

PREGÃO ELETRÔNICO Nº 015/2020 - Registro de Preços para aquisição de WORKSTATIONS com 02 (dois) MONITORES para atender a demanda da SESP.

Em 26 de maio de 2020,

Empresa: Supriservice Informática Ltda

À Secretaria de Estado da Segurança Pública e Defesa Social

Prezados Senhores,

1 - Compõem nossa Proposta os seguintes anexos:

1.1 - Proposta Comercial Detalhada, com a indicação do preço unitário de cada item e do preço global.

1.2 - Documentos exigidos para Habilitação (conforme Anexo III do Edital).

1.3 - Dados Complementares para Assinatura do Contrato.

2 - O prazo de validade desta proposta é de 60 (sessenta) dias corridos, contados da data limite para o acolhimento da mesma.

3 - Os preços ora propostos incluem todas as despesas diretas, indiretas, benefícios, tributos, contribuições, seguros e licenças de modo a se constituírem à única e total contraprestação pelo fornecimento dos itens.

Atenciosamente,


Ronald Dettmann Alves

Gerente de Contas

Cel.: +55 27 99255 0411

Tel.: +55 27 3211 6600

À SESP - Secretaria de Estado da Segurança Pública e Defesa Social

REF.: EDITAL DE PREGÃO ELETRÔNICO Nº 015/2020 - CPP1 PROCESSO Nº 85624284/2019

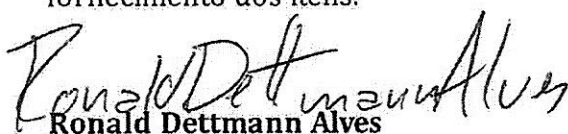
Item	Descrição	Quantidade	Vlr Unit.	Valor Total
01	WORKSTATIONS com 02 MONITORES, conforme especificações contidas no Anexo I-A do Edital.	15	R\$ 14.633,25	R\$ 219.498,75

Marca: Lenovo

Modelo: Workstation P330 com monitores S24E-10

O prazo de validade desta proposta é de 60 (sessenta) dias corridos, contados da data limite para o acolhimento da mesma.

Os preços ora propostos incluem todas as despesas diretas, indiretas, benefícios, tributos, contribuições, seguros e licenças de modo a se constituírem à única e total contraprestação pelo fornecimento dos itens.


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Detalhamento da Proposta Comercial

Partnumbers que compõem a solução:

Part number	Quantidade	Descrição
30D0CTO1WW	15	Workstation TS P330_C246_ES_TW_R_Gen2
TECLA00	15	Teclado Lenovo para ThinkCentre
MOUSE00	15	Mouse Lenovo
61CAKBR1BR	30	MONITOR LENOVO S24E-10 23.8" HDMI
4X90Q93976	15	ADAPTADOR MINI-DP P/ HDMI
5WS0T36135	15	WARRANTY 5Y Premier Support
5WS0W35697	15	5 anos Premier Support (Mon Nac)

- O Partnumber 30D0CTO1WW é composto por:

P330 TWR XEON E-2224G 16GB(1x16GB) 1x 1TB HD 7200RPM 3.5 SATA3 + 1x 256GB SSD M.2
 PCIE OPAL Windows 10 Pro for Workstations Up to 4 Cores 64bits DVD-RW:

Preload Language Windows 10 Pro for Workstations 64 Portuguese (BR)

Platform Tower C246 92% Power 400W

Processor Intel Xeon E-2244G Processor (8MB Cache, 3.80GHz)

Memory Selection 16GB DDR4 2666MHz ECC UDIMM QTY(1)

First PCIe M.2 HDD Selection 256GB Solid State Drive, M.2, PCIe, Opal QTY(1)

First HDD Selection 1TB Hard Drive, 7200RPM, 3.5", SATA3 QTY(1)

First Graphic Card NVIDIA Quadro P1000 4GB (4xMini DP) High Profile

UltraSlim ODD Slim DVD Rambo 9.0mm Windows 10

Media Card Reader 7 in 1 Card Reader

IEEE 1394 No 1394 Adapter Selected

Audio Card Integrated Audio

SMA Chassis Intrusion Switch Tower

Lenovo Tecnologia (Brasil) Ltda
CNPJ/MF: 07.275.920/0001-61
Inscrição Estadual nº 387.119.123.110

São Paulo, 09 de Abril de 2020

**À
SECRETARIA DE ESTADO DA SEGURANÇA PÚBLICA E DEFESA SOCIAL
EDITAL PE Nº 015/2020**

DECLARAÇÃO

Declaramos nos termos do Edital em referência, que a empresa **SUPRISERVICE INFORMÁTICA LTDA.**, inscrita no CNPJ/MF sob o nº **03.607.073/0001-34**, sediada na **PRAÇA SAN MARTIN, 84 - LOJAS 15 E 16 - PRAIA DO CANTO - VITÓRIA/ES - CEP: 29055-170**, é uma Revenda Autorizada, estando apto a comercializar os produtos de fabricação Lenovo.

Produtos:

Part Number	Família	SLA
30D0002QBR	ThinkStation P330	5WS0Q11728 / 5WS0T36135 Garantia de 3 para 5 anos Onsite - Premier Support 5 anos Onsite NBD / UpGrade de 3 anos OS
61CAKBR1BR	Lenovo 23.8 Wide S24e	5WS0H75824 / 5WS0W35697 Manutenção (OS) 5 anos - Monitor Lenovo (Nacional) - Premier Support (OS) - Período 5 anos - Monitor Nacional

Declaramos que:

- Os produtos citados acima são novos, pertencem à linha corporativa, estão em linha de produção pelos próximos 90 dias, que não foram submetidos a uso, nem recondicionamento, com exceção de testes de fábrica.
- A garantia e serviços de assistência técnica para todos os equipamentos ofertados, estão conforme solicitados no Edital.
- Possuem BIOS com direitos Copyright e placa mãe fabricada pela Lenovo.
- Os modelos de equipamentos ofertados atendem as diretivas ROHS de fabricação.
- Os equipamentos, mouse, teclado e monitor possuem o mesmo padrão de cor e são de fabricação Lenovo.
- Os modelos de processadores ofertados possuem processo de fabricação em vigor por pelo menos 90 (noventa) dias após publicação do Edital, pertencente a Segunda Geração de Processadores Intel Xeon E, com codinome Coffee Lake.
- A Lenovo é fabricante de suas systemboards (placas-mãe), inclusive para o modelo ThinkStation P330 Tower ofertado, e não utiliza placas de livre comercialização no mercado.
- A BIOS do modelo ThinkStation P330 Tower ofertado, é atualizável diretamente pelo sistema operacional, e possui a capacidade de habilitar e/ou desabilitar individualmente as interfaces USB e SATA.

Página 1 de 3

Sede Social: Estrada Municipal José Costa de Mesquita, 200 - Módulos 5 A 10 - Bairro Sapezal - CEP 13337-200 Indaiatuba - SP
Escritório Administrativo: E-Business Park, R. Werner Von Siemens, 111 - Torre A - 3º / 4º Andar - CEP 05069-010 São Paulo - SP

Lenovo

- A BIOS dos modelos ThinkStation P330 Tower ofertado, possui campos com os números de série exclusivos dos equipamentos, podendo os mesmos serem lidos remotamente via comandos DMI ou SMBIOS.
- O equipamento vai acompanhado com cabo VGA e um Cabo com uma ponta HDMI e na outra ponta mini DisplayPort de 1.8 metros de comprimento.
- Lenovo Brasil é desenvolvedora das versões de BIOS que são utilizadas em seus equipamentos, inclusive para o modelo ThinkStation P330 Tower ofertado e ainda, declara que esta BIOS é específica para atender as características definidas especificamente para os modelo de systemboard (placas-mãe) utilizado, e ainda por meio desta, declara que desenvolve sua BIOS seguindo as especificações e normas internacionais regidas pela Unified Extensible Firmware Interface (<http://www.uefi.org/specifications>), a qual inclusive consta como "PROMOTER MEMBERSHIP LIST", em consulta a url: <http://www.uefi.org/members>.
- Os equipamentos de modelo ThinkStation P330 Tower ofertados, suportam o padrão S.M.A.R.T III.
- Os equipamentos de modelo ThinkStation P330 Tower ofertados são licenciados para Windows 10 Pro for workstation até 4 núcleos com a chave de ativação embarcada na BIOS do equipamento.
- Como características de produtos e serviços de alta qualidade adotados como padrão pela Lenovo, o número de série de cada equipamento é único e afixado em local visível na parte externa do seu gabinete, bem como na embalagem que o armazena.
- Todos os equipamentos do LOTE 01 serão iguais, conforme proposta comercial, apresentando exatamente as mesmas configurações, e as mesmas aparências externas.
- Todos os equipamentos aqui descritos e ofertados, a serem entregues serão idênticos, ou seja, todos os componentes externos e internos conforme informados em Proposta Comercial. A Lenovo reserva-se da premissa, conforme adotado como exigência mínima no Edital, em que caso componente não mais se encontre disponível no mercado, admitem-se substitutos com qualidade e características idênticas ou superiores, mediante apresentação de declaração técnica.
- Todos as unidades do equipamento serão entregues devidamente acondicionadas em embalagens individuais adequadas, conforme os padrões e normas internacionais de segurança, já adotadas, os quais utilizam preferencialmente materiais recicláveis, de forma a garantir a máxima proteção e segurança durante o transporte e armazenagem.
- O modelo ThinkStation P330 Tower ofertado, possui solução da Lenovo, que permite monitorar o sistema, realizar diagnósticos, emitir alertas e ajudar a reparar erros do sistema, e ainda, que possuem solução da Lenovo que permite a verificação e instalação das últimas atualizações pela Lenovo.

Informamos ainda que a Lenovo Tecnologia (Brasil) Limitada é responsável pelo atendimento "on site" da garantia padrão dos equipamentos conforme o Termo de Garantia Padrão da Lenovo.

A Lenovo dispõe de telefone gratuito 0800-701-4815 (ligações fora da cidade de São Paulo) e 11 3889-8986 (ligações da cidade de São Paulo) para abertura de chamados técnicos em Língua Portuguesa e service desk. Declara ainda que os drivers, atualizações e suporte dos produtos Lenovo estão disponíveis para download no site: http://support.lenovo.com/pt_BR/.

Fls. Nº 463

Nº PROCESSO

95624284

Lenovo

A presente declaração foi emitida em atendimento ao edital acima.

Atenciosamente,



LENOVO TECNOLOGIA (BRASIL) LIMITADA.

Geraldo Rodrigues - Representante Legal



Intel® C246 Chipset

Especificações

Especificações de exportação

Essenciais

Coleção de produtos

Intel® C240 Series Chipsets

Codiname

Produtos com denominação anterior Coffee Lake

Status

Launched

Data de introdução

Q3'18

TDP

6 W

Preço recomendado para o cliente

\$49.00

Informações complementares

Opções integradas disponíveis

Sim

Especificações de memória

Nº de DIMMs por canal

2

Opções de expansão

Suporte para PCI

Não

Revisão de PCI Express

Gen3

Nº máximo de linhas PCI Express

24

Especificações de E/S

 Brasil (Português)   

Nº de portas USB	14
USB Configuration(Configuração do USB)	10 Total USB 3.1 Ports - Up to 6 USB 3.1 Gen 2 Ports - Up to 10 USB 3.1 Gen 1 Ports 14 USB 2.0 Ports
Revisão de USB	3.1/2.0
Nº máximo de portas SATA 6.0 Gb/s	8
Configuração RAID	0/1/5/10
LAN integrada	Integrated MAC
Rede sem fio integrada†	Intel® Wireless-AC MAC
Revisão de porta PCI Express de processador compatível	3
Configurações de porta PCI Express de processador compatível	24

Especificações de encapsulamento

Opções de Halógena Baixa Disponíveis	No
--------------------------------------	----

Tecnologias avançadas

Memória Intel® Optane™ suportada ‡	Sim
Tecnologia de virtualização Intel® para E/S direcionada (VT-d) ‡	Sim
Elegibilidade da plataforma Intel® vPro™ ‡	Sim
Versão do Intel® ME Firmware	12.0
Tecnologia de áudio de alta definição Intel®	Sim
Tecnologia de armazenamento Intel® Rapid	Sim
Tecnologia de armazenamento Intel® Rapid para empresas	Sim
Intel® Standard Manageability	Sim
Tecnologia Intel® de resposta inteligente	Não
Tecnologia de armazenamento Intel® Rapid para armazenamento PCI	Sim



Tecnologia confiável de plataforma Intel®

Brasil (Português)

Segurança e confiabilidade

Intel® Trusted Execution Technology ‡

Sim

Pedidos e conformidade

Produtos compatíveis

Todas as informações fornecidas estão sujeitas a alterações a qualquer momento, sem aviso prévio. A Intel pode alterar o ciclo de vida da fabricação, as especificações e as descrições dos produtos a qualquer momento, sem aviso prévio. As informações aqui contidas são fornecidas "no estado em que se encontram" e a Intel não atribui qualquer declaração ou garantias relacionadas à precisão das informações, nem sobre os recursos dos produtos, disponibilidade, funcionalidade ou compatibilidade dos produtos listados. Para obter mais informações sobre os produtos ou sistemas, entre em contato com o fornecedor do sistema.

As classificações da Intel são apenas para fins informativos e consistem em Export Control Classification Numbers (ECCN — Número de Classificação de Controle de Exportações) e Harmonized Tariff Schedule (HTS — Programa de Tarifas Harmonizadas). Quaisquer usos das classificações da Intel são sem os recursos da Intel e não devem ser interpretados como uma representação ou garantia relacionada ao ECCN ou HTS apropriado. Como exportadora e/ou importadora, sua empresa é responsável por determinar a classificação correta de sua transação

Consulte a Ficha técnica para obter definições formais de propriedades e recursos de produtos.

‡ Este recurso pode não estar disponível em todos os sistemas de computação. Verifique com o fornecedor do sistema para determinar se seu sistema oferece este recurso ou consulte as especificações de seu sistema (motherboard, processador, chipset, alimentação, HDD, controle gráfico, memória, BIOS, drivers, monitor de máquina virtual [VMM], software de plataforma e/ou sistema operacional) para saber sobre a compatibilidade do recurso. A funcionalidade, o desempenho e outros benefícios deste recurso podem variar, dependendo das configurações do sistema.

Intel® Standard Manageability requer ativação e um sistema com uma conexão de rede corporativa, um chipset habilitado para Intel® ME Firmware, hardware e software de rede. Para notebooks, a tecnologia Intel® ME Firmware pode estar indisponível ou limitada em uma VPN baseada em SO host, com conexão sem fio usando apenas bateria ou em estado de repouso, hibernando ou desligado. Os resultados dependem do hardware, da instalação e da configuração. Para obter mais informações, acesse <http://www.intel.com/content/www/br/pt/architecture-and-technology/intel-active-management-technology.html>

O TDP máximo e do sistema se baseiam nos piores casos. O TDP real pode ser inferior, se nem todas as E/Ss para chipsets forem utilizadas.

SKUs "anunciados" ainda não estão disponíveis. Favor consultar a data de lançamento para a disponibilidade no mercado.

A Tecnologia Intel® de resposta inteligente requer um processador Intel® Core™ exclusivo, um chipset habilitado, o software Tecnologia de armazenamento Intel® Rapid e uma unidade híbrida (disco rígido + unidade de estado sólido pequena) configurada corretamente. Dependendo da configuração do sistema, seus resultados podem variar. Para obter informações, entre em contato com o fabricante do seu sistema.

Informações sobre a empresa

 Nosso compromisso

Brasil (Português)   

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Intel® Core™ i7-9700 Processor

12M Cache, up to 4.70 GHz

Especificações

Especificações de exportação

Essenciais

Coleção de produtos

9ª geração de processadores Intel® Core™ i7

Codiname

Produtos com denominação anterior Coffee Lake

Segmento vertical

Desktop

Número do processador

i7-9700

Status

Launched

Data de introdução

Q2'19

Litografia

14 nm

Condições de uso

PC/Client/Tablet

Preço recomendado para o cliente

\$323.00 - \$335.00

Desempenho

Número de núcleos

8

Nº de threads

8

Frequência baseada em processador

3.00 GHz

Frequência turbo max

4.70 GHz

Cache

12 MB SmartCache

Velocidade do barramento

8 GT/s DMI3



TDP

Brasil (Português)



65W



Informações complementares

Opções integradas disponíveis

Não

Ficha
técnica

Ver agora

Especificações de memória

Tamanho máximo de memória (de acordo com o tipo de memória)

128 GB

Tipos de memória

DDR4-2666

Nº máximo de canais de memória

2

Largura de banda máxima da memória

41.6 GB/s

Compatibilidade com memória ECC ‡

Não

Gráficos de processador

Gráficos do processador ‡

Gráficos UHD Intel® 630

Frequência da base gráfica

350 MHz

Máxima frequência dinâmica da placa gráfica

1.20 GHz

Quantidade máxima de memória gráfica de vídeo

64 GB

Suporte para 4K

Yes, at 60Hz

Resolução máxima (HDMI 1.4)‡

4096x2304@24Hz

Resolução máxima (DP)‡

4096x2304@60Hz

Resolução máxima (eDP - tela plana integrada)‡

4096x2304@60Hz

Suporte para DirectX*

12

Suporte para OpenGL*

4.5

Intel® Quick Sync Video

Sim

Tecnologia Intel® InTru™ 3D

Sim

Tecnologia de alta definição Intel® Clear Video

Sim



Intel® Clear Video Technology

Nº de telas suportadas †

3

ID do dispositivo

0x3E98

Opções de expansão

Escalabilidade

1S Only

Revisão de PCI Express

3.0

Configurações PCI Express †

Up to 1x16, 2x8, 1x8+2x4

Nº máximo de linhas PCI Express

16

Especificações de encapsulamento

Soquetes suportados

FCLGA1151

Configuração máxima da CPU

1

Especificação de solução térmica

PCG 2015C (65W)

T_{JUNCTION}

100°C

Tamanho do pacote

37.5mm x 37.5mm

Tecnologias avançadas

Memória Intel® Optane™ suportada †

Sim

Tecnologia Intel® Turbo Boost †

2.0

Elegibilidade da plataforma Intel® vPro™ †

Sim

Tecnologia Hyper-Threading Intel® †

Não

Tecnologia de virtualização Intel® (VT-x) †

Sim

Tecnologia de virtualização Intel® para E/S direcionada (VT-d) †

Sim

Intel® VT-x com Tabelas de página estendida (EPT) †

Sim

Intel® TSX-NI

Sim

Intel® 64 †

Sim

≡	Conjunto de instruções	Brasil (Português) 64-bit
	Extensões do conjunto de instruções	Intel® SSE4.1, Intel® SSE4.2, Intel® AVX2
	Estados ociosos	Sim
	Tecnologia Enhanced Intel SpeedStep®	Sim
	Tecnologias de monitoramento térmico	Sim
	Tecnologia de proteção da identidade Intel® ‡	Sim
	Programa Intel® da Plataforma de Imagem Estável (SIPP)	Sim

Segurança e confiabilidade

Novas instruções Intel® AES	Sim
Chave Segura	Sim
Intel® Software Guard Extensions (Intel® SGX)	Yes with Intel® ME
Intel® Memory Protection Extensions (Intel® MPX)	Sim
Intel® OS Guard	Sim
Intel® Trusted Execution Technology ‡	Sim
Bit de desativação de execução ‡	Sim
Intel® Boot Guard	Sim

Pedidos e conformidade

Produtos compatíveis

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Consulte a Ficha técnica para obter definições formais de propriedades e recursos de produtos.

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O TDP máximo e do sistema se baseiam nos piores casos. O TDP real pode ser inferior, se nem todas as E/Ss para chipsets forem utilizadas.

Alguns produtos suportam as novas instruções AES com uma atualização da Configuração do processador, em particular, i7-2630QM/i7-2635QM, i7-2670QM/i7-2675QM, i5-2430M/i5-2435M, i5-2410M/i5-2415M. Favor entrar em contato com o OEM para o BIOS que inclui a mais recente atualização da Configuração do processador.

Frequência máxima de turbo refere-se à frequência máxima do processador de núcleo único que pode ser atingida com a Tecnologia Intel® Turbo Boost. Mais informações estão disponíveis no site www.intel.com/content/www/br/pt/architecture-and-technology/turbo-boost/turbo-boost-technology.html

Consulte <http://ipt.intel.com/> para sistemas compatíveis com a Tecnologia de proteção da identidade Intel®.

Os números dos processadores Intel não são indicação de desempenho. Os valores do processador diferenciam recursos dentro de cada família de processador e não entre famílias diferentes de processador. Consulte <http://www.intel.com.br/content/www/br/pt/processors/processor-numbers.html> para obter mais detalhes.

Consulte <http://www.intel.com/content/www/br/pt/architecture-and-technology/hyper-threading/hyper-threading-technology.html?wapkw=hyper+threading>

para obter mais informações, incluindo detalhes sobre quais processadores são compatíveis com a Tecnologia Hyper-Threading Intel®.

Os processadores compatíveis com a computação de 64 bits na arquitetura Intel® requerem BIOS habilitados para arquitetura Intel 64.

SKUs "anunciados" ainda não estão disponíveis. Favor consultar a data de lançamento para a disponibilidade no mercado.



Informações sobre a empresa

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Empregos





Brasil (Português) 



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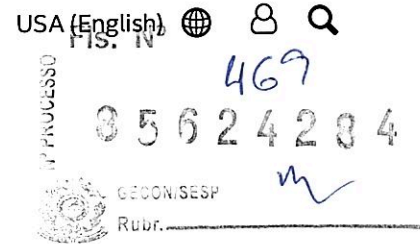
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Intel® Xeon® E-2244G Processor

8M Cache, 3.80 GHz

Specifications

Export specifications

Essentials

Product Collection	Intel® Xeon® E Processor
Code Name	Products formerly Coffee Lake
Vertical Segment	Server
Processor Number	E-2244G
Status	Launched
Launch Date	Q2'19
Lithography	14 nm
Recommended Customer Price	\$272.00

Performance

# of Cores	4
# of Threads	8
Processor Base Frequency	3.80 GHz
Max Turbo Frequency	4.80 GHz
Cache	8 MB Intel® Smart Cache
Bus Speed	8 GT/s
TDP	71 W

Supplemental Information

Embedded Options Available	No
Description	Support for up to 128GB system memory may require a BIOS update. Please contact your hardware provider regarding availability for your system.
Datasheet	View now
Product Brief	View now



Memory Specifications

USA (English)

Max Memory Size (dependent on memory type)	128 GB
Memory Types	DDR4-2666
Max # of Memory Channels	2
ECC Memory Supported †	Yes

Processor Graphics

Processor Graphics ‡	Intel® UHD Graphics P630
Graphics Base Frequency	350 MHz
Graphics Max Dynamic Frequency	1.20 GHz
Graphics Video Max Memory	128 GB
4K Support	Yes, at 60Hz
Max Resolution (HDMI 1.4)‡	4096x2160@24Hz
Max Resolution (DP)‡	4096x2304@60Hz
Max Resolution (eDP - Integrated Flat Panel)‡	4096x2304@60Hz
Max Resolution (VGA)‡	N/A
DirectX* Support	12
OpenGL* Support	4.5
Intel® Quick Sync Video	Yes
Intel® InTru™ 3D Technology	Yes
Intel® Clear Video HD Technology	Yes
Intel® Clear Video Technology	Yes
# of Displays Supported ‡	3
Device ID	0x3E96

Expansion Options

Scalability	1S Only
PCI Express Revision	3.0
PCI Express Configurations ‡	1x16,2x8,1x8+2x4
Max # of PCI Express Lanes	16

Package Specifications

Sockets Supported	FCLGA1151
Max CPU Configuration	1

T_{CASE}

USA (English)



69°C

Rubr.

100

T_{JUNCTION}

Package Size

37.5 mm x 37.5 mm

Advanced Technologies

Intel® Optane™ Memory Supported ‡	Yes
Intel® Turbo Boost Technology ‡	2.0
Intel® vPro™ Platform Eligibility ‡	Yes
Intel® Hyper-Threading Technology ‡	Yes
Intel® Virtualization Technology (VT-x) ‡	Yes
Intel® Virtualization Technology for Directed I/O (VT-d) ‡	Yes
Intel® VT-x with Extended Page Tables (EPT) ‡	Yes
Intel® Transactional Synchronization Extensions	Yes
Intel® 64 ‡	Yes
Instruction Set	64-bit
Instruction Set Extensions	Intel® SSE4.1, Intel® SSE4.2, Intel® AVX2
Idle States	Yes
Enhanced Intel SpeedStep® Technology	Yes
Thermal Monitoring Technologies	Yes

Security & Reliability

Intel® AES New Instructions	Yes
Secure Key	Yes
Intel® Software Guard Extensions (Intel® SGX)	Yes with Intel® ME
Intel® Memory Protection Extensions (Intel® MPX)	Yes
Intel® OS Guard	Yes
Intel® Trusted Execution Technology ‡	Yes
Execute Disable Bit ‡	Yes
Intel® Boot Guard	Yes

[Ordering and Compliance](#)[Compatible Products](#)[Downloads and Software](#)

All information provided is subject to change at any time, without notice. Intel may make changes to manufacturing life cycle, specifications, and product descriptions at any time, without notice. The information herein is provided "as-is" and Intel does not make any representations or warranties whatsoever regarding accuracy of the information, nor on the product features, availability, functionality, or compatibility of the products listed. Please contact system vendor for more information on specific products or systems.

Intel classifications are for informational purposes only and consist of Export Control Classification Numbers (ECCN) and Harmonized Tariff Schedule (HTS) numbers. Any use made of Intel classifications are without recourse to Intel and shall not be construed as a representation or warranty regarding the proper ECCN or HTS. Your company as an importer and/or exporter is responsible for determining the correct classification of your transaction.

Refer to Datasheet for formal definitions of product properties and features.

‡ This feature may not be available on all computing systems. Please check with the system vendor to determine if your system delivers this feature, or reference the system specifications (motherboard, processor, chipset, power supply, HDD, graphics controller, memory, BIOS, drivers, virtual machine monitor-VMM, platform software, and/or operating system) for feature compatibility. Functionality, performance, and other benefits of this feature may vary depending on system configuration.

Max Turbo Frequency refers to the maximum single-core processor frequency that can be achieved with Intel® Turbo Boost Technology. See www.intel.com/technology/turboboost/ for more information.

System and Maximum TDP is based on worst case scenarios. Actual TDP may be lower if not all I/Os for chipsets are used.

"Announced" SKUs are not yet available. Please refer to the Launch Date for market availability.

Intel processor numbers are not a measure of performance. Processor numbers differentiate features within each processor family, not across different processor families. See <http://www.intel.com/content/www/us/en/processors/processor-numbers.html> for details.

Some products can support AES New Instructions with a Processor Configuration update, in particular, i7-2630QM/i7-2635QM, i7-2670QM/i7-2675QM, i5-2430M/i5-2435M, i5-2410M/i5-2415M. Please contact OEM for the BIOS that includes the latest Processor configuration update.

See <http://www.intel.com/content/www/us/en/architecture-and-technology/hyper-threading/hyper-threading-technology.html?wapkw=hyper+threading>

for more information including details on which processors support Intel® HT Technology.

Processors that support 64-bit computing on Intel® architecture require an Intel 64 architecture-enabled BIOS.

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USA (English)   



ThinkStation P330

POWER OF A
WORKSTATION
PRICE OF A
DESKTOP



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Lenovo

ThinkStation

P330 TOWER & SMALL FORM FACTOR



POWER OF A WORKSTATION PRICE OF A DESKTOP

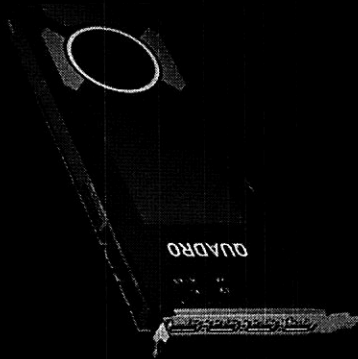
Mission-critical tasks require superior reliability and powerful performance; the ThinkStation® P330 leads on both counts and does it with exceptional all-around value. These redesigned workstations offer the latest high-performance Intel® Core™ i and Xeon® processors, NVIDIA® Quadro® professional graphics, with VR Ready capability, cutting-edge storage technologies, including on-board M.2, and Intel® Optane™ memory; now in a 30% smaller package.

OPTIONS & ACCESSORIES

ThinkVision P27q ▶



▶ NVIDIA® Quadro P4000



Front Access ▶
Storage Enclosure



Lenovo

Lenovo™ ThinkStation® P330 TWR & SFF

PERFORMANCE

Processor

Intel® Xeon® E-2100
Up to 8th Gen Intel® Core™ i7
with vPro

Operating System

Windows 10 Pro for Workstations¹
Windows 10 Pro²

Ubuntu Linux (pre-load)
Redhat Linux (certified)

Graphics

Up to NVIDIA® Quadro® P4000³
Intel® UHD Graphics

Total Memory

Up to 64GB 2666MHz, 4 DIMM Slots
ECC/non-ECC UDIMM DDR4

Memory DIMM Capacity

4/8/16GB 2666MHz non-ECC UDIMM
8/16GB 2666MHz ECC UDIMM

Total Storage

TWR⁴

Max M.2 = 3 (3TB)
Max 3.5" = 3 (12TB)
Max 2.5" = 4 (4TB)
SFF⁴
Max M.2 = 3 (3TB)
Max 3.5" = 1 (4TB)
Max 2.5" = 2 (2TB)

Storage Type Capacity

3.5" SATA 7200 rpm up to 4TB
2.5" SATA SSD up to 1TB
M.2 PCIe SSD up to 1TB

Optane Support

Intel® Optane™ 32GB Memory

Raid

0, 1, 5⁵, 10⁵

Chipset

Intel® C246

Power Supply

TWR

250W 92% Efficient
400W 92% Efficient
SFF
210W 85% Efficient
260W 92% Efficient

CONNECTIVITY

Front Ports

(2) USB 3.1 Gen 1 (Type A)
(2) USB 3.1 Gen 2 (Type A)
(1) USB 3.1 Gen 1 (Type C)
(1) Microphone
(1) Headset
(1) 7-in-1 Media Card Reader⁶
(1) Thunderbolt™ 3 (Type-C)^{5, 6, 7}
(1) 1394 IEEE Firewire^{5, 6}
(1) eSATA^{5, 6}

Rear Ports

(2) USB 3.1 Gen 1 (Type A)
(2) USB 2.0 (Type A)
(2) DisplayPort™
(1) HDMI⁶
(1) PS/2
(1) Serial
(1) Gigabit Ethernet
(1) Audio Line-out

Wi-Fi⁶

Intel® 9560 2x2 vPro

Expansion Slots⁵

1 x PCIe x16
1 x PCIe x4 (x16 Mechanical)
1 x PCIe x1

DESIGN

Dimensions

TWR - 10.6kg (23.4lb)
(mm) : H 376 x W 165 x D 328
(inches): H 14.8" x W 6.5" x D 12.9"
SFF - 6kg (13.2lb)
(mm) : H 343.5 x W 92.5 x D 305.6
(inches): H 13.5" x W 3.7" x D 12.0"

SOFTWARE

Windows 10 Preloads
Cyberlink® PowerDVD⁸
Cyberlink® Power2Go⁹
Lenovo™ Vantage
Microsoft® Office 2016 (trial)
Microsoft® LinkedIn

ISV CERTIFICATIONS

3DEXperience® (CATIA®), Alias®,
AutoCAD®, Barco®, Creo®,
HyperWorks®, Inventor®,
McKesson®, Microstation®,
NX®, Revit®, Solid Edge®,
SolidWorks®, Teamcenter®,
Tecnomatix®, Vectorworks®

GREEN CERTIFICATIONS

ENERGY STAR® 7.0
EPEAT™ GOLD
GREENGUARD®
80 PLUS® Platinum - 400W,
250W, 260W PSU
80 PLUS® Bronze - 210W PSU

OPTIONS & ACCESSORIES

ThinkVision® P27q Monitor
NVIDIA® Quadro® P4000
Front Access Storage Enclosure

For full list of accessories and options,
please visit <http://accessmartfind.lenovo.com>

- 1 Intel® Xeon® Processors only
- 2 Intel® Core™ i Processors only
- 3 Only available on Tower with 400W power supply
- 4 Any combination of storage to equal maximum storage drives
- 5 Tower only
- 6 Optional
- 7 Via FLEX Module
- 8 Only models with DVD/DVD RW
- 9 Only models with DVD RW

RECOMMENDED SERVICES

Premier Support^{10, 11}

Provides direct access to skilled and experienced Lenovo technicians offering comprehensive hardware and software support. Gives you a consistent point of contact within Lenovo to ensure that your case resolution is professionally managed from start to finish.

Onsite Service with Tech Install CRU¹⁰

Onsite Service maximizes PC uptime and productivity by providing convenient, fast repair service at your place. In addition, with Tech Install CRU service the installation of all internal Customer Replaceable Unit (CRU) parts will be done on your behalf by a trained technician.

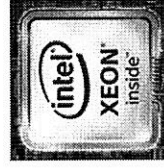
Warranty Extensions¹⁰

This fixed-term, fixed-cost service helps you accurately budget for PC expenses, protect your valuable investment, and lower the cost of ownership over time.

Keep Your Drive¹⁰

Retain your drive if it should happen to fail, giving you the peace of mind of knowing that your valuable data is secure.

10 Up to 5 years total duration
11 May not be available in all regions



Powered by Intel®
Xeon™ processors.
Intel Inside®. Powerful
Productivity Outside.

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PROCESSO

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CONSESP

EPEAT Registry

Your Resource for Sustainable Electronics



ThinkStation P330 Tower

PRODUCT SUMMARY:

Product Type:	Workstation
Country:	United States
Manufacturer:	Lenovo
EPEAT Rating:	Silver
Registration Date:	2019-01-16
Product Status:	Active
Exceptions:	
Manufacturer Part Number(s):	

EPEAT RATING SCORE DETAIL

For a product to be listed on the EPEAT Registry, it must, at a minimum, meet the applicable "required" criteria. [Click here](#) to see a list of the required criteria for this product category.

This product has met the necessary required criteria.

Along with required criteria, products can also meet optional criteria and score optional points. It is not required for a product to achieve any optional points.

- Products that meet all required criteria and achieve less than 50% of the optional points are rated at **EPEAT Bronze**.
- Products that meet all required criteria and achieve 50 - 74% of the optional points are rated at **EPEAT Silver**.
- Products that meet all required criteria and achieve 75 - 100% of the optional points are rated at **EPEAT Gold**.

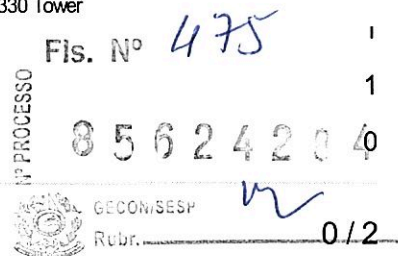
The optional criteria for this product category and optional points achieved by this product are listed below.

Optional Criteria	Scores
▼ 4.1 Substance Management	10 / 16
(4.1.2.1) Restrictions of the use of cadmium	1
(4.1.4.1) Restriction of the use of beryllium	1
(4.1.5.2) Further reduction of bromine and chlorine content of plastic materials	0
(4.1.6.1) Avoidance or elimination of substances on EU REACH Annex XIV (authorization list)	1
(4.1.6.2) Reduction of substances on the EU REACH Candidate List of SVHCs	0
(4.1.8.1) Chemical assessment and selection	0
(4.1.9.1) IEC 62474 declarable substances	0
(4.1.9.2) Requesting substance inventory	1
(4.1.9.3) Acquiring substance inventory	2
(4.1.10.1) Reduce fluorinated gas emissions from flat panel display manufacturing	2
(4.1.10.2) Reduce fluorinated greenhouse emissions from semiconductor production	2
▼ 4.2 Materials Selection	0 / 3
(4.2.1.2) Higher post-consumer recycled, ITE-derived post-consumer recycled plastic, or bio-based content	0
(4.2.1.3) Post-consumer recycled, ITE-derived post-consumer recycled plastic	0
▼ 4.4 Product longevity/life-cycle extension	2 / 3

(4.4.2.2) Publicly available service information

(4.4.2.5) Product upgradeability and repairability

(4.4.2.6) Removal of lithium ion batteries



▼ 4.5 Energy Conservation

(4.5.1.3) Energy efficiency for internal power supplies

▼ 4.7 Packaging

(4.7.3.2) Packaging composed of recycled, and/or biobased, and/or sustainably forested content

(4.7.4.1) Offering of a bulk packaging option

▼ 4.8 Life cycle assessment and carbon footprint

(4.8.1.1) Product life cycle assessment and public disclosure of analyses

(4.8.1.2) Product specific greenhouse gas emissions—product carbon footprint

(4.8.2.1) Corporate carbon footprint

(4.8.2.2) Greenhouse gas emissions from product transport

▼ 4.9 Corporate Environmental Performance

(4.9.1.2) Third party certified environmental management system (EMS) for supplier manufacturing facilities

(4.9.2.2) Corporate environmental performance reporting by suppliers

(4.9.3.1) Energy management system/energy performance improvement – manufacturers

(4.9.3.2) Energy management system/energy performance improvement for suppliers

(4.9.4.1) Renewable energy use by manufacturer

(4.9.4.2) Renewable energy use by manufacturer suppliers

▼ 4.10 Corporate social responsibility

(4.10.1.1) Socially responsible supplier manufacturing: Labor

(4.10.1.2) Socially responsible manufacturing: OHS

(4.10.2.2) Participation in an in-region program that advances responsible sourcing of conflict minerals

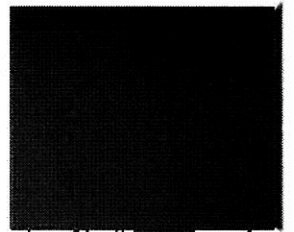
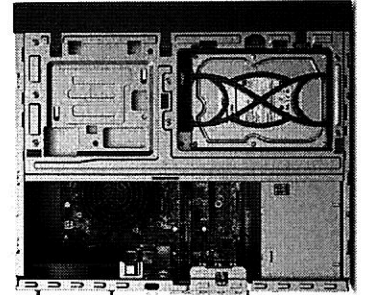
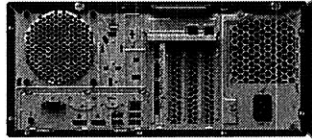
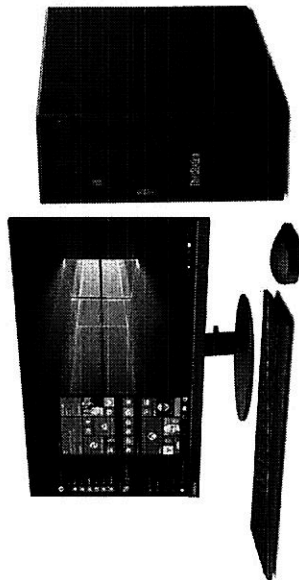
(4.10.2.3) Smelter and refiner participation in OECD-aligned third party mechanisms

Total Optional Criteria Score**26 / 47**

Please note that it is not required for a product to achieve any optional points.

Some optional criteria may not be applicable to a product. Optional criteria that are not applicable (N/A) to the product are not included in the Total Optional Criteria Score, and are not reflected above.

For any questions, comments, or feedback regarding the EPEAT Registry, please [contact us \[mailto:lfernandez@greenelectronicscouncil.org\]](mailto:lfernandez@greenelectronicscouncil.org).



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ThinkStation P330 Tower Gen 2 (30CY and 30D0) Platform Specifications - I of II

Components		Specification			
Form factor	18L Tower				
Dimensions	Height: 376 mm (14.8 in). Width: 165 mm (6.5 in). Depth: 328 mm (12.9 in)				
Weight	Maximum configuration: 28.22 lb (12.8kg)				
Supports one of the following processors:					
Processor	Xeon E-2286G	6C/12T/4.0GHz/12MB/95W/DDR4-2666 400W PSU needed			
	Xeon E-2278G	8C/16T/3.4GHz/16MB/80W/DDR4-2666 400W PSU needed			
	Xeon E-2276G	6C/12T/3.8GHz/12MB/80W/DDR4-2666			
	Xeon E-2274G	4C/8T/4.0GHz/8MB/83W/DDR4-2666			
	Xeon E-2246G	6C/12T/3.6GHz/12MB/80W/DDR4-2666			
	Xeon E-2244G	4C/8T/3.8GHz/8MB/71W/DDR4-2666			
	Xeon E-2236	6C/12T/3.4GHz/12MB/80W/DDR4-2666			
	Xeon E-2234	4C/8T/3.6GHz/8MB/71W/DDR4-2666			
	Xeon E-2226G	6C/6T/3.4GHz/12MB/80W/DDR4-2666			
	Xeon E-2224G	4C/4T/3.5GHz/8MB/71W/DDR4-2666			
	Xeon E-2224	4C/4T/3.4GHz/8MB/71W/DDR4-2666			
	Xeon E-2186G	6C/12T/3.8GHz/12MB/95W/DDR4-2666 400W PSU needed			
	Xeon E-2174G	4C/8T/3.8GHz/8MB/71W/DDR4-2666			
	Pentium Gold G5620	2C/4T/4.0GHz/4MB/54W/DDR4-2400			
	Core i9-9900	8C/16T/3.1GHz/16MB/65W/DDR4-2666			
	Core i7-9700K	8C/8T/3.6GHz/12MB/95W/DDR4-2666 400W PSU needed			
Core i7-9700	8C/8T/3.0GHz/12MB/65W/DDR4-2666				
Core i7-8700	6C/12T/3.2GHz/12MB/65W/DDR4-2666				
Core i5-9600K	6C/6T/3.7GHz/9MB/95W/DDR4-2666 400W PSU needed				
Core i5-9600	6C/6T/3.1GHz/9MB/65W/DDR4-2666				
Core i5-9500	6C/6T/3.0GHz/9MB/65W/DDR4-2666				
Core i5-9400	6C/6T/2.9GHz/9MB/65W/DDR4-2666				
Core i5-8500	6C/6T/3.0GHz/9MB/65W/DDR4-2666				
Core i3-9300	4C/4T/3.7GHz/8MB/62W/DDR4-2400				
Core i3-9100	4C/4T/3.6GHz/6MB/65W/DDR4-2400				
Core i3-8300	4C/4T/3.7GHz/8MB/62W/DDR4-2400				
Core i3-8100	4C/4T/3.6GHz/6MB/65W/DDR4-2400				
Chipset	Intel C246 Chipset				
Memory Sockets	4 DIMM sockets with 2 channels				
Memory Types	8GB/16GB DDR4-2666 UDIMM ECC or 4GB/8GB/16GB DDR4-2666 UDIMM non-ECC				
Memory Capacity	64B with 4 x 16GB, both UDIMM ECC or UDIMM non-ECC				
Memory Protection	ECC on models with UDIMM ECC memory				
Three PCIe 3.0 slots as following:					
Expansion slots	Slot 1	PCIe 3.0 x16, full height, half length, links to GPU			
	Slot 2	PCIe 3.0 x1, full height, full length, links to PCH			
	Slot 3	PCIe 3.0 x16 (negotiable link width x4), full height, half length, links to PCH			
Processor graphics	Integrated Intel UHD Graphics P630 in -G suffix Xeon processors, or Intel UHD Graphics 630 in Core i7, i5, i3, or Pentium processors.				
	Works along with discrete graphics to support multi-display, enables three rear display connectors (2 DP standard, 1 DP or HDMI optional)				
Up to two PCIe 3.0 x16 slots for discrete graphics card (Slot 1 and 3). Supports the following graphics adapters:					
Discrete Graphics Offering	Graphics	Memory	Power	Connector	Max Qty
	Quadro P400	2GB GDDR5	30W	3x miniDP	2
	Quadro P620	2GB GDDR5	40W	4x miniDP	2
	Quadro P1000	4GB GDDR5	50W	4x miniDP	2
	Quadro P2000	5GB GDDR5	75W	4x DP	2
	Quadro P2200	5GB GDDR5X	75W	4x DP	2
	Quadro P5000	16GB GDDR5X	180W	DVI-D DL + 4x DP	1
	Quadro RTX 4000	8GB GDDR6	160W/3x DP, 1x VirtualLink		1
Note: 2x Quadro P2000, or Quadro RTX 4000 needs 400W PSU					

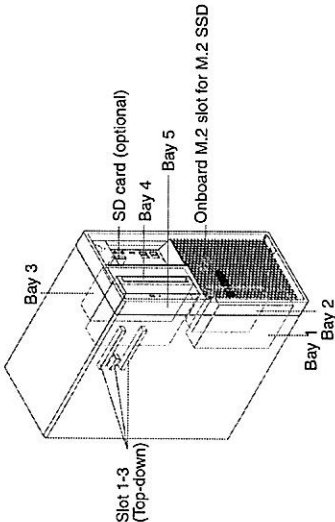
Note: 2x Quadro P2000, Quadro P5000, or Quadro RTX 4000 needs 400W PSU

Components		Specification
Storage Controller	Storage Controller	Onboard Intel RST SATA RAID
	Storage Controller	Onboard Intel RST SATA RAID
Storage Support	Disk Type	Interface
	3.5" SATA HDD	SATA 6Gb/s 7.2K
	2.5" SATA HDD	SATA 6Gb/s 7.2K
	2.5" SATA SSD	SATA 6Gb/s
	Optane Memory	PCIe NVMe
	M.2 PCIe SSD	PCIe NVMe
	Up to five bays with four disk bays plus one slim optical bay, supports up to 3x 3.5" HDD plus 1x 2.5" SSD, or 4x 2.5" HDD/SSD	
	Bay 1	Primary disk bay, 3.5" or 2.5"
	Bay 2	2.5" SATA bay, cannot be available when 2nd Quadro P2000 is used
	Bay 3	Secondary disk bay, 3.5" or 2.5"
Storage Bays	Bay 4	5.25" Flex bay, supports one of the following:
	- Flex module for optional front eSATA/Thunderbolt/IEEE1394 3rd disk bay, 3.5" or 2.5", removable, via Front Access Storage Enclosure, using SATA 4 connector as eSATA mode 3rd disk bay, 3.5" or 2.5", via 5.25" to 3.5" HDD Kit	
	Bay 5	9mm Slim ODD bay
	M.2	3x M.2 SSD (1 onboard, 2 via PCIe to M.2 adapter)
Media reader	Optional SD card reader on most models	
Network interfaces	One onboard GbE port via integrated gigabit ethernet Intel i219LM, supports Wake-on-LAN. Optional PCIe ethernet adapters are available	
WLAN + Bluetooth	One dedicated onboard M.2 slot for optional Intel Wireless-AC 9560, 2x2, 2.4GHz/5GHz (160MHz channels), 802.11ac, Bluetooth 5, up to 1.73Gbps	
Security features	Power-on and admin password, Trusted Platform Module, TCG 2.0 compliant. Optional chassis intrusion switch, e-lock, Kensington lock, and pad lock	
Intel vPro	Supports Intel vPro on Xeon models. vPro also requires Wireless-AC 9560 if Wi-Fi is needed	
Intel AMT	Intel Active Management Technology 12 on Xeon models, Intel Standard Manageability on other models	
Base warranty	US models comes with 3-year limited onsite service with 9x5/NBD, 1 or 3-year limited onsite service with 9x5/NBD in EMEA or other GEOs	
HD Audio	Intel HD Audio interface with Realtek ALC233 Codec	
Front ports	2x USB 3.1 Gen 1 Type A, 2x USB 3.1 Gen 2 Type A, 1x USB 3.1 Gen 1 Type-C, 1x Mic-In, 1x Combo jack	
Rear ports	2x USB 3.1 Gen 1 Type A, 2x USB 2.0 Type-A, 1x RJ-45, 1x COM, 2x DP. Notes: DP needs Core, Pentium, or -G suffix Xeon processor	
Optional front ports (on flex module)	2x Thunderbolt (USB Type-C), one of two ports supports video-out. 1x eSATA, 1x IEEE1394	
Optional rear ports	Supports the following via cable: 1x COM, 1x Parallel, 2x PS/2, 1x DP or 1x HDMI, 2x USB 2.0. Supports the following via PCIe adapter: 4x COM, 2x USB 3.1 Type-C, 2x USB 3.0, 1x Thunderbolt. Notes: DP or HDMI needs Core, Pentium, or -G suffix Xeon processor	
Temperature	Operating: 41 °F to 104 °F (10 °C to 35 °C) Non operating (no package): 14 °F to 140 °F (-10 °C to 60 °C) Non operating (with package): -40 °F to 140 °F (-40 °C to 60 °C)	

ThinkStation P330 Tower Gen 2 (30CY and 30D0) Form Specifications - II of II

Components	Specification
Altitude	Operating: -15.2 m (-50 ft) to 3048 m (10 000 ft). Storage: -15.2 m (-50 ft) to 10 668 m (35 000 ft)
Humidity	Operating: 30%~90%, non-condensing Storage (with package): 20%~90%, non-condensing
Environmental certification	RoHS-compliant. GREENGUARD. EPEAT Silver rating and ENERGY STAR 7 qualified
Power supply	Supports one 250W or 400W power supply, 100V - 240V, 92% PSU. Climate Savers Computing Platinum and 80 PLUS Platinum qualified. 400W PSU supports one 6+2-pin aux power connector.
ISV certifications	Please visit www.thinkworkstations.com/isv-certifications/

Note:
1. Depending on many factors, actual data transfer speed mentioned on this page may be lower than theoretical speed.
2. Any questions or advice on ThinkStation PSREF, please contact ThinkStation PSREF developer



IP PROCESSO

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P330 User Guide



Machine Types (2nd Gen): 30CY, 30D0, and 30D3

Note: Before using this information and the product it supports, be sure to read and understand the "Read this first: Important safety information" on page iii and Appendix G "Notices" on page 145.

Fourth Edition (March 2020)

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Read this first: Important safety information

This chapter contains the safety information that you must be familiar with.

Before using this manual

CAUTION:

Before using this manual, be sure to read and understand all the related safety information for this product. Refer to the information in this section and the safety information in the *Safety and Warranty Guide* that you received with this product. Reading and understanding this safety information reduces the risk of personal injury and damage to your product.

If you no longer have a copy of the *Safety and Warranty Guide*, you can obtain a Portable Document Format (PDF) version from the Lenovo Support Web site at <https://support.lenovo.com>. The Lenovo Support Web site also provides the *Safety and Warranty Guide* and this *User Guide* in additional languages.

Service and upgrades

Do not attempt to service a product yourself unless instructed to do so by the Customer Support Center or your documentation. Only use a Service Provider who is approved to repair your particular product.

Note: Some computer parts can be upgraded or replaced by the customer. Upgrades typically are referred to as options. Replacement parts approved for customer installation are referred to as Customer Replaceable Units, or CRUs. Lenovo provides documentation with instructions when it is appropriate for customers to install options or replace CRUs. You must closely follow all instructions when installing or replacing parts. The Off state of a power indicator does not necessarily mean that voltage levels inside a product are zero. Before you remove the covers from a product equipped with a power cord, always ensure that the power is turned off and that the product is unplugged from any power source. If you have any questions or concerns, contact the Customer Support Center.

Although there are no moving parts in the computer after the power cord has been disconnected, the following warnings are required for your safety.



Moving Parts:

Keep fingers and other parts of your body away from hazardous, moving parts. If you suffer an injury, seek medical care immediately.



Hot Surface:

Avoid contact with hot components inside the computer. During operation, some components become hot enough to burn the skin. Before you open the computer cover, turn off the computer, disconnect power, and wait approximately 10 minutes for the components to cool.



After replacing a CRU, reinstall all protective covers, including the computer cover, before connecting power and operating the computer. This action is important to help prevent unexpected electrical shock and help ensure the containment of an unexpected fire that could happen under extremely rare conditions.



Sharp Edges:

When replacing CRUs, be cautious of sharp edges or corners that might cause injury. If you suffer an injury, seek medical care immediately.

Power cords and power adapters

Use only the power cords and power adapters supplied by the product manufacturer. Do not use the ac power cord for other devices.

The power cords shall be safety approved. For Germany, it shall be H05VV-F, 3G, 0.75 mm², or better. For other countries, the suitable types shall be used accordingly.

Never wrap a power cord around a power adapter or other object. Doing so can stress the cord in ways that can cause the cord to fray, crack, or crimp. This can present a safety hazard.

Always route power cords so that they will not be walked on, tripped over, or pinched by objects.

Protect power cord and power adapters from liquids. For instance, do not leave your power cord or power adapter near sinks, tubs, toilets, or on floors that are cleaned with liquid cleansers. Liquids can cause a short circuit, particularly if the power cord or power adapter has been stressed by misuse. Liquids also can cause gradual corrosion of power cord terminals and/or the connector terminals on a power adapter, which can eventually result in overheating.

Ensure that all power cord connectors are securely and completely plugged into receptacles.

Do not use any power adapter that shows corrosion at the ac input pins or shows signs of overheating (such as deformed plastic) at the ac input or anywhere on the power adapter.

Do not use any power cords where the electrical contacts on either end show signs of corrosion or overheating or where the power cord appears to have been damaged in any way.

Power cord notice

Note: The power cord and adapter provided with this product are intended to be used with this product only. Do not use them with any other products.

For your safety, Lenovo provides a power cord with a grounded attachment plug to use with this product. To avoid electrical shock, always use the power cord and plug with a properly grounded outlet.

Power cords provided by Lenovo in the United States and Canada are listed by Underwriter's Laboratories (UL) and certified by the Canadian Standards Association (CSA).

For units intended to be operated at 115 volts: Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT, three-conductor cord, a maximum of 15 feet in length and a parallel blade, grounding-type attachment plug rated 10 amperes, 125 volts.

For units intended to be operated at 230 volts (U.S. use): Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT, three-conductor cord, a maximum of 15 feet in length and a tandem blade, grounding-type attachment plug rated 10 amperes, 250 volts.

For units intended to be operated at 230 volts (outside the U.S.): Use a cord set with a grounding-type attachment plug. The cord set should have the appropriate safety approvals for the country in which the equipment will be installed.

Power cords provided by Lenovo for a specific country or region are usually available only in that country or region.

For units intended to be operated in Germany: The power cords must be safety approved. For Germany, it must be H05VV-F, 3G, 0.75 mm², or better. For other countries, the suitable types must be used accordingly.

For units intended to be operated in Denmark: Use a cord set with a grounding-type attachment plug. The cord set should have the appropriate safety approvals for the country in which the equipment will be installed.

For units intended to be operated in Norway, Sweden, Finland: Use a cord set with a two-prong attachment plug. The cord set should have the appropriate safety approvals for the country in which the equipment will be installed.

If you intend to use your PC in a country or region that is different from your ordering location, please purchase an additional Lenovo power cord for the country or region where the PC will be used. Refer to the power cord guide provided in our Web site, <https://support.lenovo.com>, for details. Some countries and regions support multiple voltages, so make sure you order the appropriate power cord for the intended voltage.

Extension cords and related devices

Ensure that extension cords, surge protectors, uninterruptible power supplies, and power strips that you use are rated to handle the electrical requirements of the product. Never overload these devices. If power strips are used, the load should not exceed the power strip input rating. Consult an electrician for more information if you have questions about power loads, power requirements, and input ratings.

Plugs and outlets



If a receptacle (power outlet) that you intend to use with your computer equipment appears to be damaged or corroded, do not use the outlet until it is replaced by a qualified electrician.

Do not bend or modify the plug. If the plug is damaged, contact the manufacturer to obtain a replacement.

Do not share an electrical outlet with other home or commercial appliances that draw large amounts of electricity; otherwise, unstable voltage might damage your computer, data, or attached devices.

Some products are equipped with a three-pronged plug. This plug fits only into a grounded electrical outlet. This is a safety feature. Do not defeat this safety feature by trying to insert it into a non-grounded outlet. If you cannot insert the plug into the outlet, contact an electrician for an approved outlet adapter or to replace the outlet with one that enables this safety feature. Never overload an electrical outlet. The overall system load should not exceed 80 percent of the branch circuit rating. Consult an electrician for more information if you have questions about power loads and branch circuit ratings.

Be sure that the power outlet you are using is properly wired, easily accessible, and located close to the equipment. Do not fully extend power cords in a way that will stress the cords.

Be sure that the power outlet provides the correct voltage and current for the product you are installing.

Carefully connect and disconnect the equipment from the electrical outlet.

Power supply statement

Never remove the cover on a power supply or any part that has the following label attached.



Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

External devices

CAUTION:

Do not connect or disconnect any external device cables other than Universal Serial Bus (USB) and 1394 cables while the computer power is on; otherwise, you might damage your computer. To avoid possible damage to attached devices, wait at least five seconds after the computer is shut down to disconnect external devices.

Lithium coin-cell battery notice



Danger of explosion if battery is incorrectly replaced.

If the coin-cell battery is not a CRU, do not attempt to replace the coin-cell battery. Replacement of the battery must be done by a Lenovo-authorized repair facility or technician.

The Lenovo-authorized repair facilities or technicians recycle Lenovo batteries according to local laws and regulations.



When replacing the lithium coin-cell battery, use only the same type or equivalent type that is recommended by the manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of. Swallowing the lithium coin-cell battery will cause choking or severe internal burns in just two hours and might even result in death.

Keep batteries away from children. If the lithium coin-cell battery is swallowed or placed inside any part of the body, seek medical care immediately.

Do not:

- Throw or immerse into water
- Heat to more than 100 °C (212°F)
- Repair or disassemble
- Leave in an extremely low air pressure environment
- Leave in an extremely high-temperature environment
- Crush, puncture, cut, or incinerate

Dispose of the battery as required by local ordinances or regulations.

The following statement applies to users in the state of California, U.S.A.

California Perchlorate Information:

Products containing manganese dioxide lithium coin-cell batteries may contain perchlorate.

Perchlorate Material - special handling may apply, see <https://www.dtsc.ca.gov/hazardouswaste/perchlorate/>.

Heat and product ventilation



Computers, power adapters, and many accessories can generate heat when turned on and when batteries are charging. Always follow these basic precautions:

- Do not leave your computer, power adapter, or accessories in contact with your lap or any part of your body for an extended period when the products are functioning or when the battery is charging. Your

computer, power adapter, and many accessories produce some heat during normal operation. Extended contact with the body could cause discomfort or, potentially, a skin burn.

- Do not charge the battery or operate your computer, power adapter, or accessories near flammable materials or in explosive environments.
- Ventilation slots, fans, and heat sinks are provided with the product for safety, comfort, and reliable operation. These features might inadvertently become blocked by placing the product on a bed, sofa, carpet, or other flexible surface. Never block, cover, or disable these features.

Inspect your desktop computer for dust accumulation at least once every three months. Before inspecting your computer, turn off the power and unplug the computer's power cord from the electrical outlet; then remove any dust from vents and perforations in the bezel. If you notice external dust accumulation, then examine and remove dust from the inside of the computer including heat sink inlet fins, power supply vents, and fans. Always turn off and unplug the computer before opening the cover. If possible, avoid operating your computer within two feet of high-traffic areas. If you must operate your computer in or near a high-traffic area, inspect and, if necessary, clean your computer more frequently.

For your safety and to maintain optimum computer performance, always follow these basic precautions with your desktop computer:

- Keep the cover closed whenever the computer is plugged in.
- Regularly inspect the outside of the computer for dust accumulation.
- Remove dust from vents and any perforations in the bezel. More frequent cleanings might be required for computers in dusty or high-traffic areas.
- Do not restrict or block any ventilation openings.
- Do not store or operate your computer inside furniture, as this might increase the risk of overheating.
- Airflow temperatures into the computer should not exceed 35°C (95°F).
- Do not install air filtration devices. They may interfere with proper cooling.

Electrical current safety information



Electric current from power, telephone, and communication cables is hazardous.

To avoid a shock hazard:

- **Do not use your computer during a lightning storm.**
- **Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.**
- **Connect all power cords to a properly wired and grounded electrical outlet.**
- **Connect properly wired outlets to any equipment that will be attached to this product.**
- **Whenever possible, use one hand only to connect or disconnect signal cables.**
- **Never turn on any equipment when there is evidence of fire, water, or structural damage.**
- **Disconnect the attached power cords, battery, and all the cables before you open the device covers, unless instructed otherwise in the installation and configuration procedures.**
- **Do not use your computer until all internal parts enclosures are fastened into place. Never use the computer when internal parts and circuits are exposed.**



Connect and disconnect cables as described in the following procedures when installing, moving, or opening covers on this product or attached devices.

To connect:

1. Turn everything **OFF**.
2. First, attach all cables to devices.
3. Attach signal cables to connectors.
4. Attach power cords to outlets.
5. Turn devices **ON**.

To disconnect:

1. Turn everything **OFF**.
2. First, remove power cords from outlets.
3. Remove signal cables from connectors.
4. Remove all cables from devices.

The power cord must be disconnected from the wall outlet or receptacle before installing all other electrical cables connected to the computer.

The power cord may be reconnected to the wall outlet or receptacle only after all other electrical cables have been connected to the computer.



During electrical storms, do not perform any replacement and do not connect the telephone cable to or disconnect it from the telephone outlet on the wall.

Laser safety information

CAUTION:

When laser products (such as CD-ROMs, DVD drives, fiber optic devices, or transmitters) are installed, note the following:

- Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.
- Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.



Some laser products contain an embedded Class 3B laser diode. Note the following:
Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.

Liquid crystal display (LCD) notice



To avoid shock hazards:

- Do not remove the covers.
- Do not operate this product unless the stand is attached.
- Do not connect or disconnect this product during an electrical storm.
- The power cord plug must be connected to a properly wired and grounded power outlet.
- Any equipment to which this product will be attached must also be connected to properly wired and grounded power outlets.
- To isolate the monitor from the electrical supply, you must remove the plug from the power outlet. The power outlet should be easily accessible.

Handling:

- If your monitor weighs more than 18 kg (39.68 lb), we recommend that it be moved or lifted by two people.

Product disposal (TFT monitors):

- The fluorescent lamp in the liquid crystal display contains mercury; dispose according to local, state, or federal laws.

Battery warnings:

- Risk of explosion if battery is replaced by an incorrect type.
- Dispose of used batteries according to the instructions.

Use earphones, headphones, or a headset

- If your computer has both a headphone connector and an audio line-out connector, always use the headphone connector for earphones, headphones, or a headset. However, the headphone connector does not support the microphone of the headset.
- If your computer has both a headset connector and an audio line-out connector, always use the headset connector for earphones, headphones, or a headset.



Excessive sound pressure from earphones and headphones can cause hearing loss. Adjustment of the equalizer to maximum increases the earphone and headphone output voltage and the sound pressure level. Therefore, to protect your hearing, adjust the equalizer to an appropriate level.

Excessive use of headphones or earphones for a long period of time at high volume can be dangerous if the output of the headphone or earphone connectors do not comply with specifications of EN 50332-2. The headphone output connector of your computer complies with EN 50332-2 Sub clause 7. This specification limits the computer's maximum wide band true RMS output voltage to 150 mV. To help protect against hearing loss, ensure that the headphones or earphones you use also comply with EN 50332-2 (Clause 7

Limits) or a wide band characteristic voltage of 75 mV. Using headphones that do not comply with EN 50332-2 can be dangerous due to excessive sound pressure levels.

If your Lenovo computer came with headphones or earphones in the package, as a set, the combination of the headphones or earphones and the computer already complies with the specifications of EN 50332-1. If different headphones or earphones are used, ensure that they comply with EN 50332-1 (Clause 6.5 Limitation Values). Using headphones that do not comply with EN 50332-1 can be dangerous due to excessive sound pressure levels.

Choking hazard notice



CHOKING HAZARD – Product contains small parts.

Keep away from children under three years.

Plastic bag notice



Plastic bags can be dangerous. Keep plastic bags away from babies and children to avoid danger of suffocation.

Glass parts notice

CAUTION:

Some parts of your product may be made of glass. This glass could break if the product is dropped on a hard surface or receives a substantial impact. If glass breaks, do not touch or attempt to remove it. Stop using your product until the glass is replaced by trained service personnel.

Computer placement notices

Inappropriate computer placement might cause harm to children.

- Place the computer on a sturdy piece of low-rise furniture or furniture that has been anchored.
- Do not place the computer at the edge of the furniture.
- Keep the computer cables out of the reach of children.
- Some items, such as toys, might attract children. Keep such items away from the computer.

Supervise children in rooms where the above safety instructions cannot be fully implemented.

Hazardous energy statement



Disconnect all power cords from electrical outlets before removing the computer cover or any part that has the above label attached.

DO NOT disassemble components that have the above label attached. There are no serviceable parts inside these components.

Your product is designed for safe use. However, hazardous voltage, current, and energy levels are present inside any component that has this label attached. Disassembling of these components might cause fire or might even result in death. If you suspect a problem with one of these parts, contact a service technician.

CAUTION:



Bright Light, possible skin or eye damage. Disconnect power before servicing.

CAUTION:



Infrared Light, possible skin or eye damage. Disconnect power before servicing.

Eye comfort

The property of the display in combination with following notes result in reduced eye fatigue and increased comfort.

For tips on how to minimize visual fatigue, please go to <https://www.lenovo.com/us/en/safecomp/> to visit "Minimizing Visual Fatigue".

Tip-over hazard prevention notice

The computer may cause harm to children if it is not located in an appropriate place. Follow the tips below to protect children from harm caused by the computer tipping over:

- Place the computers or monitors on sturdy furniture with a low base or furniture that has been anchored. Push the computers or monitors as far from the edge of the furniture as possible..
- Keep remote controls, toys, and other items that might attract children away from the computers or monitors
- Keep the computer or monitor cables out the reach of the children.
- Supervise children in rooms where these safety tips have not been followed.

CAUTION:

Some parts of your product may be made of glass. This glass could break if the product is dropped on a hard surface or receives a substantial impact. If glass breaks, do not touch it or attempt to remove it. Stop using your product until the glass is replaced by trained service personnel.

Remote control

CAUTION:

Do not use rechargeable batteries in this device.

Static electricity prevention

Static electricity, although harmless to you, can seriously damage computer components and options. Improper handling of static-sensitive parts can damage the part. When you unpack an option or CRU, do not open the static-protective package containing the part until the instructions direct you to install it.

When you handle options or CRUs, or perform any work inside the computer, take the following precautions to avoid static-electricity damage:

- Limit your movement. Movement can cause static electricity to build up around you.
- Always handle components carefully. Handle adapters, memory modules, and other circuit boards by the edges. Never touch exposed circuitry.
- Prevent others from touching components.
- When you install a static-sensitive option or CRU, touch the static-protective package containing the part to a metal expansion-slot cover or other unpainted metal surface on the computer for at least two seconds. This reduces static electricity in the package and your body.
- When possible, remove the static-sensitive part from the static-protective packaging and install the part without setting it down. When this is not possible, place the static-protective packaging on a smooth, level surface and place the part on it.
- Do not place the part on the computer cover or other metal surface.

Operating environment

Maximum altitude (without pressurization)

- Operating: From -15.2 m (-50 ft) to 3048 m (10 000 ft)
- Storage: From -15.2 m (-50 ft) to 10 668 m (35 000 ft)

Temperature

- Operating: From 10°C (50°F) to 35°C (95°F)
- Storage in original shipping package: From -40°C (-40°F) to 60°C (140°F)
- Storage without package: From -10°C (14°F) to 60°C (140°F)

Note: If your computer is stored or transported in temperatures less than 10°C (50°F), allow the computer to rise slowly to an optimal operating temperature before use. This process might take up to two hours. Using the computer in a lower operating temperature might result in irreparable damage to your computer.

Relative humidity

- Operating: 10%-80% (non-condensing)
- Storage: 10%–90% (non-condensing)

Cleaning and maintenance

With appropriate care and maintenance, your computer will serve you reliably. The following topics offer information to help you keep your computer working with best performance.

Basic maintenance tips

Here are some basic points about keeping your computer functioning properly:

- Keep the computer in a clean, dry environment. Ensure that the computer rests on a flat, steady surface.
- Do not cover any of air vents. These air vents provide airflow to keep the computer from overheating.
- Keep electrical appliances such as an electric fan, radio, high-powered speakers, air conditioner, and microwave oven away from your computer because the strong magnetic fields generated by these appliances can damage the monitor and data on the storage drive.
- Keep food and drinks away from all parts of the computer. Food particles and spills might make the keyboard and mouse stick and unusable.
- Do not get the power switches or other controls wet. Moisture can damage these parts and cause an electrical hazard.
- Always disconnect a power cord by grasping the plug instead of the cord.
- Keep the computer software, device drivers, and operating system up-to-date.
- Empty your recycle bin on a regular basis.
- Clean out your Inbox, Sent Items, and Deleted Items folders in your e-mail application on a regular basis.
- Clean up files and free up storage drive space and memory space occasionally to prevent performance problems.
- Keep a log book. Entries might include major software or hardware changes, device-driver updates, intermittent problems and what you did to resolve them, and other issues you might have experienced. The cause of a problem might be change in hardware, change in software, or any other actions that might have taken place. A log book can help you or a Lenovo technician determine the cause of a problem.
- Back up your data on the storage drive regularly. You can restore the storage drive from a backup.
- Create a recovery medium as early as possible. You can use the recovery medium to recover your operating system even if Windows fails to start up.
- Get the most up-to-date operating system update patches, software programs, and device drivers.

Maintenance tips about moving the computer

Before moving the computer, take the following precautions:

1. Back up your data on the storage drive.
2. Remove any media from the drives and turn off all connected devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.
3. If you saved the original shipping cartons and packing materials, use them to pack the units. If you are using different cartons, cushion the units to avoid damage.

When you move the computer to another country or region, you must take local electrical standards into consideration. If the local electrical outlet style is different from the type you are currently using, contact the Lenovo Customer Support Center to purchase either an electrical plug adapter or a new power cord.

Clean your computer

CAUTION:

Remove any media from the drives and turn off all connected devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.

It is a good practice to clean your computer periodically to protect the surfaces and ensure trouble-free operation.

Clean the computer surface: Wipe it with a lint-free cloth dampened in mild soap and water. Avoid applying liquids directly to the surface.

Clean the keyboard: Wipe the keys one by one with a lint-free cloth dampened in mild soap and water. If you wipe several keys at a time, the cloth might hook onto an adjacent key and possibly damage it. Avoid spraying cleaner directly onto the keyboard. To remove any crumbs or dust from beneath the keys, you can use a camera blower with a brush or use cool air from a hair dryer.

Clean the computer screen: Scratches, oil, dust, chemicals, and ultraviolet light can affect the performance of your computer screen. Use a dry, soft lint-free cloth to wipe the screen gently. If you see a scratchlike mark on your screen, it might be a stain. Wipe or dust the stain gently with a soft, dry cloth. If the stain remains, moisten a soft, lint-free cloth with water or eyeglass cleaner, but do not apply liquids directly to your computer screen. Ensure that the computer screen is dry before closing it.

Chapter 1. Product overview

This chapter provides basic information to help you get familiar with your computer.

Hardware locations

This section provides information about the locations of your computer hardware.

Front view

Note: The computer hardware might look slightly different from the illustration.

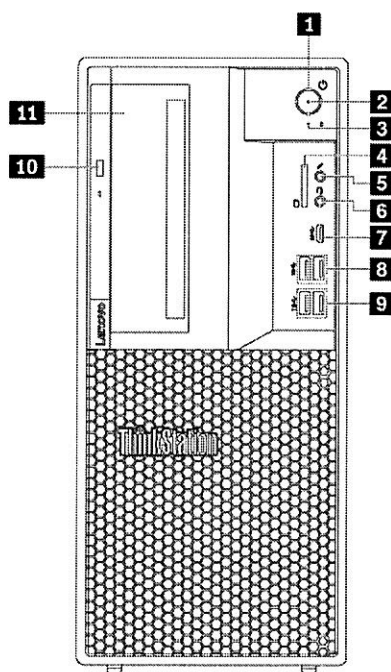


Figure 1. Front connectors, controls, and indicators

1 Power button	2 Power indicator
3 Storage-drive activity indicator	4 SD card slot (available on some models)
5 Microphone connector	6 Headset connector
7 USB-C connector	8 USB 3.1 connectors Gen 1 (2)
9 USB 3.1 connectors Gen 2 (2)	10 Slim optical-drive eject button (available on some models)
11 Flex bay (available on some models)	

1 Power button

Press the power button to turn on your computer. If your computer is unresponsive, you can turn off the computer by pressing and holding the power button for four or more seconds.

2 Power indicator

When the power indicator is on, the computer is turned on.

3 Storage-drive activity indicator

This indicator shows the status of the internal storage drives (such as hard disk drives or solid-state drives).

On: The storage drives are active and data is being transferred.

Off (when the computer is powered on): The storage drives are not in use or no data is being transferred.

4 SD card slot (available on some models)

An SD card is installed on some computer models.

5 Microphone connector

Use this connector to attach a microphone to your computer when you want to record sound or if you use speech-recognition software.

6 Headset connector

Use this connector to attach a headset to your computer.

7 USB-C connector

The USB-C connector supports the USB Type-C™ standard. With an appropriate USB-C cable connected, you can use the connector to transfer data or charge your device.

8 USB 3.1 connectors Gen 1 (2)

Connect USB-compatible devices, such as a USB keyboard, a USB mouse, a USB storage device, or a USB printer.

9 USB 3.1 connectors Gen 2 (2)

With greater data transfer rate, the USB 3.1 connector Gen 2 is used to connect USB-compatible devices, such as a USB keyboard, a USB mouse, a USB storage device, or a USB printer.

10 Slim optical-drive eject button (available on some models)

Press the button to eject the tray of the slim optical drive. To close the tray, push the tray inward until you hear a click.

11 Flex bay (available on some models)

Some computer models come with a flex bay. Depending on your computer model, one of the following devices might be installed in the flex bay:

- Flex module
- Flex storage enclosure
- Front-access storage enclosure

For more information, see “Device in the flex bay” on page 77.

Rear view

Some connectors on the rear of your computer are color-coded to help you determine where to connect the cables on your computer.

Note: The computer hardware might look slightly different from the illustration.

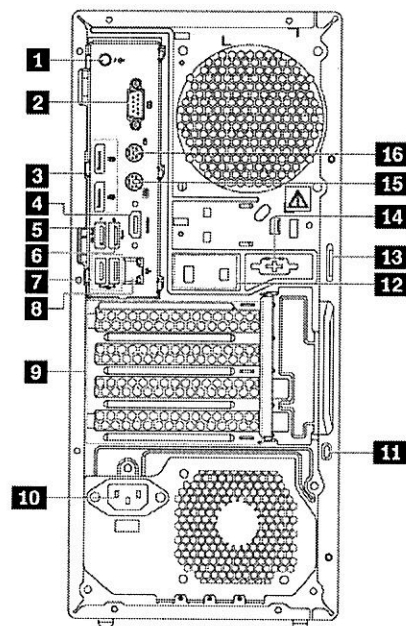


Figure 2. Rear view

1 Audio line-out connector	2 Serial connector
3 DisplayPort connectors (2)	4 DisplayPort connector or HDMI™ connector (available on some models)
5 USB 3.1 connector Gen 1	6 USB 3.1 connector Gen 1
7 USB 2.0 connectors (2)	8 Ethernet connector
9 PCIe card area*	10 Power-cord connector
11 Security-lock slot	12 Cable-lock slots
13 Padlock loop	14 Serial connector (available on some models)
15 PS/2 keyboard connector (available on some models)	16 PS/2 mouse connector (available on some models)

Notes: * A discrete graphics card or a network adapter can be installed in the appropriate Peripheral Component Interconnect Express (PCIe) card slot. If such a card is installed, use the connectors on the card instead of the corresponding connectors on the computer to optimize the performance. Depending on your computer model, the preinstalled cards might vary. One or more graphics cards might be installed to provide the following connectors:

- Digital Visual Interface (DVI) connector
- DisplayPort® connector
- Mini DisplayPort® connector

DVI monitor connector

Use this connector to attach a DVI monitor or other compatible devices.

DisplayPort connector

Use this connector to attach a high-performance monitor, a direct-drive monitor, or other compatible devices.

Mini DisplayPort connector

Use this connector to attach a high-performance monitor, a direct-drive monitor, or other compatible devices. The Mini DisplayPort connector is a miniaturized version of a DisplayPort connector.

1 Audio line-out connector

The audio line-out connector is used to send audio signals from the computer to external devices, such as headphones.

2 Serial connector

Use this connector to attach an external modem, a serial printer, or other devices that use a 9-pin serial connector.

3 DisplayPort connectors (2)

Use this connector to attach a high-performance monitor, a direct-drive monitor, or other compatible devices.

4 DisplayPort connector or HDMI connector (available on some models)

• DisplayPort connector

Use this connector to attach a high-performance monitor, a direct-drive monitor, or other compatible devices.

• HDMI connector

The High-Definition Multimedia Interface (HDMI) connector is a digital audio and video interface that can connect a compatible digital audio device or video monitor, such as a DVD player or a high-definition digital television (HDTV).

5 USB 3.1 connector Gen 1

Connect USB-compatible devices, such as a USB keyboard, a USB mouse, a USB storage device, or a USB printer. This connector supports the smart power on feature. When you connect a supported keyboard to this connector, you can turn on the computer or wake it up from hibernation mode by pressing Alt+P on the keyboard. You can enable or disable the smart power on feature from the Setup Utility program.

6 USB 3.1 connector Gen 1

Connect USB-compatible devices, such as a USB keyboard, a USB mouse, a USB storage device, or a USB printer.

7 USB 2.0 connectors (2)

Use this connector to attach a USB-compatible device, such as a USB keyboard, mouse, storage drive, or printer.

8 Ethernet connector

Connect an Ethernet cable for a local area network (LAN).

Note: To operate the computer within Federal Communications Commission (FCC) Class B limits, use a Category 5 Ethernet cable.

9 PCIe card area

To further improve the computer performance, you can install PCIe cards into this area. Depending on your computer model, the preinstalled cards might vary.

10 Power-cord connector

Connect the power cord to your computer for power supply.

11 Security-lock slot

Attach a Kensington-style cable lock to the security-lock slot to secure your computer. For more information, see "Attaching a Kensington-style cable lock" on page 31.

12 Cable lock slots

Used to secure a cable lock. For more information, see "Attaching a cable lock" on page 31.

13 Padlock loop

Connect a padlock to secure your computer. For more information, see "Locking the computer cover" on page 29.

14 Serial connector (available on some models)

Use this connector to attach an external modem, a serial printer, or other devices that use a 9-pin serial connector.

15 PS/2 keyboard connector (available on some models)

Use this connector to attach a Personal System/2 (PS/2) keyboard.

16 PS/2 mouse connector (available on some models)

Use this connector to attach a PS/2 mouse, a trackball, or other pointing devices.

Computer components

Notes:

- Depending on the model, your computer might look slightly different from the illustration.
- To prepare your computer, see "Preparing your computer" on page 56.

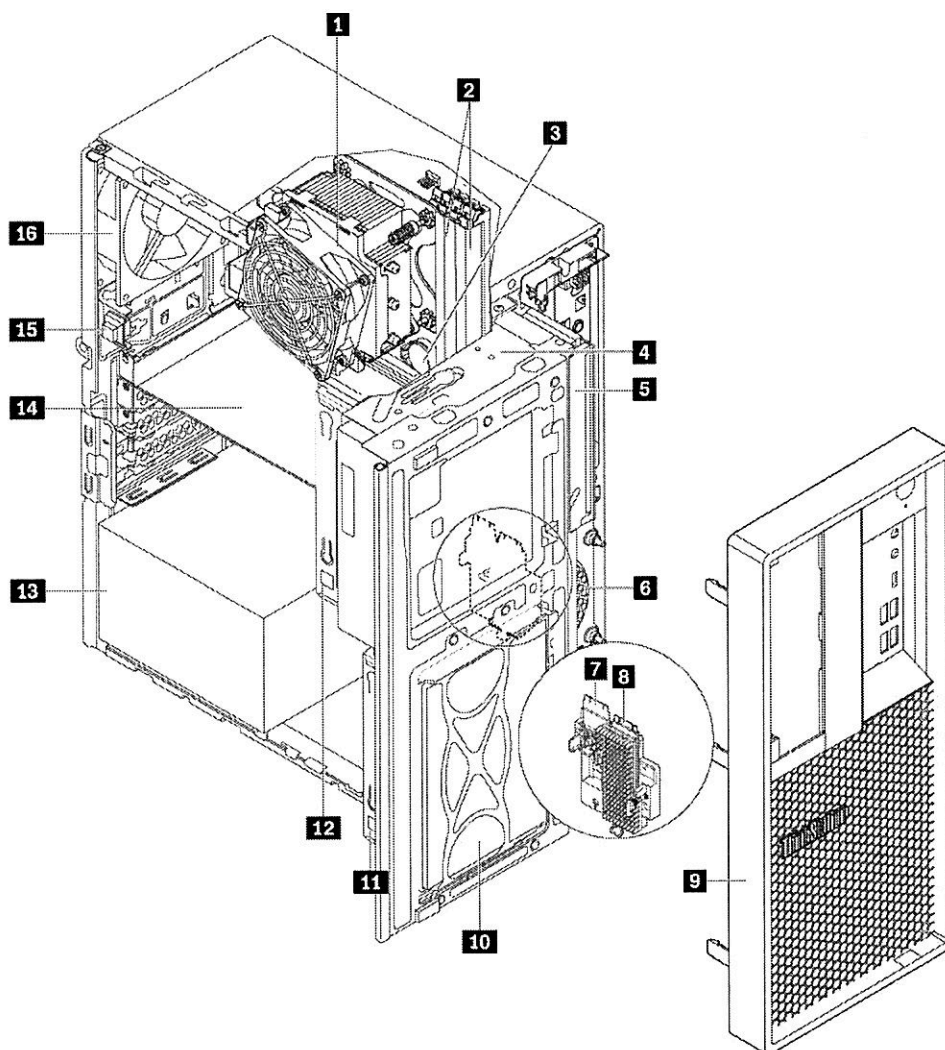


Figure 3. Component locations

1 Heat-sink-and-fan assembly	2 Memory modules
3 Coin-cell battery	4 Flex bay (available on some models)
5 Slim optical drive (available on some models)	6 Front fan
7 Wi-Fi card (available on some models)	8 M.2 solid-state drive (available on some models)
9 Front bezel	10 Storage-drive bay
11 Type-2 storage-drive cage (available on some models)	12 Type-1 storage-drive cage (available on some models)
13 Power supply assembly	14 PCIe card (available on some models)
15 Cover presence switch (also called intrusion switch)	16 Rear fan



Parts on the system board

Note: The system board might look slightly different from the illustration.

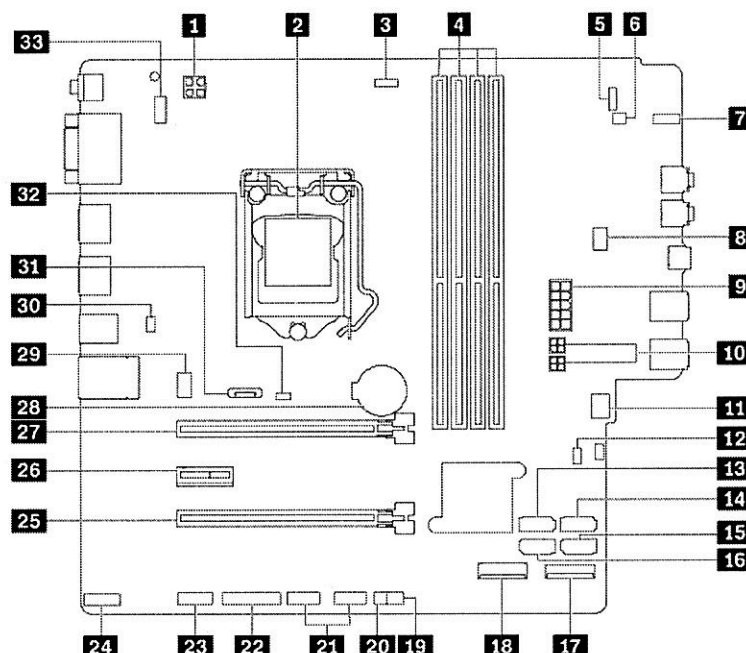


Figure 4. System board part locations

1 4-pin microprocessor power connector	2 Microprocessor
3 Microprocessor fan connector	4 Memory slots (DIMM)
5 Front-bezel connector	6 Internal-speaker connector
7 Storage-drive activity indicator	8 Flex bay fan connector
9 10-pin system board power connector	10 SATA power connectors
11 Front-fan connector	12 Clear CMOS/Recovery jumper
13 SATA 3 connector	14 SATA 4 connector or eSATA connector
15 SATA 2 connector	16 SATA 1 connector
17 M.2 solid-state drive slot	18 Wi-Fi card slot
19 Thermal-sensor connector	20 ThinkStation® LED connector
21 Front USB 2.0 connectors (available on some models)	22 Parallel connector
23 Serial port (COM) connector	24 Thunderbolt™ control connector
25 PCIe x16 card slot (negotiable link width x4)	26 PCIe x1 card slot
27 PCIe x16 card slot	28 Coin-cell battery
29 Rear-fan connector	30 E-lock connector

31 DisplayPort connector

32 Cover presence switch connector (Intrusion switch connector)

33 PS/2 keyboard and mouse connector

Internal storage drives

Internal storage drives are devices that your computer uses to read and store data. You can add drives to your computer to increase storage capacity and enable your computer to read other types of media. Internal storage drives are installed in bays.

When you remove or install an internal storage drive, note the type and size of the drive that each bay supports and correctly connect the required cables. Refer to the appropriate section in Chapter 7 “Hardware removal and installation” on page 55 for instructions on how to remove or install internal storage drives for your computer.

The following illustration shows the locations of the storage drives.

Note: The computer hardware might look slightly different from the illustration.

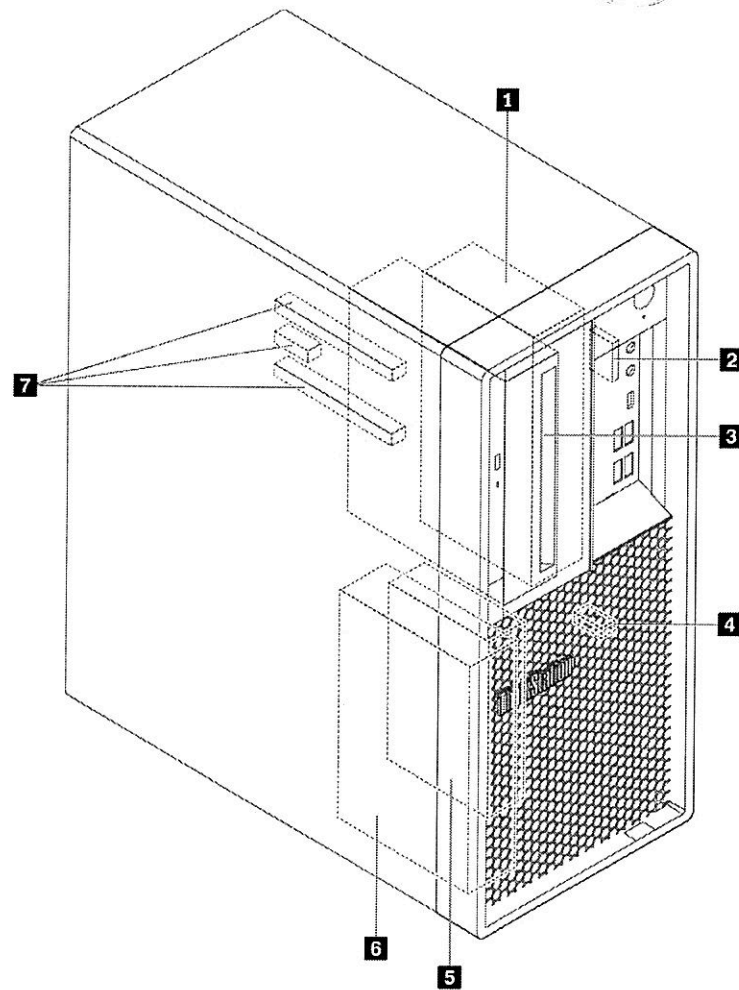


Figure 5. Storage-drive bay locations

1 Type-1 storage-drive cage	2 SD card slot (available on some models)
3 Flex bay (available on some models)	4 M.2 solid-state drive slot
5 Type-2 storage-drive cage	6 Type-1 storage-drive bay
7 PCIe card slots (3)	

1 Type-1 storage-drive cage

You can install a 3.5-inch storage drive or a 2.5-inch storage drive in this cage.

2 SD card slot (available on some models)

An SD card is installed in some computer models.

3 Flex bay (available on some models)

Depending on your computer model, one of the following devices might be installed in the flex bay:

- Flex module
- Front-access storage enclosure
- Flex storage enclosure

4 M.2 solid-state drive slot

One M.2 solid-state drive is installed in some computer models.

5 Type-2 storage-drive cage

You can install a 2.5-inch storage drive in this cage.

6 Type-1 storage-drive bay

You can install a 3.5-inch storage drive or a 2.5-inch storage drive in the storage-drive bay.

7 PCIe card slots (3)

You can install compatible PCIe cards and PCIe solid-state drives in the PCIe card slots.

Machine type and model label

The machine type and model label identifies your computer. When you contact Lenovo for help, the machine type and model information helps support technicians to identify your computer and provide faster service.

The following is a sample of the machine type and model label.

Note: The computer hardware might look slightly different from the illustration.

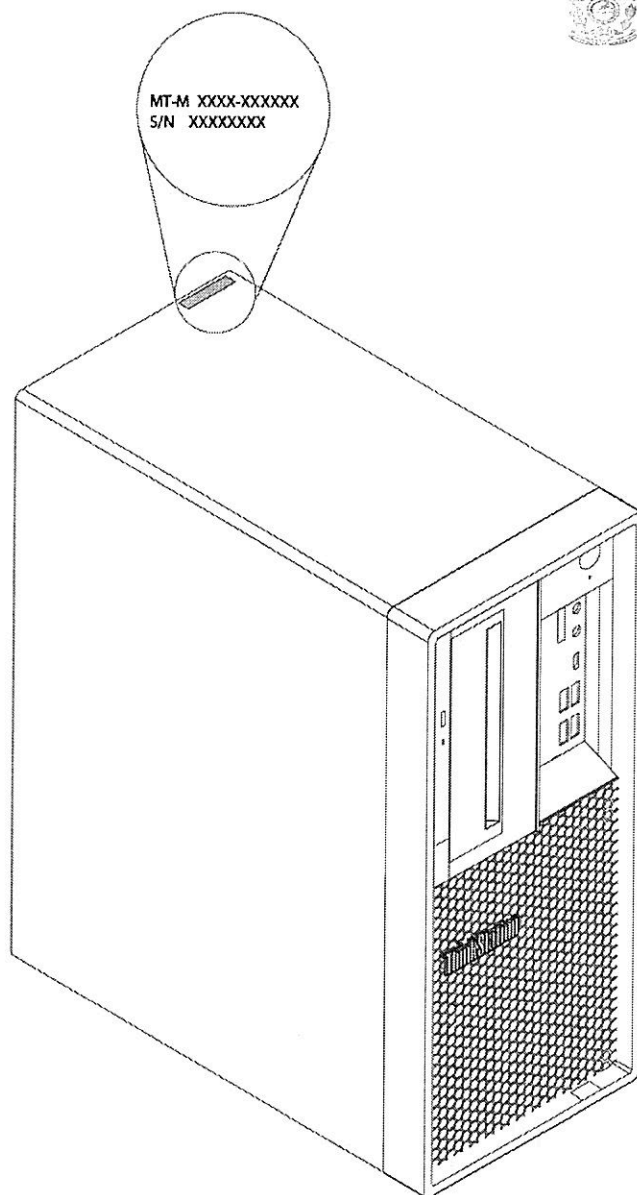


Figure 6. Machine type and model label

Computer features

For your specific computer model, some features might vary or not apply.

Information about your computer

- To view basic information (such as microprocessor and memory information) about your computer, do the following:
 1. Click the Start button to open the Start menu.
 2. Click **Settings** → **System** → **About**.

- To view detailed information about the devices (such as the network adapters) on your computer, do the following:
 1. Right-click the Start button to open the Start context menu.
 2. Click **Device Manager**.
 3. Locate and double-click your device in **Device Manager** to view device properties. Type the administrator password or provide confirmation if prompted.

Memory

Up to four double data rate 4 (DDR4) error correction code (ECC) unbuffered dual inline memory modules (UDIMMs) or DDR4 non-ECC UDIMMs

Internal drives

Your computer supports the following storage drives:

- SD card (available on some models)
- Hard disk drive (available on some models)
- M.2 solid-state drive with the Intel Optane technology (available on some models)
- M.2 solid-state drive without the Intel Optane technology (available on some models)
- Slim optical drive (available on some models)
- Solid-state drive (available on some models)

To view the amount of storage drive space, do the following:

1. Right-click the Start button to open the Start context menu.
2. Click **Disk Management** and follow the instructions on the screen.

Video features

- PCIe x16 graphics card slots on the system board for discrete graphics cards
- Video connectors on a discrete graphics card:
 - DVI connector (available on some models)
 - DisplayPort connector (available on some models)
 - Mini DisplayPort connector (available on some models)

Audio features

Integrated audio controller supports the following connectors and devices on your computer:

- Audio line-out connector
- Headset connector
- Internal speaker
- Microphone connector

Input/Output (I/O) features

- 100/1000 Mbps Ethernet connector
- 9-pin serial connector
- Audio connectors (audio line-out connector, microphone connector, and headset connector)
- HDMI connector (available on some models)
- Display connectors (DisplayPort connector, DVI connector, and Mini DisplayPort connector) (vary by graphics card)

- PS/2 keyboard connector (available on some models)
- PS/2 mouse connector (available on some models)
- USB connectors
- USB-C connector

Expansion

- Flex bay (available on some models)
- Memory slots
- M.2 solid-state drive slot
- PCIe x1 card slot
- PCIe x16 card slot
- PCIe x16 card slot (negotiable link width x4)
- SD card slot (available on some models)
- Storage-drive bay
- Storage-drive cages (available on some models)

Power supply

Your computer comes with one of the following power supplies:

- 250-watt automatic voltage-sensing power supply
- 400-watt automatic voltage-sensing power supply

Wireless features

Depending on your computer model, the following wireless features are supported:

- Wireless LAN
- Bluetooth (available on some models)

System management features

- Ability to store power-on self-test (POST) hardware test results
- Desktop Management Interface (DMI)

Desktop Management Interface provides a common path for users to access information about all aspects of a computer. The information includes the processor type, installation date, attached printers and other peripherals, power sources, and maintenance history.

- ErP LPS compliance mode

The energy-related products directive (ErP) lowest power state (LPS) compliance mode reduces the consumption of electricity when your computer is in sleep or off mode. For more information, see "Enabling or disabling the ErP LPS compliance mode" on page 36.

- Intelligent Cooling Engine (ICE)

The energy-related products directive (ErP) lowest power state (LPS) compliance mode reduces the consumption of electricity when your computer is in sleep or off mode. For more information, see "Switching between better acoustic and better thermal performance" on page 37 and "Enabling or disabling the system to record thermal alert logs" on page 37.

- Intel® Standard Manageability (ISM)

Intel Standard Manageability builds certain functionalities into computer hardware and firmware. Therefore, computers are less expensive for businesses and easier to monitor, maintain, update, upgrade, and repair.

- Intel Active Management Technology (Intel AMT)

With specific Intel platform capabilities and third-party management and security applications, Intel Active Management Technology enables IT administrators or managed service providers to easily and remotely discover, repair, and protect their networked computing assets.

- Preboot Execution Environment (PXE)

Preboot Execution Environment enables you to start computers using a network interface. This manner is independent of starting computers from data storage devices (such as the hard disk drive) or installed operating systems.

- System Management (SM) basic input/output system (BIOS) and SM software

The SM BIOS specification defines data structures and access methods in a BIOS. Therefore, a user or an application can store and retrieve information specific about the computer in question.

- Wake on LAN (WOL)

Wake on LAN is an Ethernet computer networking standard that allows a computer to be turned on or woken up by a network message. The message is usually sent by a program running on another computer on the same local area network.

- Windows Management Instrumentation (WMI)

Windows Management Instrumentation is a set of extensions to the Windows Driver Model. It provides an operating system interface through which instrumented components provide information and notification.

Security features

- Ability to enable and disable a device
- Ability to enable and disable USB connectors individually
- Antivirus program
- BIOS passwords and Microsoft® Windows® accounts to deter unauthorized use of your computer
- Computrace Agent software embedded in firmware (for selected models)
- Cover presence switch (also called intrusion switch)
- Firewalls
- Smart USB Protection function
- Startup sequence control
- Startup without a keyboard or mouse
- Support for a cable lock
- Support for a Kensington-style cable lock
- Support for a padlock
- Trusted Platform Module (TPM)

Preinstalled operating system

Your computer is preinstalled with the Windows 10 operating system. Additional operating systems might be identified by Lenovo as compatible with your computer. To determine if an operating system has been certified or tested for compatibility, check the Web site of the operating system provider.

Statement on USB transfer rate

Depending on many factors such as the processing capability of the host and peripheral devices, file attributes, and other factors related to system configuration and operating environments, the actual transfer rate using the various USB connectors on this device will vary and will be slower than the data rate listed below for each corresponding device.

USB device	Data rate (Gbit/s)
3.2 Gen 1 / 3.1 Gen 1	5
3.2 Gen 2 / 3.1 Gen 2	10
3.2 Gen 2 x 2	20

Computer specifications

This section lists the physical specifications for your computer.

Dimensions

- Width: 165 mm (6.5 inches)
- Height: 376 mm (14.8 inches)
- Depth: 328 mm (12.91 inches)

Weight

Maximum configuration as shipped: 10.6 kg (23.37 lb)

Environment

- Air temperature:
 - Operating: From 10°C (50°F) to 35°C (95°F)
 - Storage in original shipping package: From -40°C (-40°F) to 60°C (140°F)
 - Storage without package: From -10°C (14°F) to 60°C (140°F)
- Humidity:
 - Operating: 30%–90% (non-condensing)
 - Storage: 20%–90% (non-condensing)
- Altitude:
 - Operating: From -15.2 m (-50 ft) to 3048 m (10 000 ft)
 - Storage: From -15.2 m (-50 ft) to 10 668 m (35 000 ft)

Electrical input

- Input voltage: From 100 V ac to 240 V ac
- Input frequency: 50/60 Hz

Programs

This section provides information about the programs on your computer.

Accessing a program on your computer

To access a program on your computer, do one of the following:

- From Windows Search:
 1. Type the program name into the search box next to the Start button.
 2. In the search results, click the name of the desired program to launch the program.
- From the Start menu or Control Panel:

1. Click the Start button to open the Start menu. Then, click the name of the desired program to launch the program.
2. If the program name is not displayed on the Start menu, access the program from Control Panel.
 - a. Click the Start button to open the Start menu.
 - b. Click **Windows System → Control Panel**.
 - c. View Control Panel by Large icons or Small icons, and then click the name of the desired program to launch the program.

An introduction to Lenovo programs

This section provides information about the major Lenovo programs available on your operating system.

Note: Depending on your computer model, some of the following programs might not be available.

- **Lenovo Vantage**

Your computer's best features and capabilities should be easy to access and understand. With Lenovo Vantage, they are.

Use Lenovo Vantage to do the following:

- Know the device status easily and customize device settings.
- Download and install UEFI BIOS, firmware, and driver updates to keep your computer up-to-date.
- Monitor your computer health, and secure your computer against outside threats.
- Look up warranty status (online).
- Access *User Guide* and helpful articles.

Notes:

- The available features vary depending on the computer model.
- Lenovo Vantage makes periodic updates of the features to keep improving your experience with your computer. The description of features might be different from that on your actual user interface.

- **ThinkStation Diagnostics**

The ThinkStation Diagnostics program enables you to troubleshoot and resolve computer problems. The program notifies you of any issues detected by the real-time hardware diagnostic monitoring function. The program also provides the details of the issue, analyzes possible causes, and provides solutions.

Chapter 2. Using your computer

This chapter provides information to help you use the various features provided by your computer.

Registering your computer

When you register your computer with Lenovo, you enter required information into a Lenovo database. The information enables Lenovo to contact you when there is a recall or other severe problem and provide quicker service when you call Lenovo for help. In addition, some locations offer extended privileges and services to registered users.

To register your computer with Lenovo, go to <https://support.lenovo.com/productregistration> and follow the instructions on the screen.

Get started with Windows 10

Learn the basics of Windows 10 and start working with it right away. For more information about Windows 10, see the Windows help information.

Windows account

A user account is required to use the Windows operating system. It can either be a Windows user account or a Microsoft account.

Windows user account

When you start Windows for the first time, you are prompted to create a Windows user account. This first account you created is of the "Administrator" type. With an Administrator account, you can create additional user accounts or change account types by doing the following:

1. Open the **Start** menu and select **Settings → Accounts → Family & other users**.
2. Follow the on-screen instructions.

Microsoft account

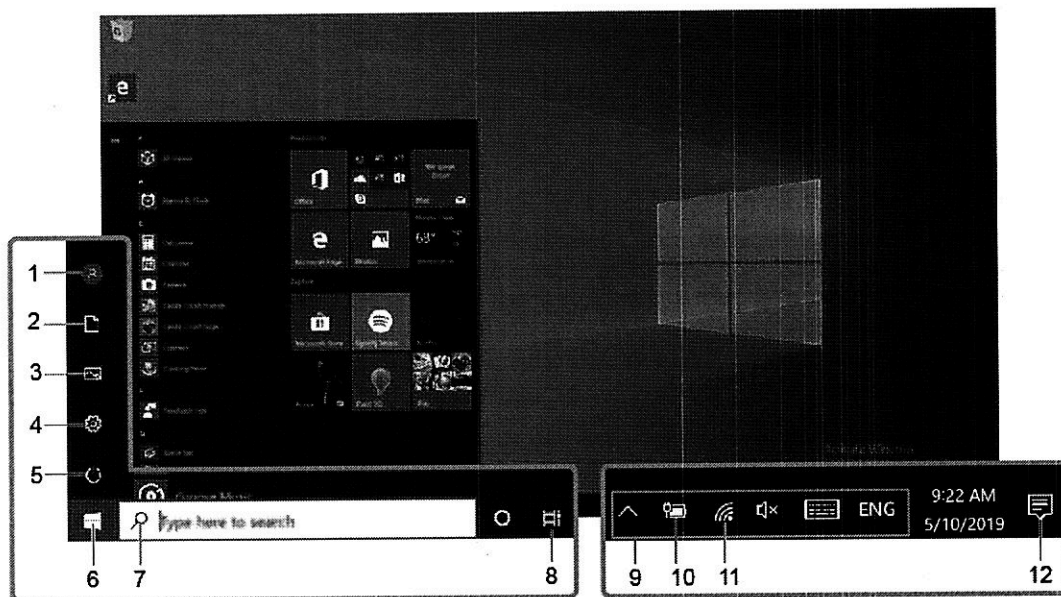
You can also log in to the Windows operating system with a Microsoft account.

To create a Microsoft account, go to the Microsoft sign-up page at <https://signup.live.com> and follow the on-screen instructions.

With a Microsoft account, you can:

- Enjoy one-time signing in if you are using other Microsoft services, such as OneDrive, Skype, and Outlook.com.
- Sync personalized settings across other Windows-based devices.

Windows user interface



1. Account 	Change account settings, lock the computer, or sign out from the current account.
2. Documents 	Open the Documents folder, a default folder to save your received files.
3. Pictures 	Open the Pictures folder, a default folder to save your received pictures.
4. Settings 	Launch Settings.
5. Power 	Shut down, restart, or put the computer into sleep mode.
6. Start button 	Open the Start menu.
7. Windows Search 	Type what you are looking for in the search box and get search results from your computer and the Web.
8. Task View 	Display all opened apps and switch among them.
9. Windows notification area	Display notifications and status of some features.
10. Battery status icon	Display power status and change battery or power settings. When your computer is not connected to ac power, the icon changes to  .
11. Network icon	Connect to an available wireless network and display the network status. When connected to a wired network, the icon changes to  .
12. Action center 	Display the latest notifications from apps and provide quick access to some features.

Open the Start menu

- Click the **Start** button.
- Press the Windows logo key on the keyboard.

Open the Start context menu

Right-click the **Start** button.

Access Control Panel

- Open the **Start** menu and click **Windows System → Control Panel**.
- Use Windows Search.

Launch an app

- Open the **Start** menu and select the app you want to launch.
- Use Windows Search.

Setting the computer volume

To set the computer volume, do the following:

1. Click the volume icon in the Windows notification area on the taskbar.

Note: If the volume icon is not displayed in the Windows notification area, add the icon to the notification area. See the Windows help system.

2. Follow the instructions on the screen and the hover text to adjust the volume, mute the speaker, or unmute the speaker.

Using a disc

This section provides instructions on how to use a disc and the optical drive.

Guidelines about using the optical drive

When using the optical drive, follow these guidelines:

- Do not place the computer in a location where the drive is exposed to any of the following conditions:
 - High temperature
 - High humidity
 - Excessive dust
 - Excessive vibration or sudden shock
 - An inclined surface
 - Direct sunlight
- Do not insert any object other than a disc into the drive.
- Do not insert damaged discs into the drive. Warped, scratched, or dirty discs can damage the drive.
- Before moving the computer, remove the disc from the drive.

Handling and storing a disc

When handling and storing a disc, follow these guidelines:

- Hold the disc by its edges. Do not touch the surface of the side that is not labeled.
- To remove dust or fingerprints, wipe the disc with a clean, soft cloth from the center to the outside. Wiping the disc in a circular direction might cause loss of data.
- Do not write or stick paper on the disc.
- Do not scratch or mark the disc.
- Do not place or store the disc in direct sunlight.
- Do not use benzene, thinners, or other cleaners to clean the disc.

- Do not drop or bend the disc.

Playing and removing a disc

To play a disc, do the following:

1. With the computer on, press the eject/close button on the front of the optical drive. The tray slides out of the drive.
2. Insert a disc into the tray. Some optical drive has a snap hub in the center of the tray. If your drive has a snap hub, support the tray with one hand and then push the center of the disc until it snaps into place.
3. Press the eject/close button again or gently push the tray forward to close the tray. The disc player program starts automatically. For more information, refer to the help system of the disc player program.

To remove a disc from the optical drive, do the following:

1. With the computer on, press the eject/close button on the front of the optical drive. The tray slides out of the drive.
2. Carefully remove the disc from the tray.
3. Press the eject/close button again or gently push the tray forward to close the tray.

Note: If the tray does not slide out of the drive when you press the eject/close button, turn off your computer. Then, insert a straightened paper clip into the emergency-eject hole adjacent to the eject/close button. Use the emergency eject only in an emergency.

Recording a disc

If your optical drive supports recording, you can record a disc.

Recording a disc using Windows tools

To record a disc using Windows tools, do one of the following:

- Burn a disc using the AutoPlay window.
 1. Ensure that the disc is played automatically.
 - a. Click the Start button to open the Start menu.
 - b. Click **Settings → Devices → AutoPlay**.
 - c. Select or turn on **Use AutoPlay for all media and devices**.
 2. Insert a recordable disc into the optical drive that supports recording. The AutoPlay window opens.
 3. Follow the instructions on the screen.
- Burn a disc using Windows Media® Player.
 1. Insert a recordable disc into the optical drive that supports recording.
 2. Open Windows Media Player. See "Accessing a program on your computer" on page 15.
 3. Follow the instructions on the screen.
- Burn a disc from an ISO file.
 1. Insert a recordable disc into the optical drive that supports recording.
 2. Double-click the ISO file.
 3. Follow the instructions on the screen.

Recording a disc using preinstalled programs

To record a disc using preinstalled programs, do the following:

1. Insert a recordable disc into the optical drive that supports recording.

2. Open the PowerDVD Create, PowerProducer, or Power2Go program. See "Accessing a program on your computer" on page 15.
3. Follow the instructions on the screen.

Connecting to a network

This section provides instructions on how to connect to a network.

Connecting to an Ethernet LAN

You can connect your computer to an Ethernet LAN by connecting an Ethernet cable to the Ethernet connector.



DANGER

To avoid the risk of electrical shock, do not connect the telephone cable to the Ethernet connector.

Connecting to a wireless LAN

You can connect your computer to a wireless LAN without the use of an Ethernet cable but by means of radio waves only.

Note: The wireless LAN feature is available only on some models.

To establish a wireless-LAN connection, do the following:

1. Ensure that a wireless LAN is available and the wireless LAN feature on your computer is working.
2. Click the wireless-network-connection-status icon in the Windows notification area to display available wireless networks.

Note: If the wireless-network-connection-status icon is not displayed in the Windows notification area, add the icon to the notification area. See the Windows help system.

3. Click a wireless LAN, and then click **Connect** to connect your computer to it. Provide required information if needed.

Connecting to a Bluetooth-enabled device

Bluetooth is a short-range wireless communications technology. Use Bluetooth to establish a wireless connection between your computer and another Bluetooth-enabled device within a distance of about 10 m (32.8 ft).

Note: The Bluetooth feature is available only on some models.

To connect to a Bluetooth-enabled device, do the following:

1. Turn on the Bluetooth feature of your computer. Ensure that the Bluetooth-enabled device is located within a distance of about 10 m (32.8 ft) from your computer.
2. Click the Bluetooth icon in the Windows notification area on the taskbar. Then, click **Add a Device** and follow the instructions on the screen.

Note: If the Bluetooth icon is not displayed in the Windows notification area, add the icon to the notification area. See the Windows help system.

Chapter 3. You and your computer

This chapter provides information about accessibility, ergonomic, and cleaning and maintenance.

Arranging your workspace

Arrange your workspace to suit your needs and the kind of work you do. This section provides information about the factors that affect the way you arrange your workspace.

Glare and lighting

Position the monitor to minimize glare and reflections from overhead lights, windows, and other light sources. Reflected light from shiny surfaces can cause annoying reflections on your screen. When possible, place the monitor at right angles to windows and other light sources. If necessary, reduce overhead lighting by turning off lights or using lower wattage bulbs. If you install the monitor near a window, use curtains or blinds to block the sunlight. You can adjust the brightness and contrast controls on the monitor as the room lighting changes throughout the day.

Where it is impossible to avoid reflections or to adjust the lighting, an antiglare filter placed over the screen might be helpful. However, these filters might affect the clarity of the image on the screen; try them only after you have exhausted other methods of reducing glare.

Air circulation

Your computer produces heat. The computer has a fan that pulls in fresh air and forces out hot air through the air vents. Blocking the air vents can cause overheating, which might result in a malfunction or damage. Position the computer so that nothing blocks the air vents; usually, 51 mm (2 inches) of air space is sufficient. Ensure that the vented air is not blowing on people.

Electrical outlet locations and cable lengths

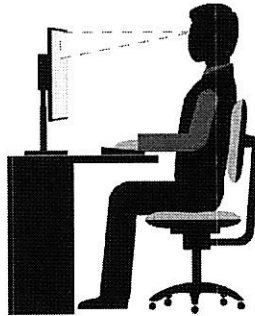
The following factors might determine the final placement of your computer:

- Locations of electrical outlets
- Length of power cords or power adapters
- Length of the cables that are connected to other devices

For more information about power cords or power adapters, see “Power cords and power adapters” on page iv.

Comfort

Although no single working position is ideal for everyone, here are a few guidelines to help you find a position that suits you best. The following figure sets an example for your reference.



- **Screen position:** Keep the screen at a comfortable viewing distance, usually 51–61 cm (20–24 inches). Then, adjust the screen so that the top of the screen is at or slightly below eye level and you can view it without twisting your body.
- **Chair position:** Use a chair that gives you good back support and seat height adjustment. Use chair adjustments to best suit your desired posture.
- **Head position:** Keep your head and neck in a comfortable and neutral (vertical or upright) position.
- **Arm and hand positions:** Keep your forearms, wrists, and hands in a relaxed and neutral (horizontal) position. Type with a soft touch without pounding the keys.
- **Leg position:** Keep your thighs parallel to the floor and your feet flat on the floor or on a footrest.

Make minor modifications in your working posture to deter the onset of discomfort caused by long periods of working in the same position. Frequent short breaks from your work also help to prevent minor discomfort associated with your working posture.

Keeping your computer current

In most cases, it is a good practice to have the most up-to-date operating system update patches, software programs, and device drivers. This section provides instructions on how to get the latest updates for your computer.

Getting the latest system updates

To get the latest system updates for your computer, ensure that your computer is connected to the Internet and do one of the following:

- Open Lenovo Vantage to check the available update packages. If the latest update package is available, follow the on-screen instructions to download and install the package.

To open the Lenovo Vantage program, see “Accessing a program on your computer” on page 15.

- Use Windows Update to get the system updates, such as security fixes, new versions of Windows components, and device driver updates.
 1. Click the Start button to open the Start menu.
 2. Click **Settings → Update & Security → Windows Update**.
 3. Follow the instructions on the screen.

Note: The device drivers provided by Windows Update might not be tested by Lenovo. It is recommended that you get device drivers by using Lenovo programs or from the Lenovo Web site at <https://support.lenovo.com>.

Accessibility information

Lenovo is committed to providing users who have hearing, vision, and mobility limitations with greater access to information and technology. This section provides information about the ways these users can get the most out of their computer experience. You also can get the most up-to-date accessibility information from the following Web site:

<https://www.lenovo.com/accessibility>

Keyboard shortcuts

The following list contains keyboard shortcuts that can help make your computer easier to use.

Note: Depending on your keyboard, some of the following keyboard shortcuts might not be available.

- **Windows logo key + U:** Open Ease of Access Center
- **Right Shift for eight seconds:** Turn on or turn off Filter Keys
- **Shift five times:** Turn on or turn off Sticky Keys
- **Num Lock for five seconds:** Turn on or turn off Toggle Keys
- **Left Alt+Left Shift+Num Lock:** Turn on or turn off Mouse Keys
- **Left Alt+Left Shift+PrtScn (or PrtSc):** Turn on or turn off High Contrast

For more information, go to <https://windows.microsoft.com/>, and then search using any of the following keywords: keyboard shortcuts, key combinations, shortcut keys.

Ease of Access Center

Ease of Access Center on the Windows operating system enables you to configure your computer to suit your physical and cognitive needs.

To use Ease of Access Center, do the following:

1. Click the Start button to open the Start menu.
2. Click **Settings → Ease of Access**.
3. Choose the appropriate tool by following the instructions on the screen.

Ease of Access Center mainly includes the following tools:

- Magnifier

Magnifier is a useful utility that enlarges the entire screen or part of the screen so that you can see the items better.

- Narrator

Narrator is a screen reader that reads aloud what is displayed on the screen and describes events such as error messages.

- On-Screen Keyboard

To input data into your computer using a mouse, joystick, or other pointing devices instead of a physical keyboard, you can use On-Screen Keyboard.

- High Contrast

High Contrast is a feature that heightens the color contrast of some text and images on your screen. As a result, those items are more distinct and easier to identify.

- Personalized keyboard

Adjust keyboard settings to make your keyboard easier to use. For example, you can use your keyboard to control the pointer and type certain key combinations easier.

- **Personalized mouse**

Adjust mouse settings to make your mouse easier to use. For example, you can change the pointer appearance and make it easier to manage windows with the mouse.

Speech Recognition

Speech Recognition enables you to control your computer by voice.

Using only your voice, you can start programs, open menus, click objects on the screen, dictate text into documents, and write and send e-mails. Everything you do with the keyboard and mouse can be done with only your voice.

To use Speech Recognition, do the following:

1. Click the Start button to open the Start menu.
2. Click **Windows System → Control Panel**.
3. View Control Panel by Large icons or Small icons, and then click **Speech Recognition**.
4. Follow the instructions on the screen.

Screen-reader technologies

Screen-reader technologies are primarily focused on software program interfaces, help information systems, and various online documents. For additional information about screen readers, see the following:

- Using PDFs with screen readers:
<https://www.adobe.com/accessibility.html?promoid=DJGVE>
- Using the JAWS screen reader:
<https://www.freedomscientific.com/Products/Blindness/JAWS>
- Using the NVDA screen reader:
<https://www.nvaccess.org/>

Screen resolution

You can make the text and images on your screen easier to read by adjusting the screen resolution of your computer.

To adjust the screen resolution, do the following:

1. Right-click a blank area on the desktop.
2. Click **Display settings → Display**.
3. Follow the instructions on the screen.

Note: Setting the resolution too low might prevent some items from fitting on the screen.

Customizable item size

You can make the items on your screen easier to read by changing the item size.

- To change the item size temporarily, use the Magnifier tool in Ease of Access Center.
- To change the item size permanently, do the following:
 - Change the size of all the items on your screen. Do the following:
 1. Right-click a blank area on the desktop.
 2. Click **Display settings → Display**.

3. Follow the on-screen instructions to change the item size. For some applications, your configuration might not take effect until you sign out and then sign in again.
- Change the size of the items on a Web page.
Press and hold Ctrl, and then press the plus-sign key (+) to enlarge or the minus-sign key (-) to reduce the text size.
 - Change the size of the items on the desktop or a window.

Note: This function might not work on some windows.

If your mouse has a wheel, press and hold Ctrl, and then scroll the wheel to change the item size.

Industry-standard connectors

Your computer provides industry-standard connectors that enable you to connect assistive devices.

For more information about the location and function of each connector, see “Hardware locations” on page 1.

TTY/TDD conversion modem

Your computer supports the use of a text telephone (TTY) or the telecommunications device for the deaf (TDD) conversion modem. The modem must be connected between your computer and a TTY/TDD telephone. Then, you can type a message on your computer and send it to the telephone.

Documentation in accessible formats

Lenovo provides electronic documentation in accessible formats, such as properly tagged PDF files or HyperText Markup Language (HTML) files. Lenovo electronic documentation is developed to ensure that visually impaired users can read the documentation through a screen reader. Each image in the documentation also includes adequate alternative text so that visually impaired users can understand the image when they use a screen reader.

Chapter 4. Security

This chapter provides information about how to protect your computer from unauthorized use.

Locking your computer

This section provides instructions on how to lock your computer with the locking devices to keep your computer safe.

Enabling or disabling the E-lock

Your computer may have a security lock solution installed to protect the computer from unauthorized tampering of the internal components. Using the E-Lock, you can mechanically lock or unlock the computer cover.

To enable or disable the E-Lock, do the following:

1. Turn on or restart the computer.
2. Before Windows starts up, repeatedly press and release the F1 or Fn+F1 key until the Setup Utility program opens.
3. Click **Security** → **Electronic Lock** to enable or disable the E-lock.
4. Press F10 or Fn+F10 to save the changes and reboot the computer.

Note: Changes do not take effect until the setting is saved and the system is rebooted.

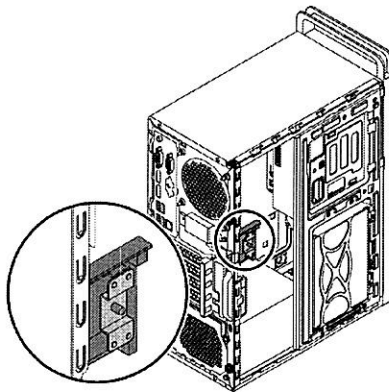


Figure 7. Enabling or disabling the E-lock

Locking the computer cover

Locking the computer cover helps prevent unauthorized people from gaining access to the inside of your computer. Your computer comes with a padlock loop so that the computer cover cannot be removed when a padlock is installed.

Note: The computer hardware might look slightly different from the illustration.

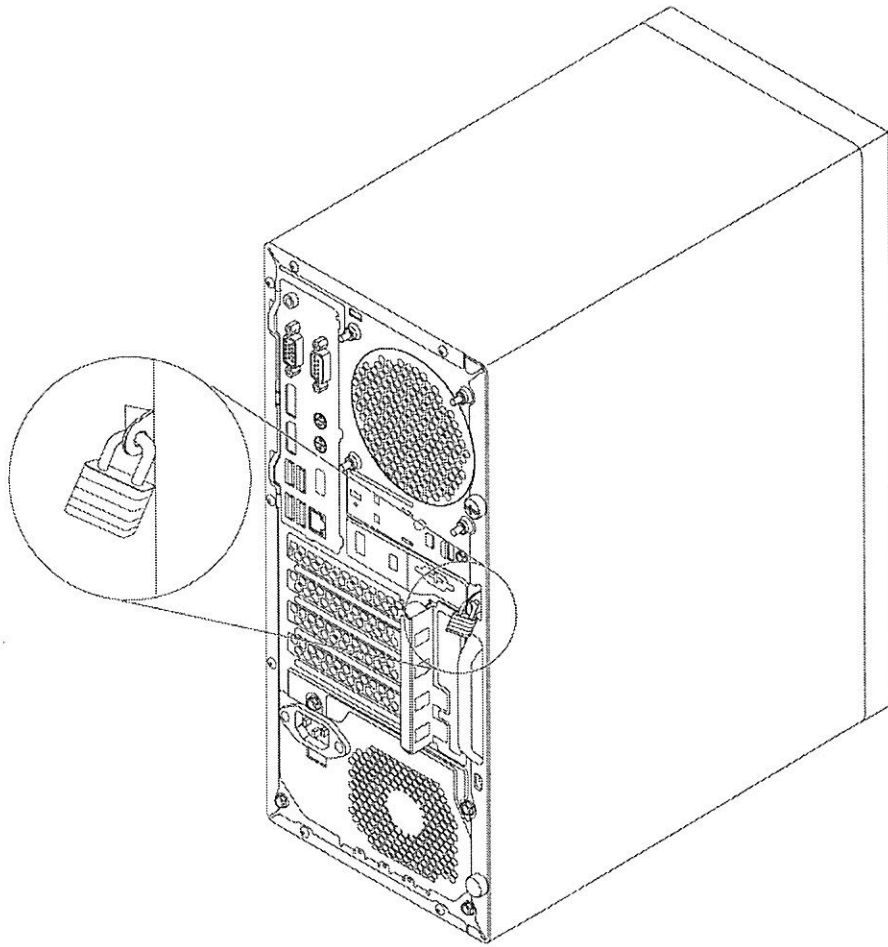


Figure 8. Padlock