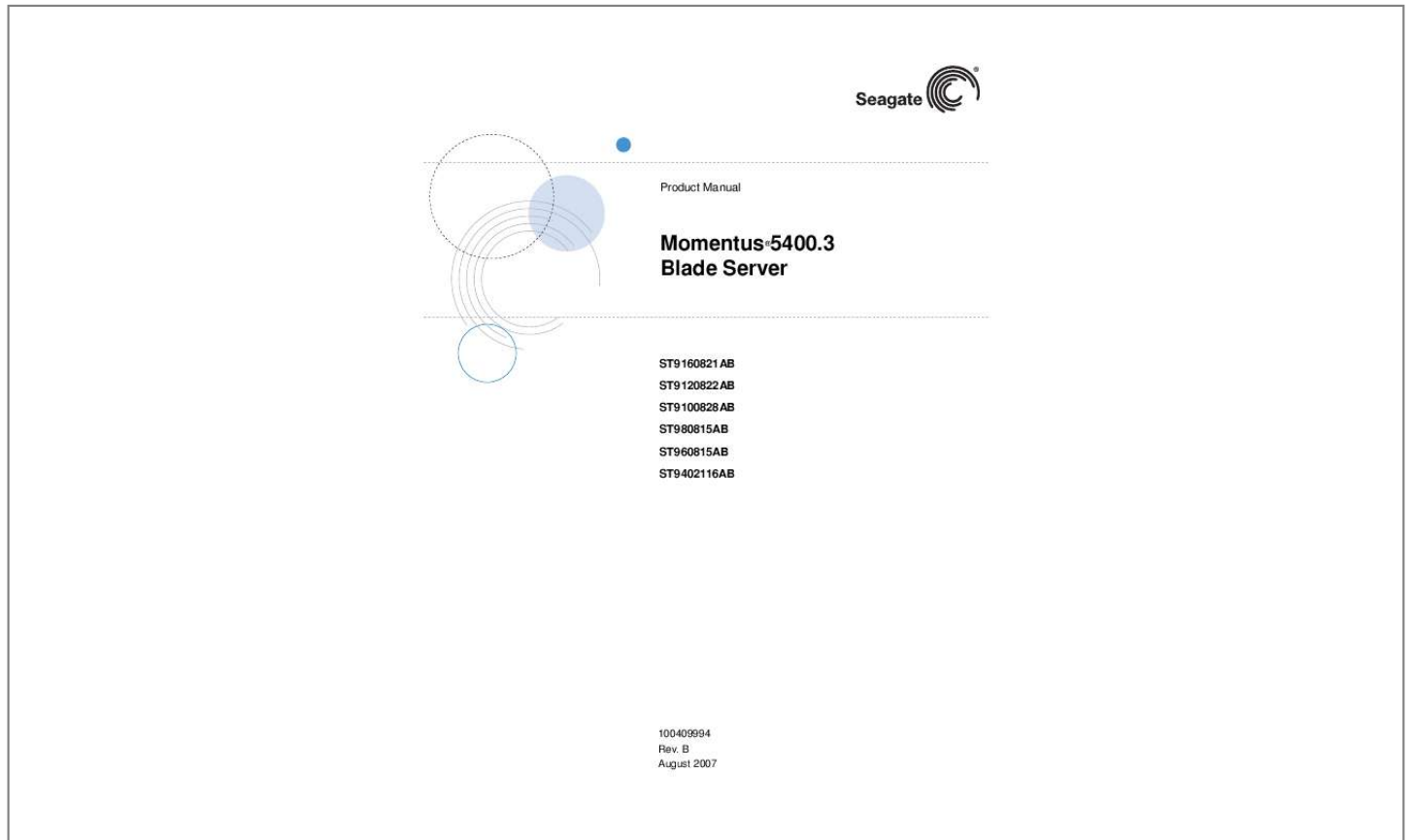




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You can read the recommendations in the user guide, the technical guide or the installation guide for MAXTOR MOMENTUS 5400.3 BLADE SERVER. You'll find the answers to all your questions on the MAXTOR MOMENTUS 5400.3 BLADE SERVER in the user manual (information, specifications, safety advice, size, accessories, etc.). Detailed instructions for use are in the User's Guide.

User manual MAXTOR MOMENTUS 5400.3 BLADE SERVER
User guide MAXTOR MOMENTUS 5400.3 BLADE SERVER
Operating instructions MAXTOR MOMENTUS 5400.3 BLADE SERVER
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Manual abstract:

@@@All other trademarks or registered trademarks are the property of their respective owners. One gigabyte, or GB, equals one billion bytes and one terabyte, or TB, equals one trillion bytes when referring to hard drive capacity. Accessible capacity may vary depending on operating environment and formatting. Quantitative usage examples for various applications are for illustrative purposes. Actual quantities will vary based on various factors, including file size, file format, features and application software. Seagate reserves the right to change, without notice, product offerings or specifications. Contents 1.0

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This manual describes the functional, mechanical and interface specifications for the following Seagate® Momentus®5400.3 drives: · ST9160821AB · ST9120822AB · ST9100828AB · ST980815AB · ST960815AB · ST9402116AB These drives provide the following key features: · 5,400-RPM spindle speed · 8-Mbyte buffer · Quiet operation.

Fluid Dynamic Bearing (FDB) motor. · High instantaneous (burst) data transfer rates (up to 100 Mbytes per second) using Ultra DMA mode 5. · Tunneling Magneto-resistive (TMR) recording heads. · State-of-the-art cache and on-the-fly error-correction algorithms. · Full-track multiple-sector transfer capability without local processor intervention. · 900 Gs nonoperating shock and 350 Gs operating shock. · SeaTools™ diagnostic software performs a drive self-test

that eliminates unnecessary drive returns. · The 3D Defense System™, which includes Drive Defense, Data Defense, and Diagnostic Defense, offers the industry's most comprehensive protection for disc drives. · Support for S.M.

A.R.T. drive monitoring and reporting. · Support for Read Multiple and Write Multiple commands.

· Support for autodetection of master/slave drives using cable select (CSEL). Momentus 5400.3 PATA Blade Server Product Manual, Rev. B 1 2 Momentus 5400.3 PATA Blade Server Product Manual, Rev.

B 2.0 Drive specifications Unless otherwise noted, all specifications are measured under ambient conditions, at 25°C, and nominal power. For convenience, the phrases the drive and this drive are used throughout this manual to indicate ST9160821AB, ST9120822AB, ST9100828AB, ST980815AB, ST960815AB, and ST9402116AB model drives. 2.1 Specification summary The specifications listed in this table are for quick reference. For details on specification measurement or definition, see the appropriate section of this manual. Table 1: Specifications for 160 and 120 Gbyte models ST9160821AB 160 312,581,808 512 4 2 8 835k 150k 132 5,400 352 100 PIO modes 04 Multiword DMA modes 02 Ultra DMA modes 05 9.5 +/-0.2 mm (0.374 +/-

008 inches) 69.85 +/-0.25 mm (2.750 +/-0.010 inches) 100.50 +/-0.25 mm (3.957 +/-0.010 inches) 100 grams (0.22 lb) 5.

6 3.0 3.0 1.0 (read), 1.5 (write) 13.

0 11.0 12.5 22 (typical); 24 (max) 1.0 amps 3 Drive specification Formatted Gbytes (512 bytes/sector)* Guaranteed sectors Bytes per sector Physical read/write heads Discs Cache (Mbytes) Recording density, BPI (bits/inch typical) Track density, TPI (tracks/inch typical) Areal density (Gbits/inch² max) ST9120822AB 120 234,441,648 Spindle speed (RPM) Internal data transfer rate (Mbits/sec max) I/O data-transfer rate (Mbytes/sec max) ATA data-transfer modes supported Height Width Length Weight (typical) Average latency (msec) Power-on to ready (sec typical) Standby to ready (sec typical) Track-to-track seek time (msec typical) Average random seek, write (msec typical) Average random seek, read (msec typical) Average random seek, (msec typical) Full-stroke seek (msec) Startup current 5V (typical) Momentus 5400.



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3 PATA Blade Server Product Manual, Rev.

B 3 Table 1: Specifications for 160 and 120 Gbyte models ST9160821AB 2.0 watts Read: 2.0 watts; Write: 1.8 watts 0.8 watts 0.2 watts (typical)*** 0.2 watts (typical)*** 5V ± 5% 0° to 40°C (operating), 40° to 70°C (nonoperating) Duty 50%, Power-on Hours (POH): 8760/year 20°C (operating) 30°C (nonoperating) 5% to 90% (operating) 5% to 95% (nonoperating) 30% per hour max 30°C (operating) 38°C (nonoperating) 304.8 m to 3,048 m (1000 ft to 10,000 ft) 304.8 m to 12,192 m (1,000 ft to 40,000 ft) max 350 800 900 400 1.0 Gs (0 to peak, 5500 Hz) 5.

0 Gs (0 to peak, 5500 Hz) Drive specification Seek power (typical) Read/write power (typical) Idle mode (typical, low power) Standby mode Sleep mode Voltage tolerance (including noise) Ambient temperature Temperature gradient (°C per hour max, noncondensing) Relative humidity (noncondensing) Relative humidity gradient Wet bulb temperature (°C max) Altitude, operating Altitude, nonoperating (below mean sea level) Shock, operating (Gs max at 2 msec) Shock, nonoperating (Gs max at 2 msec) Shock, nonoperating (Gs max at 1 msec) Shock, nonoperating (Gs max at 0.5 msec) Vibration, operating (max displacement may apply below 10 Hz) Vibration, nonoperating (max displacement may apply below 22 Hz) Drive acoustics, sound power (bels), 2 disc Idle** Performance seek Nonrecoverable read errors Annualized Failure Rate (AFR) Load/Unload (U/UL) cycles 25°C, 50% relative humidity 32°C, 80% relative humidity 5°C, 80% relative humidity 5°C, 20% relative humidity 60°C, 20% relative humidity Warranty ST9120822AB 2.4 (typical) 2.6 (max) 3.0 (typical) 3.2 (max) 1 per 1014 bits read <1.79% 600,000 software-controlled power on/off cycles 20,000 hard power on/off cycles 600,000 software-controlled power on/off cycles 20,000 hard power on/off cycles 5 years on distribution units. To determine the warranty for a specific drive, use a web browser to access the following web page: www.seagate.com/support/service/ From this page, click on the "Verify Your Warranty" link.

You will be asked to provide the drive serial number, model number (or part number) and country of purchase. The system will display the warranty information for your drive. *One Gbyte equals one billion bytes when referring to hard drive capacity. Accessible capacity may vary depending on operating environment and formatting.

**During periods of drive idle, some offline activity may occur, according to the S.M.A.R.T.

specification, which may increase acoustic and power to operational levels. ***Typical notebooks will pull power to the drive when entering S3 and S4; while in the S3 and S4 states, drive sleep and drive standby modes will not contribute to battery power consumption. 6 Momentus 5400.3 PATA Blade Server Product Manual, Rev. B Table 1: Specifications for 60 and 40 Gbyte models ST960815AB 60 117,210,240 512 2 1 8 835k 150k 132 5,400 352 100 PIO modes 04 Multiword DMA modes 02 Ultra DMA modes 05 9.5 +/-0.2 mm (0.374 +/-0.008 inches) 69.85 +/-0.

25 mm (2.750 +/-0.010 inches) 100.50 +/-0.25 mm (3.957 +/-0.010 inches) 96 grams (0.21 lb) 5.6 3.0 3.0 1.0 (read), 1.5 (write) 13.0 11.0 12.

5 22 (typical); 24 (max) 1.0 amps 2.0 watts Read: 2.0 watts; Write: 1.8 watts 0.

8 watts 0.2 watts (typical)*** 0.2 watts (typical)*** 5V ± 5% 0° to 40°C (operating), 40° to 70°C (nonoperating) Duty 50%, Power-on Hours (POH): 8760/year 20°C (operating) 30°C (nonoperating) 5% to 90% (operating) 5% to 95% (nonoperating) 30% per hour max 30°C (operating) 38°C (nonoperating) 304.8 m to 3,048 m (1000 ft to 10,000 ft) 304.8 m to 12,192 m (1,000 ft to 40,000 ft) max 350 800 1 Drive specification Formatted Gbytes (512 bytes/sector)* Guaranteed sectors Bytes per sector Physical read/write heads Discs Cache (Mbytes) Recording density, BPI (bits/inch typical) Track density, TPI (tracks/inch typical) Areal density (Gbits/inch max) Spindle speed (RPM) Internal data transfer rate (Mbits/sec max) I/O data-transfer rate (Mbytes/sec max) ATA data-transfer modes supported 2 ST9402116AB 40 78,140,160 Height Width Length Weight (typical) Average latency (msec) Power-on to ready (sec typical) Standby to ready (sec typical) Track-to-track seek time (msec typical) Average random seek, write (msec typical) Average random seek, read (msec typical) Average random seek, (msec typical) Full-stroke seek (msec) Startup current 5V (typical) Seek power (typical) Read/write power (typical) Idle mode (typical, low power) Standby mode Sleep mode Voltage tolerance (including noise) Ambient temperature Temperature gradient (°C per hour max, noncondensing) Relative humidity (noncondensing) Relative humidity gradient Wet bulb temperature (°C max) Altitude, operating Altitude, nonoperating (below mean sea level) Shock, operating (Gs max at 2 msec) Shock, nonoperating (Gs max at 2 msec) Momentus 5400.3 PATA Blade Server Product Manual, Rev. B 7 Table 1: Specifications for 60 and 40 Gbyte models ST960815AB 900 400 1.0 Gs (0 to peak, 5500 Hz) 5.0 Gs (0 to peak, 5500 Hz) Drive specification Shock, nonoperating (Gs max at 1 msec) Shock, nonoperating (Gs max at 0.5 msec) Vibration, operating (max displacement may apply below 10 Hz) Vibration, nonoperating (max displacement may apply below 22 Hz) Drive acoustics, sound power (bels), 2 disc Idle** Performance seek Nonrecoverable read errors Annualized Failure Rate (AFR) Load/Unload (U/UL) cycles 25°C, 50% relative humidity 32°C, 80% relative humidity 5°C, 80% relative humidity 5°C, 20% relative humidity 60°C, 20% relative humidity Warranty ST9402116AB 2.

4 (typical) 2.6 (max) 2.9 (typical) 3.1 (max) 1 per 1014 bits read <1.79% 600,000 software-controlled power on/off cycles 20,000 hard power on/off cycles 600,000 software-controlled power on/off cycles 20,000 hard power on/off cycles 5 years on distribution units. To determine the warranty for a specific drive, use a web browser to access the following web page: www.seagate.com/support/service/ From this page, click on the "Verify Your Warranty" link. You will be asked to provide the drive serial number, model number (or part number) and country of purchase. The system will display the warranty information for your drive.

*One Gbyte equals one billion bytes when referring to hard drive capacity. Accessible capacity may vary depending on operating environment and formatting. **During periods of drive idle, some offline activity may occur, according to the S.M.A.

R.T. specification, which may increase acoustic and power to operational levels. ***Typical notebooks will pull power to the drive when entering S3 and S4; while in the S3 and S4 states, drive sleep and drive standby modes will not contribute to battery power consumption.



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3 PATA Blade Server Product Manual, Rev. B 2.2 Model Formatted capacity Formatted capacity* 160 Gbytes 120 Gbytes 100 Gbytes 80 Gbytes 60 Gbytes 40 Gbytes Guaranteed sectors 312,581,808 234,441,648 195,371,568 156,301,488 117,210,240 78,140,160 Bytes per sector 512 512 512 512 512 512 ST9160821AB ST9120822AB ST9100828AB ST980815AB ST960815AB ST9402116AB *One Gbyte equals one billion bytes when referring to hard drive capacity. Accessible capacity may vary depending on operating environment and formatting. 2.3 Cylinders 16,383 Default logical geometry Read/write heads 16 Sectors per track 63 LBA mode When addressing these drives in LBA mode, all blocks (sectors) are consecutively numbered from 0 to n-1, where n is the number of guaranteed sectors as defined above. 2.4 Model Physical organization Read/write heads 4 3 3 2 2 1 Number of discs 2 2 2 1 1 1 ST9160821AB ST9120822AB ST9100828AB ST980815AB ST960815AB ST9402116AB Momentus 5400.3 PATA Blade Server Product Manual, Rev. B 9 2.

5 Recording and interface technology Specification Parallel ATA Perpendicular 835k 150k 132 5,400 352 100 (Ultra DMA mode 5) 1:1 8 Mbytes (8,192 kbytes) Technology Interface Recording method Recording density BPI (bits/inch typical) Track density TPI (tracks/inch typical) Areal density (Gbits/inch² max) Spindle speed (RPM) ($\pm 0.2\%$) Internal data-transfer rate OD (Mbits/sec max) I/O data-transfer rate (Mbytes/sec max) Interleave Cache buffer 2.6 Height Width Length Physical characteristics (mm) (inches) (mm) (inches) (mm) (inches) 9.5 ± 0.2 0.374 ± 0.008 69.85 ± 0.25 2.750 ± 0.010 100.50 ± 0.25 3.957 ± 0.010 Typical weight ST9160821AB ST9120822AB ST9100828AB ST980815AB ST960815AB ST9402116AB 100 grams 0.22 pounds 96 grams 0.21 pounds 10 Momentus 5400.3 PATA Blade Server Product Manual, Rev. B 2.7 Seek time Seek measurements are taken with nominal power at 25°C ambient temperature.

All times are measured using drive diagnostics. The specifications below are defined as follows: · Track-to-track seek time is an average of all possible single-track seeks in both directions. · Average seek time is a true statistical random average of at least 5,000 measurements of seeks between random tracks, less overhead. Typical seek times (msec)* Track-to-track Average Full-stroke Average latency *Measured in performance mode Read 1.0 11.0 22.0 5.56 Write 1.5 13.0 24.

0 5.56 Note. These drives are designed to consistently meet the seek times represented in this manual. Physical seeks, regardless of mode (such as track-to-track and average), are expected to meet or exceed the noted values. However, due to the manner in which these drives are formatted, benchmark tests that include command overhead or measure logical seeks may produce results that vary from these specifications. 2.8 Time to ready Typical 3.0 3.0 Max @ 25°C 8.0 8.

0 Time to ready Power-on to Ready (sec) Standby to Ready (sec) Momentus 5400.3 PATA Blade Server Product Manual, Rev. B 11 2.9 Power specifications The drive receives DC power (+5V) through the interface connector. 2.

9.1 Power consumption Power requirements for the drives are listed in the table on page 12. Typical power measurements are based on an average of drives tested, under nominal conditions, at 25°C ambient temperature. · Spinup power Spinup power is measured from the time of power-on to the time that the drive spindle reaches operating speed. · Seek mode During seek mode, the read/write actuator arm moves toward a specific position on the disc surface and does not execute a read or write operation.

Servo electronics are active. Seek mode power is measured based on three random seek operations every 100 msec. This mode is not typical. · Read/write power and current Read/write power is measured with the heads on track, based on three 63 sector read or write operations every 100 msec. · Idle mode power* Idle mode power is measured with the drive up to speed, with servo electronics active and with the heads in a random track location. · Standby mode During Standby mode, the drive accepts commands, but the drive is not spinning, and the servo and read/write electronics are in power-down model Table 2: DC power for 2 disk models +5V average (25°C) 1.0 amps 2.0 watts 2.0 watts 1.8 watts 1.

7 watts 0.99 watts 0.8 watts 0.2 watts 0.2 watts Power dissipation Spinup (typical) Seek Read Write Idle, performance Idle, active* Idle, low power mode* Standby Sleep *During periods of drive idle, some offline activity may occur according to the S.M.A.R.T. specification, which may increase acoustic and power to operational levels.

12 Momentus 5400.3 PATA Blade Server Product Manual, Rev. B 2.9.1.

1 Typical current profile Figure 4. Typical 5V startup and operation current profile 2.9.2 Conducted noise Input noise ripple is measured at the host system power supply across an equivalent 15-ohm resistive load on the +5 volt line. Using 5-volt power, the drive is expected to operate with a maximum of 100 mV peak-to-peak square-wave injected noise at up to 10 MHz.

Note. Equivalent resistance is calculated by dividing the nominal voltage by the typical RMS read/write current. 2.9.3 Voltage tolerance Voltage tolerance (including noise): 5V $\pm 5\%$ Momentus 5400.3 PATA Blade Server Product Manual, Rev. B 13 2.10 2.10.1 Environmental specifications Ambient temperature Ambient temperature is defined as the temperature of the environment immediately surrounding the drive.

Duty 50%, power-on hours (POH) of 8,760 per year (24 hours per day, 7 days per week operation). Actual drive case temperature should not exceed 45°C (113°F) within the operating ambient conditions. Above 1,000 feet (305 meters), the maximum temperature is derated linearly by 1°C every 1000 feet. Operating Nonoperating 0° to 40°C (32° to 104°F) 40° to 70°C (40° to 158°F) 2.10.2 Temperature gradient Operating Nonoperating 20°C per hour (68°F per hour max), without condensation 30°C per hour (86°F per hour max), without condensation 2.10.3 2.10.3.

1 Humidity Relative humidity Operating 5% to 90% noncondensing (30% per hour max) Nonoperating 5% to 95% noncondensing (30% per hour max) 2.10.3.2 Wet bulb temperature Operating 30°C (86°F max) Nonoperating 38°C (100.4°F max) 2.

10.4 Altitude Operating Nonoperating 304.8 m to 3,048 m (1,000 ft to 10,000 ft) 304.8 m to 12,192 m (1,000 ft to 40,000 ft) 14 Momentus 5400.3 PATA Blade Server Product Manual, Rev.

B 2.10.5 Shock All shock specifications assume that the drive is mounted securely with the input shock applied at the drive mounting screws. Shock may be applied in the X, Y or Z axis. 2.10.5.1 Operating shock These drives comply with the performance levels specified in this document when subjected to a maximum operating shock of 350 Gs based on half-sine shock pulses of 2 msec.



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Shocks should not be repeated more than two times per second. 2.

10.5.2 Nonoperating shock The nonoperating shock level that the drive can experience without incurring physical damage or degradation in performance when subsequently put into operation is 800 Gs based on a nonrepetitive half-sine shock pulse of 2 msec duration. The nonoperating shock level that the drive can experience without incurring physical damage or degradation in performance when subsequently put into operation is 900 Gs based on a nonrepetitive half-sine shock pulse of 1 msec duration. The nonoperating shock level that the drive can experience without incurring physical damage or degradation in performance when subsequently put into operation is 400 Gs based on a nonrepetitive half-sine shock pulse of 0.5 msec duration. 2.10.6 Vibration All vibration specifications assume that the drive is mounted securely with the input vibration applied at the drive mounting screws. Vibration may be applied in the X, Y or Z axis.

2.10.6.1 Operating vibration The following table lists the maximum vibration levels that the drive may experience while meeting the performance standards specified in this document. 5500 Hz 1.

0 Gs (0 to peak). Max displacement may apply below 10 Hz. 2.10.6.

2 Nonoperating vibration The following table lists the maximum nonoperating vibration that the drive may experience without incurring physical damage or degradation in performance when subsequently put into operation. 5500 Hz 5.0 Gs (0 to peak). Max displacement may apply below 22 Hz. Momentus 5400.3 PATA Blade Server Product Manual, Rev. B 15 2.11 Acoustics Drive acoustics are measured as overall A-weighted acoustic sound power levels (no pure tones). All measurements are consistent with ISO document 7779. Sound power measurements are taken under essentially free-field conditions over a reflecting plane.

For all tests, the drive is oriented with the cover facing upward. Note. For seek mode tests, the drive is placed in seek mode only. The number of seeks per second is defined by the following equation: (Number of seeks per second = $0.4 / (\text{average latency} + \text{average access time})$) Table 3: Models 2 Discs ST9160821AB ST9120822AB ST9100828AB ST980815AB ST960815AB ST9402116AB Drive level acoustics Idle* 2.4 bels (typ) 2.6 bels (max) 2.2 bels (typ) 2.4 bels (max) Normal Seek 2.6 2.

8 2.5 2.7 Performance Seek 3.0 bels (typ) 3.2 bels (max) 2.

9 bels (typ) 3.1 bels (max) 1 Disc *During periods of drive idle, some offline activity may occur according to the S.M.A.R.

T. specification, which may increase acoustic and power to operational levels. 2.12 Electromagnetic immunity When properly installed in a representative host system, the drive operates without errors or degradation in performance when subjected to the radio frequency (RF) environments defined in the following table: Table 4: Test Electrostatic discharge Radiated RF immunity Electromagnetic immunity Description Contact, HCP, VCP: ± 4 kV; Air: ± 8 kV Performance level B Reference standard EN 61000-4-2: 95 EN 61000-4-3: 96 ENV 50204: 95 EN 61000-4-4: 95 EN 61000-4-5: 95 EN 61000-4-6: 97 EN 61000-4-8: 97 EN 61000-4-11: 94 80 to 2,000 MHz, 10 V/m, A 80% AM with 1 kHz sine 900 MHz, 3 V/m, 50% pulse modulation @ 200 Hz ± 1 kV on AC mains, ± 0.5 kV on external I/O ± 1 kV differential, ± 2 kV common, AC mains 150 kHz to 80 MHz, 3 Vrms, 80% AM with 1 kHz sine 1 A/m, 50Hz/60Hz, 3 axes 30% Reduction for 25 cycles >95% Reduction for 250 cycles >95%, 0.5 cycles B B A A C C B Electrical fast transient Surge immunity Conducted RF immunity Power Frequency H-field immunity Voltage dips, interrupts A - 1) No upset or degradation in performance beyond manufacturer's specified limits. 2) No data loss. B - 1) Unit self recovers without user intervention. 2) No data loss. C - 1) Upset OK provided that unit will function after user intervention.

16 Momentus 5400.3 PATA Blade Server Product Manual, Rev. B 2.13 Reliability Specification 1 per 1014 bits read, max. <1.79% Measurement type Nonrecoverable read errors Annualized Failure Rate (AFR) Load/Unload (U/UL) 25°C, 50% relative humidity 32°C, 80% relative humidity 5°C, 80% relative humidity 5°C, 10% relative humidity 55°C, 16% relative humidity Warranty 600,000 software-controlled power on/off cycles 20,000 hard power on/off cycles 600,000 software-controlled power on/off cycles 20,000 hard power on/off cycles 5 years on distribution units. To determine the warranty for a specific drive, use a web browser to access the following web page: www.seagate.com/support/service/ From this page, click on the "Verify Your Warranty" link. You will be asked to provide the drive serial number, model number (or part number) and country of purchase.

The system will display the warranty information for your drive. 2.14 2.14.1 Agency certification Safety certification The drives are recognized in accordance with UL 1950 and CSA C22.

2 (950) and meet all applicable sections of IEC950 and EN 60950 as tested by TUV North America. 2.14.2 Electromagnetic compatibility Hard drives that display the CE mark comply with the European Union (EU) requirements specified in the Electromagnetic Compatibility Directive (89/336/EEC). Testing is performed to the levels specified by the product standards for Information Technology Equipment (ITE).

Emission levels are defined by EN 55022, Class B and the immunity levels are defined by EN 55024. Seagate uses an independent laboratory to confirm compliance with the EC directives specified in the previous paragraph. Drives are tested in representative end-user systems. Although CE-marked Seagate drives comply with the directives when used in the test systems, we cannot guarantee that all systems will comply with the directives. The drive is designed for operation inside a properly designed enclosure, with properly shielded I/O cable (if necessary) and terminators on all unused I/O ports. Computer manufacturers and system integrators should confirm EMC compliance and provide CE marking for their products. Momentus 5400.3 PATA Blade Server Product Manual, Rev. @@@@ Radio and television interference. @@@@. Move the device to one side or the other of the radio or TV.

· Move the device farther away from the radio or TV. @@@@ This booklet is available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. @@@@ Our supplier contracts require compliance with our chemical substance restrictions, and our suppliers document their compliance with our requirements by providing material content declarations for all parts and materials for the disc drives documented in this publication. Current supplier declarations include disclosure of the inclusion of any RoHS-regulated substance in such parts or materials. Seagate also has internal systems in place to ensure ongoing compliance with the RoHS Directive and all laws and regulations which restrict chemical content in electronic products.



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These systems include standard operating procedures that ensure that restricted substances are not utilized in our manufacturing operations, laboratory analytical validation testing, and an internal auditing process to ensure that all standard operating procedures are complied with. 2.16 Corrosive environment Seagate electronic drive components pass accelerated corrosion testing equivalent to 10 years exposure to light industrial environments containing sulfurous gases, chlorine and nitric oxide, classes G and H per ASTM B845.

However, this accelerated testing cannot duplicate every potential application environment. Users should use caution exposing any electronic components to uncontrolled chemical pollutants and corrosive chemicals as electronic drive component reliability can be affected by the installation environment. The silver, copper, nickel and gold films used in Seagate products are especially sensitive to the presence of sulfide, chloride, and nitrate contaminants. Sulfur is found to be the most damaging. In addition, electronic components should never be exposed to condensing water on the surface of the printed circuit board assembly (PCBA) or exposed to an ambient relative humidity greater than 95%.

Materials used in cabinet fabrication, such as vulcanized rubber, that can outgas corrosive compounds should be minimized or eliminated. The useful life of any electronic equipment may be extended by replacing materials near circuitry with sulfide-free alternatives. Momentus 5400.3 PATA Blade Server Product Manual, Rev. B 19 20 Momentus 5400.

3 PATA Blade Server Product Manual, Rev. B 3.0 Configuring and mounting the drive This section contains the specifications and instructions for configuring and mounting the drive. 3.1 Handling and static discharge precautions After unpacking, and before installation, the drive may be exposed to potential handling and electrostatic discharge (ESD) hazards. Observe the following standard handling and static-discharge precautions: Caution: · Keep the drive in the electrostatic discharge (ESD) bag until you are ready for installation to limit the drive's exposure to ESD. · Before handling the drive, put on a grounded wrist strap, or ground yourself frequently by touching the metal chassis of a computer that is plugged into a grounded outlet. Wear a grounded wrist strap throughout the entire installation procedure. · Handle the drive only by its edges or frame. · The drive is fragile--handle it with care.

Do not press down on the drive top cover. · Always rest the drive on a padded, antistatic surface until you mount it in the computer. · Do not touch the connector pins or the printed circuit board. · Do not remove the factory-installed labels from the drive or cover them with additional labels. Removal voids the warranty. Some factory-installed labels contain information needed to service the drive. Other labels are used to seal out dirt and contamination. Momentus 5400.3 PATA Blade Server Product Manual, Rev. B 21 3.

2 3.2.1 Jumper settings Master/slave configuration Use the options jumper block shown in Figure 5 to configure the drive for operation. This jumper block is the 4-pin header adjacent to pins 1 and 2 of the I/O signal pins. For additional information about using the Cable select option, see Section 3.

2.2. The "Master or single drive" option is the factory default setting. Drive is master (or single drive) Drive is slave Cable select Figure 5. Jumper settings 3. 2.2 Cable-select option Computers that use cable select determine the master and slave drives by selecting or deselecting pin 28, CSEL, on the interface bus.

Master and slave drives are determined by their physical position on the cable. To enable cable select, set a jumper as shown in Figure 5. Refer to your computer manual to determine whether your computer supports this option. 22 Momentus 5400.3 PATA Blade Server Product Manual, Rev. B 3.3 Drive mounting You can mount the drive using four screws in the side-mounting holes or four screws in the bottom-mounting holes. See Figure 6 for drive mounting dimensions (dimensions in inches with mm in parentheses).

Follow these important mounting precautions when mounting the drive: · Allow a minimum clearance of 0.030 inches (0.76 mm) around the entire perimeter of the drive for cooling. · Use only M3 x 0.5 mounting screws. · Do not overtighten the mounting screws (maximum torque: 4.0 inch-lb). · Four (4) threads (0.080 inches) minimum screw engagement recommended. Measurements shown in Figure 6 are in inches.

1 2 3 DIMENSIONS PER EIA-720 OR SFF 8201 SPECIFICATION. DIMENSIONS PER SFF 8212 OR SFF 8223. DRIVE LENGTH W/ PATA IS 3.945±.057 (WORST CASE).

DRIVE LENGTH W/ SATA IS 3.957±.062 (WORST CASE). 3.945 ± .010 (BASE) .157 2 (.490) .217 ±.050 .217 ±.050 2 .399 (.673) C C OF CONN. DATUM B OF DRIVE (.

189) 2 1 2.750 (BASE) ±.010 SATA PATA 3 BASE 3.567 .551 1 1 2X M3 X 0.5-6H MOUNTING HOLES; BOTH SIDES .12 MIN FULL THREAD 0.148 ±.010 X 90 1 .020) SECTION B-B (SATA) .

374 ±.008 -D2X .118 BOTH SIDES 1 .039 BCD BASE .551 1 2 .

152 .399 2 3.567 (BASE) 1 4X M3 X 0.5-6H MOUNTING HOLES; BOTH SIDES .10 MIN FULL THREAD 0.

148 ±.010 X 90 1 DETAIL A (PATA) B 1 .039 .016 BCD C 2.430 B -B2 .012 .370 2 DETAIL A .160 -C- 1 DETAIL A (SATA) Figure 6. Mounting dimensions--top, side and end view Momentus 5400.3 PATA Blade Server Product Manual, Rev.

B 23 24 Momentus 5400.3 PATA Blade Server Product Manual, Rev. B 4.0 ATA interface These drives use the industry-standard ATA task file interface that supports 16-bit data transfers. It supports ATA programmed input/output (PIO) modes 04; multiword DMA modes 02, and Ultra DMA modes 05. The drive also supports the use of the IORDY signal to provide reliable high-speed data transfers. For detailed information about the ATA interface, refer to the draft of AT Attachment with Packet Interface Extension (ATA/ATAPI-6), NCITS T13 1410D, subsequently referred to as the Draft ATA-6 Standard. 4.1 ATA interface signals and connector pins The following table summarizes the signals on the 44-pin ATA interface connector. For a detailed description of these signals, refer to the Draft ATA-6 Standard.

Table 5: Connector signals Connector Contact 1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 Signal Name RESETDD7 DD6 DD5 DD4 DD3 DD2 DD1 DD0 Ground DMARQ DIOWDIORIORDY DMACKINTRQ DA1 DA0 CS1FXDASP+5 V (Logic) Ground (Return) Cable Conductor 1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 Cable Conductor 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 Connector Contact 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 Signal Name Ground DD8 DD9 DD10 DD11 DD12 DD13 DD14 DD15 (keypin) Ground Ground Ground PSYNC:CSEL Ground IOCS16PDIAGDA2 CS3FXGround +5V (Motor) No connection Momentus 5400.



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3 PATA Blade Server Product Manual, Rev. B 25 4.1.1 Supported ATA commands The following table lists ATA-standard commands that the drive supports. For a detailed description of the ATA commands, refer to the Draft ATA-6 Standard... Table 6: Supported commands Command code (in hex) Command name
 ATA-standard commands ATA Device Configuration Overlay ATA Service Check Power Mode Download Microcode Execute Device Diagnostics Flush
 Cache Flush Cache Extended Format Track (Legacy) Identify Device Idle Idle Immediate Initialize Device Parameters Read Buffer Read DMA Read DMA
 Extended Read Log Extended Read Multiple Read Multiple Extended Read Native Max Address Read Native Max Address Extended Read Sectors Read
 Sectors Extended Read Verify Sectors Read Verify Sectors Extended Recalibrate Security Disable Password Security Erase Prepare Security Erase Unit
 Security Freeze Lock Security Set Password B1H A2H 98H, E5H 92H 90H E7H EAH 50H ECH 97H, E3H 95H, E1H 91H E4H C8H, C9H 25H 22H C4H
 29H F8H 27H 20H, 21H 24H 40H, 41H 42H 10H F6H F3H F4H F5H F1H 26 Momentus 5400.3 PATA Blade Server Product Manual, Rev.
 B Table 6: Supported commands Command code (in hex) F2H 70H 91H EFH F9H Address Password Lock Unlock Freeze Lock C6H 99H, E6H B0H 96H,
 E2H 94H, E0H 9AH, FAH, FBH E8H CAH, CBH 35H 32H C5H 39H 30H, 31H 34H 00H 01H 02H 03H 04H Command name Security Unlock Seek Set Drive
 Parameters Set Features Set Max Address Note: Individual Set Max commands are identified by the value placed in the Set Max Features register as defined
 to the right. Set Multiple Mode Sleep S.M.A.R.T. Standby Standby Immediate Vendor Unique Write Buffer Write DMA Write DMA Extended Write Log
 Extended Write Multiple Write Multiple Extended Write Sectors Write Sectors Extended ATA-standard power-management commands Check Power Mode
 Idle Idle Immediate Sleep Standby Standby Immediate ATA-standard security commands Security Set Password Security Unlock Security Erase Prepare
 Security Erase Unit F1H F2H F3H F4H 98H or E5H 97H or E3H 95H or E1H 99H or E6H 96H or E2H 94H or E0H Momentus 5400.3 PATA Blade Server
 Product Manual, Rev. B 27 Table 6: Supported commands Command code (in hex) F5H F6H Command name Security Freeze Lock Security Disable
 Password 28 Momentus 5400.3 PATA Blade Server Product Manual, Rev.

B 4.1.2 Identify Device command The Identify Device command (command code ECH) transfers information about the drive to the host following power up.
 The data is organized as a single 512-byte block of data, whose contents are shown in Table 6 on page 26. All reserved bits or words should be set to zero.
 Parameters listed with an "x" are drive-specific or vary with the state of the drive. See Section 2.0 on page 3 for default parameter settings. The following
 commands contain drive-specific features that may not be included in the Draft ATA-6 Standard. Word 0 Description Configuration information: · Bit 15: 0 =
 ATA; 1 = ATAPI · Bit 7: removable media · Bit 6: removable controller · Bit 0: reserved Number of logical cylinders ATA-reserved Number of logical heads
 Retired Retired Number of logical sectors per logical track: 63 Retired Serial number: (20 ASCII characters, 0000H = none) Retired Retired Obsolete
 Firmware revision (8 ASCII character string, padded with blanks to end of string) Drive model number (40 ASCII characters, padded with blanks to end of
 string) Value 0C5AH 1 2 3 4 5 6 7 9 10 19 20 21 22 23 26 27 46 16,383 0000H 16 0000H 0000H 003FH 0000H ASCII 0000H 0400H 0000H x.
 xx ST9160821AB ST9120822AB ST9100828AB ST980815AB ST960815AB ST9402116AB 8010H 0000H 2F00H 0000H 0200H 0200H 0007H xxxxH xxxxH
 xxxxH 47 48 49 50 51 52 53 54 55 56 (Bits 70) Maximum sectors per interrupt on Read multiple and Write multiple (16) Reserved Standard Standby timer,
 IORDY supported and may be disabled ATA-reserved PIO data-transfer cycle timing mode Retired Words 5458, 6470 and 88 are valid Number of current
 logical cylinders Number of current logical heads Number of current logical sectors per logical track Momentus 5400.3 PATA Blade Server Product Manual,
 Rev. B 29 Word 5758 59 60 61 Description Current capacity in sectors Number of sectors transferred during a Read Multiple or Write Multiple command
 Total number of user-addressable LBA sectors available (see Section 2.2 for related information) Value xxxxH xxxxH ST9160821AB = 312,581,808
 ST9120822AB = 234,441,648 ST9100828AB = 195,371,568 ST980815AB = 156,301,488 ST960815AB = 117,210,240 ST9402116AB = 78,140,160 0000H
 xx07H 0003H 0078H 0078H 00F0H 0078H 0000H 0000H 0000H 007EH 0000H 346BH 7D01H 4003H 34xxH 3xxxH 4003H xx3FH 0000H 0000H 0040H
 FFFEH xxxxH xxxxH 0000H 0001H 62 63 64 65 66 67 68 69 74 75 76 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 127 128 Retired Multiword DMA
 active and modes supported (see note following this table) Advanced PIO modes supported (modes 3 and 4 supported) Minimum multiword DMA transfer
 cycle time per word (120 nsec) Recommended multiword DMA transfer cycle time per word (120 nsec) Minimum PIO cycle time without IORDY flow control
 (240 nsec) Minimum PIO cycle time with IORDY flow control (120 nsec) ATA-reserved Queue depth ATA-reserved Major version number Minor version
 number Command sets supported Command sets supported Command sets support extension Command sets enabled Command sets enabled Command sets
 enable extension Ultra DMA support and current mode (see note following this table) Security erase time Enhanced security erase time Advanced power
 management value Master password revision code Hardware reset value (see description following this table) Auto acoustic management setting ATA-
 reserved Security status 30 Momentus 5400.3 PATA Blade Server Product Manual, Rev.

B Word 129 159 160 254 255 Description Seagate-reserved ATA-reserved Integrity word Value xxxxH 0000H xxA5H Note. See the bit descriptions below for
 words 63, 88, 93 and 94 of the Identify Drive data. Description (if bit is set to 1) Bit 0 1 2 8 9 10 Word 63 Multiword DMA mode 0 is supported. Multiword
 DMA mode 1 is supported. Multiword DMA mode 2 is supported.

Multiword DMA mode 0 is currently active. Multiword DMA mode 1 is currently active. Multiword DMA mode 2 is currently active. Bit 0 1 2 3 4 8 9 10 11 12
 13 Word 88 Ultra DMA mode 0 is supported. Ultra DMA mode 1 is supported. Ultra DMA mode 2 is supported. Ultra DMA mode 3 is supported. Ultra DMA
 mode 4 is supported. Ultra DMA mode 0 is currently active. Ultra DMA mode 1 is currently active.

Ultra DMA mode 2 is currently active. Ultra DMA mode 3 is currently active. Ultra DMA mode 4 is currently active. Ultra DMA mode 5 is currently active.
 Bit 13 Word 93 1 = 80-conductor cable detected, CBLID above VIH 0 = 40-conductor cable detected, CBLID below VIL Momentus 5400.3 PATA Blade
 Server Product Manual, Rev. B 31 4.1.3 Set Features command This command controls the implementation of various features that the drive supports.



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When the drive receives this command, it sets BSY, checks the contents of the Features register, clears BSY and generates an interrupt. If the value in the register does not represent a feature that the drive supports, the command is aborted. Power-on default has the read look-ahead and write caching features enabled. The acceptable values for the Features register are defined as follows: Table 7: 02H 03H Features register values Enable write cache (default). Set transfer mode (based on value in Sector Count register). Sector Count register values: 00H 01H 08H 09H 0AH 0BH 0CH 20H 21H 22H 40H 41H 42H 43H 44H 45H Set PIO mode to default (PIO mode 2). Set PIO mode to default and disable IORDY (PIO mode 2). PIO mode 0 PIO mode 1 PIO mode 2 PIO mode 3 PIO mode 4 (default) Multiword DMA mode 0 Multiword DMA mode 1 Multiword DMA mode 2 Ultra DMA mode 0 Ultra DMA mode 1 Ultra DMA mode 2 Ultra DMA mode 3 Ultra DMA mode 4 Ultra DMA mode 5 05H 55H 82H AAH F1H Enable advanced power management Disable read look-ahead (read cache) feature. Disable write cache. Enable read look-ahead (read cache) feature (default). Report full capacity available Note. At power-on or after a hardware or software reset the default values of the features are as indicated above. 32 Momentus 5400.3 PATA Blade Server Product Manual, Rev. B 5.0 Internet Seagate Technology support services For information regarding Seagate products and services, visit www.seagate.com. @@@@ @@@@ @spp.seagate.com spp.

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com. Global Customer Support Presales, Technical, and Warranty Support Call Center Toll-free USA, Canada, and Mexico 1-800-SEAGATE Data Recovery Services Call Center USA, Canada, and Mexico Direct dial +1-405-324-4700 Toll-free 1-800-475-01435 Direct dial +1-905-474-2162 FAX 1-800-475-0158 +1-905-474-2459 Europe, the Middle East and Africa Support Services For an extensive list of telephone numbers to technical support, presales and warranty service in Europe, the Middle East and Africa, go to the "Contact Us" page on www.seagate.com. Asia/Pacific Support Services For an extensive list of telephone numbers to technical support, presales and warranty service in Asia/Pacific, go to the "Contact Us" page on www.seagate.com. 34 Momentus 5400.3 PATA Blade Server Product Manual, Rev. B Index Numerics 3D Defense System 1 A acoustics 16 AFR 17 agency certification (regulatory) 17 altitude 14 ambient conditions 3 ambient temperature 11, 14 Annualized Failure Rate 17 areal density 10 ATA interface 25 ATA-standard commands 26 Australian C-Tick 18 autodetection 1 average seek time 11 Diagnostic Defense 1 diagnostic software 1 discs 9 dissipation 12 Download Microcode 26 Drive Defense 1 drive diagnostics 11 drive monitoring 1 drive self-test 1 E electrical fast transient 16 electromagnetic compatibility 17 Electromagnetic Compatibility Directive 17 electromagnetic immunity 16 electrostatic discharge 16 EMC compliance 17 EN 60950 17 enclosures 18 Environmental protection 19 environmental specifications 14 error-correction algorithms 1 errors 17 European Union 17 Execute Device Diagnostics 26 B BPI 10 buffer 1, 10 burst 1 C cable select 1 cable-select option 22 cache 1, 10 case temperature 14 CE mark 17 certification 17 Check Power Mode 27 chemical substances 19 commands 26 compliance 17 conducted noise 13 conducted RF immunity 16 configuring the drive 21 connector pins 25 Corrosive environment 19 CSA C22. 2 (950) 17 CSEL 22 C-Tick 18 current profile 13 cycles 17 F FCC verification 18 Features register 32 Flush Cache 26 Flush Cache Extended 26 formatted capacity 9 frequency 16 G guaranteed sectors 9 H handling 21 heads 9 height 10 humidity 14 I I/O data-transfer rate 10 Identify Device 26 Identify Device command 29 Idle 27 Idle Immediate 27 Idle mode power 12 IEC950 17 Information Technology Equipment 17 Initialize Device Parameters 26 D Data Defense 1 data-transfer rates 1 DC power 12 density 10 Momentus 5400.3 PATA Blade Server Product Manual, Rev. B 35 interface 10, 25 interface signals 25 interference 18 interleave 10 internal data-transfer rate OD 10 ISO document 7779 16 R radiated RF immunity 16 radio and television interference 18 radio frequency (RF) 16 random track location 12 Read Buffer 26 Read DMA 26 Read DMA Extended 26 read errors 17 Read Multiple 1, 26 Read Multiple Extended 26 Read Native Max Address 26 Read Native Max Address Extended 26 Read Sectors 26 Read Sectors Extended 26 Read Verify Sectors 26 Read Verify Sectors Extended 26 read/write heads 9 read/write power and current 12 recording and interface technology 10 recording density 10 recording method 10 register 32 relative humidity 14 reliability 17 resistance 13 RF 16 RoHS 19 J jumper settings 22 K Korean RRL 18 L LBA mode 9 length 10 Load/Unload 17 logical geometry 9 M master/slave 1 Master/slave configuration 22 maximum temperature 14 modes 25 monitoring 1 mounting the drive 21, 23 N noise 13 nominal power 3 nonoperating shock 15 nonoperating vibration 15 nonrecoverable read errors 17 S S.



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