

Lenovo P1 Gen 5

Version: 1.0 | 05/02/2022

Downloads

Hardware Maintenance Manual	P1 Gen 5 HMM
Drivers & Software	ThinkPad P1 Gen 5 Drivers & Software

SECTION I: SYSTEM OVERVIEW

Description	ThinkPad P1 Designed with the modern user in mind, the ThinkPad® P1 is the perfect combination of workstation know-how, ultra-premium design, and true mobility, without sacrificing looks for power.
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CPU

Processor Support	Intel 12th Gen Alder Lake H Series (45W) Core i7 and i9
Type	BGA

Operating Systems

Preloaded	Windows 11 Pro 64-bit (21H2) Windows 11 Home 64-bit (21H2) Windows 11 Home Single Language 64-bit (21H2) Windows 11 Chinese Language Edition 64-bit (21H2) Windows 10 Pro 64-bit preinstalled through downgrade rights in Windows 11 Pro 64-bit (21H2) Windows 10 China Government Edition Ubuntu Linux 64-bit (Version 20.04 LTS, running the 4.15.0 kernel) Ubuntu Linux Data Science Workstation
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	Fedora 36 Linux (depending on NVIDIA open source driver status) No Operating System
Supported	Ubuntu Linux 22.04 Cert only Red Hat Enterprise Linux (RHEL) 8.6 (depending on NVIDIA open source driver status)

Memory

Number of DIMM Slots	2 DIMM sockets
Channels	Single Channel w/ 1DIMM Dual Channel w/ 2DIMMs
Type	DDR5 SoDIMM
ECC Support	No
Speed	Up to 4800MHz
Max DIMM Size	32GB
Max System Memory	64GB
Min System Memory	8GB
Soldered Memory	None
Disclaimers	No ECC memory on P1 Gen 5

Storage

Storage Slots	2x M.2 2280 (with Iris Xe, NV RTX A1000, NV RTX A2000 8GB) 1x M.2 2280 (with NV RTX A3000 12GB, NV RTX A4500, NV RTX A5500, GF RTX 3070 Ti, GF RTX 3080 Ti)
SATA	None
PCIe	Solid State Drive, 2x OPAL2 PCIe NVMe M.2 2280 TLC
SAS	None
Interface	PCIe Gen 4 Performance or Gen 4 Value
Security	OPAL2 for NVMe SSD
Optional Hard Disk Drive Controllers	None
Disclaimers	NV RTX A3000 12GB, NV RTX A4500, NV RTX A5500, GF RTX 3070 Ti, GF RTX 3080 Ti cannot be configured with dual storage

Video

Integrated Graphics	For Intel® i7-12700H Processor Graphics Intel® Iris Xe Graphics Utilized via "Hybrid Mode" in BIOS For Intel® i7-12800H vPro Processor Graphics Intel® Iris Xe Graphics Utilized via "Hybrid Mode" in BIOS
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	For Intel® i9-12900H vPro Processor Graphics Intel® Iris Xe Graphics Utilized via "Hybrid Mode" in BIOS
Discrete Graphics	NVIDIA RTX A1000, NVIDIA RTX A2000 8GB, NVIDIA RTX A3000 12GB, NVIDIA RTX A4500, NVIDIA RTX A5500 NVIDIA GeForce RTX 3070 Ti, NVIDIA GeForce RTX 3080 Ti
Adapter	None
Bus Interface	PEG

Display

Resolutions	WUXGA (FHD+) / WQXGA (QHD+) / WQUXGA (UHD+)
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Camera

Resolution	FHD 1080p / IR Camera
Frames per Second	30 fps
Focus	Fixed 50cm
Camera Interface	USB 2.0
IR Camera	Yes, On Select Model

Keyboard

Number of Keys	US : 84 / UK : 85 / JP :89
Numpad	No
Size	100% ISO
Function Key Features	Yes
Backlit	Yes
Keyboard size	Como 2021 Full size KB without NumPad (Bottom loading)
Key stroke	1.5mm
Key pitch	19.05 mm (Vertical & Horizontal)
Keyboard backlight	Yes
Keyboard thickness	4.55mm

Touchpad / Fingerprint Reader

TrackPoint Details	COMO TrackPoint module (t5.55mm)
Finger Print Reader Model	Synaptics Metallica 8x8 FPR, MoC - integrated with Power button

Multi-Touch	Yes
Resolution	1000 ppi
TouchPad/Trackpad thickness	3.3mm
TouchPad/Trackpad type	2 Buttons Clickpad
Trackpad size	115mm x 67.6mm
Trackpad material/finish	Glass surface

I/O – Ports and Connectors

USB	2x USB-A 3.2 (Gen1) (1 powered)
Thunderbolt	2x Thunderbolt 4 (USB-C/DP/PD) (DP 1.4 for discrete, DP 1.2 for integrated graphics)
HDMI	1x HDMI 2.1
Audio Combo Jack	1x Microphone & Headphone Combo Jack (3.5mm)
Media Card Reader	Dedicated SD Express 7.0 Card Reader (UHS-I) (MMC,SD,SDHC SDXC)
Smart Card Reader	None
Power Connector	DC-In
Docking Port	Docking Via Thunderbolt 4 / USB-C
VirtualLink	None
Network adapter	No native RJ-45 port RJ-45 functionality provided via USB-C to Ethernet Adapter
Disclaimers	HDMI 2.1: Up to 8K/60Hz for discrete graphics or Up to 4K/60Hz for integrated graphics

Power Connector

Main	DC-In
USB-C	2x Thunderbolt 4 (USB-C/DP/PD)

Ethernet

Vendor	N/A
Count	N/A
EEPROM	N/A
Speeds	N/A
Functions	N/A
Connectors	No native RJ-45 port RJ-45 functionality provided via USB-C to Ethernet Adapter

WWAN

Model	Fibocom FM350-GL 5G (On Select Models) Quectel EM05CEFC 4G LTE CAT4 (PRC only)
Disclaimers	NV RTX A3000 12GB, NV RTX A4500, NV RTX A5500, GF RTX 3070 Ti, GF RTX 3080 Ti cannot be configured with WWAN Not WWAN-Ready

Near Field Communications

Model	Foxconn NXP NPC300 NFC
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Audio

Vendor	Realtek
Type	Intel High Definition Audio (2 channel)
Internal Speaker	2 channel
Connectors	Microphone & Headphone Combo Jack (3.5mm)
Chipset	ALC3306 w/ Smart Amp
Number of Channels	4-channel DAC, 4-channel ADC
Number of Bits/Audio Resolution	16/20/24-bit PCM format
Sampling Rate (Recording/Playback)	44.1k/48k/96k/192kHz sample rate
Signal to Noise Ratio	Mic In: 95dB FSA Headphone Out@32ohm: 100dB FSA
Analog Audio	None
Dolby Digital	Dolby ATMOS
Digital Out (S/PDIF)	No
Speaker Power Rating	2W@4ohm/ch

Power adapter

Type	Slim 135W AC Adapter	Slim 170W AC Adapter	Slim 230W AC Adapter
Dimensions	200cc (118 x 77 x 22mm)	240cc (142 x 77 x 22mm)	353cc (160 x 87 x 25.4mm)
Weight	Max 370g	Max 475g	Max 815g
Input Voltage	100-240V	100-240V	100-240V

Security

TPM	Version 2.0
Asset ID	Yes
vPro	Intel vPro for WS

Chassis Information

Format	16" Thin & Light
Color	Deep Black Carbon Fiber Weave (for UHD+ only)
Thermal Solutions	Internal Dual FAN, Intelligent Cooling, KBD air intake, Dual by-pass design Vapor Chamber and Liquid Metal Cooling (for NV RTX A3000 12GB, NV RTX A4500, NV RTX A5500, GF RTX 3070 Ti, GF RTX 3080 Ti)
Dimensions	Length 14.15 inches 359.5 millimeters Width 9.99 inches 253.8 millimeters Height Non-Touch 0.69 inches 17.7 millimeters Touch 0.71 inches 18.2 millimeters
Weight	Non-Touch Model: 4 Cell Battery 1.81kgs/3.99lbs Touch Model: 4 Cell Battery 1.86kgs/4.10lbs

Packaging Parameters

	Standard	Retail
Height (mm)	329mm	325mm
Height (inch)	12.95in	12.79in
Width (mm)	518mm	531mm
Width (inch)	20.39in	20.90in
Depth (mm)	80mm	80mm
Depth (inch)	3.14in	3.14in
Weight (kgs)	3.3kgs	4.1kgs
Weight (lbs)	7.27lbs	9.03lbs

Security & Serviceability

Hardware Maintenance Manual	P1 Gen 5 HMM — need link
Drivers & Software	P1 Gen 5 Drivers & Software — need link
Self Healing BIOS	Yes
Access Panel	Removable bottom cover
Number of Screws	7
Swappable Components	Bottom cover, memory module, M.2 solid-state drive, coin-cell battery, TrackPoint pointing cap, SIM Tray
Storage Slots	2 slots
Memory	2 SoDIMM slots
Restore CD/DVD/USB Set	None, Restore Media available via Lenovo Customer Support Center
Cable Lock Support	Security-lock slot, Optional Kensington Cable Lock
Power-On Password	Yes
Hard Disk Password	Yes; User and Master hard disk password
Supervisor Password	Yes
NIC LEDs (integrated)	None
Security Chip	Yes (for TPM 2.0)
Access Panel Key Lock	Bottom Cover Tamper Detection
Boot Sequence Control	Yes

Operating Environment

Operating - Air Temperature	At altitudes up to 2438 m (8000 ft) - Operating: 5°C to 35°C (41°F to 95°F)
Non Operating - Air Temperature	At altitudes up to 2438 m (8000 ft) - Storage: 5°C to 43°C (41°F to 109°F)
Humidity	Operating: 8% to 95% at wet-bulb temperature 23°C (73°F) Storage: 5% to 95% at wet-bulb temperature 27°C (81°F)
Corrosive Gas	G1
Particulates	P1

SECTION II: SUPPORTED COMPONENTS

Supported Components

Processor	Intel® Core™ i7-12700H processor (E-cores up to 3.50 GHz P-cores up to 4.70 GHz) Intel® Core™ i7-12800H vPro processor (E-cores up to 3.70 GHz P-cores up to 4.80 GHz)
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	Intel® Core™ i9-12900H vPro processor (E-cores up to 3.80 GHz P-cores up to 5.00 GHz)
Memory Support	DDR5 4800MHz SoDIMM
Chipset (PCH)	Mobile Intel® WM690 Chipset
Size of BIOS Flash	32MB
Super I/O	None
Clock	Crystal
Audio	Realtek High Definition Audio
Ethernet	No native RJ-45 port RJ-45 functionality provided via USB-C to Ethernet Adapter

Memory

System Capacity Options	8GB 16GB 32GB 64GB
Memory Types	8GB DDR5 4800MHz SoDIMM 16GB DDR5 4800MHz SoDIMM 32GB DDR5 4800MHz SoDIMM
Brand of Memory	Samsung SK Hynix Micron
Memory Speed	4800MHz
Disclaimers	No ECC memory on P1 Gen 5

Storage

2.5" SAS Hard Disk Drive (HDD)	None
2.5" SATA Hard Disk Drive (HDD)	None
2.5" SATA Solid State Drive (SSD)	None
M.2 (NGFF) PCIe Solid State Drive (SSD)	256GB OPAL2 PCIe 4x4 Value TLC (M.2 2280-S3) 512GB OPAL2 PCIe 4x4 Value TLC (M.2 2280-S3) 1TB OPAL2 PCIe 4x4 Value TLC (M.2 2280-S3) 512GB OPAL2 PCIe 4x4 Performance TLC (M.2 2280-S3) 1TB OPAL2 PCIe 4x4 Performance TLC (M.2 2280-S3) 2TB OPAL2 PCIe 4x4 Performance TLC (M.2 2280-S3) 4TB OPAL2 PCIe 4x4 Performance TLC (M.2 2280-S3)
2.5" PCIe Solid State Drive (SSD)	None
Brand of Drive	Samsung Western Digital Hynix Kioxia Micron UnionMemory

Intel Optane Storage Technology	None
RAID	Optional, Selectable in BIOS
RAID Level and Requirements	RAID-0/1

Removeable Media

Media Card Reader Specifications	SD Express 7.0 UHS-II
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SECTION III: Supported Component Detail

CPU Specifications

CPU	Intel® Core™ i7-12700H processor (E-cores up to 3.50 GHz P-cores up to 4.70 GHz)	Intel® Core™ i7-12800H vPro processor (E-cores up to 3.70 GHz P-cores up to 4.80 GHz)	Intel® Core™ i9-12900H vPro processor (E-cores up to 3.80 GHz P-cores up to 5.00 GHz)
Integrated Graphics	Intel® Iris Xe Graphics	Intel® Iris Xe Graphics	Intel® Iris Xe Graphics
# of Cores	6 P-cores and 8 E-cores	6 P-cores and 8 E-cores	6 P-cores and 8 E-cores
# of Threads	20	20	20
Processor Base Frequency	2.3GHz on P-cores and 1.7GHz on E-cores	2.4GHz on P-cores and 1.8GHz on E-cores	2.5GHz on P-cores and 1.8GHz on E-cores
Max Turbo Frequency	4.7GHz on P-cores and 3.5GHz on E-cores	4.8GHz on P-cores and 3.7GHz on E-cores	5GHz on P-cores and 3.8GHz on E-cores
Cache	24 MB	24 MB	24 MB
TDP	45 W	45 W	45 W

Display Specifications

Model	WUXGA Non-Touch	WQXGA Non-Touch	WQUXGA Non-Touch	WQUXGA Touch
Resolution	FHD+ (1920 x 1200)	QHD+ (2560 x 1600)	UHD+ (3840 x 2400)	UHD+ (3840 x 2400)
Diagonal	16"	16"	16"	16"
Aspect Ratio	16:10	16:10	16:10	16:10

Backlight	LED	LED	LED	LED
PPI	FHD+: 142	QHD+: 189	UHD+: 283	UHD+: 283
Active Area	FHD+: 344.68mm x 215.42mm	QHD+: 344.68mm x 215.42mm	UHD+: 343.99mm x 214.99mm	UHD+: 343.99mm x 214.99mm
Refresh Rate	Max 60Hz	Max 165Hz	Max 60Hz	Max 60Hz
Contrast Ratio	FHD+: 1200:1	QHD+: 1200:1	UHD+: 1500:1	UHD+: 1500:1
Viewing Angle	FHD+: 89/89/80/80 degree	QHD+: 85/85/85/85 degree	UHD+: 85/85/85/85 degree	UHD+: 85/85/85/85 degree
Color gamut	100% sRGB	100% sRGB	100% Adobe	100% Adobe
Brightness	300 nits	500 nits	600 nits	600 nits
HDR	N/A	N/A	HDR400 Dolby Vision	HDR400 Dolby Vision
Color Depth	FHD+: 16.7M (8-bit)	QHD+: 16.7M (8-bit)	UHD+: 1064M (8-bit + FRC)	UHD+: 1064M (8-bit + FRC)
Interface	FHD+: eDP 1.4	QHD+: eDP 1.4	UHD+: eDP 1.4	UHD+: eDP 1.4
Panel ID Recognition	EDID in BIOS Table	EDID in BIOS Table	EDID in BIOS Table	EDID in BIOS Table
Weight	330g max	330g max	330g max	330g max
Color Calibrator	X-Rite Pantone Color Calibration	X-Rite Pantone Color Calibration	X-Rite Pantone Color Calibration	X-Rite Pantone Color Calibration
Panel Technology	IPS, Anti-Glare	IPS, Anti-Glare	IPS, Anti-Glare	IPS, Anti-Reflective/Anti-Smudge
Touch Panel	None	None	None	Multi-Finger Touch Panel with Pen Controller, Wacom. Pen Tilt support

SSD Specifications

2.5" SATA Solid State Drive (SSD)	N/A
M.2 (NGFF) PCIe Solid State Drive (SSD)	2x M.2 2280-S3 PCIe
2.5" PCIe Solid State Drive (SSD)	N/A
Intel Optane Storage Technology	N/A

Solid State Storage Devices

Supported Types	M.2	M.2	M.2
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Open GL	4.6	4.6	4.6	4.6	4.6	4.6	4.6
Shader Model	7.0	7.0	7.0	7.0	7.0	7.0	7.0
DirectX	12 Ultimate	12 Ultimate	12 Ultimate	12 Ultimate	12 Ultimate	12 Ultimate	12 Ultimate
PCIe Generation	4	4	4	4	4	4	4
Single Precision Floating-Point Performance	7.5	9.3	14.2	18.5	24.7		
Tensor Performance	59.7	74.3	113	148.4	197.8		
NVIDIA FXAA/TXAA Anti-Aliasing	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NVIDIA RTX Desktop Manager	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vulkan Support	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NVIDIA Optimus	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NVIDIA Max-Q Technology	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NVENC/NVDEC	Yes	Yes	Yes	Yes	Yes	Yes	Yes

WLAN

Model	Garfield Peak 2 Intel Wi-Fi 6E AX211 (Gig+) + BT5.2
Antenna Diversity	Supported
MIMO	Supported
Radio ON/OFF Control	Supported
Connector interface	M.2 CNVi
Operating Temperature (Adapter Shield)	0c to +80c
Humidity Non-Operating	50%~90% Rh non condensing (at temperatures of 25c to 35c)
Operating Systems	Microsoft Windows 11, Windows 10, Linux
Wi-Fi Alliance	Wi-Fi CERTIFIED 6 with Wi-Fi 6E, Wi-Fi CERTIFIED a/b/g/n/ac, WMM, WMM-PowerSave, WPA3, Protected Management Frames, Wi-Fi Direct, Wi-Fi Agile Multiband
IEEE WLAN Standard	IEEE 802.11-2016 and select amendments (selected feature coverage) IEEE 802.11a, b, d, e, g, h, i, k, n, r, u, v, w, ac, ax; Fine Timing Measurement based on 802.11-2016, Wi-Fi Location R2 (802.11az) HW readiness
Roaming	Support seamless roaming between access points
Bluetooth	BT 5.2
Authentication Protocols	802.1X EAP-TLS, EAP-TTLS/MSCHAPv2, PEAPv0 - MSCHAPv2 (EAP-SIM, EAP-AKA, EAP-AKA')
Encryption	128-bit AES-CCMP, 256-bit AES-GCMP
Regulatory	For a list of country approvals, please contact your local Intel representatives
US Government	FIPS 140-2
Product Safety	UL,C-UL,CB (IEC 60950-1)

Disclaimers

For more details, please refer to the Intel document as below.
<https://www.intel.es/content/www/es/es/products/docs/wireless/wi-fi-6e-ax211-module-brief.html>

Battery

Dimension	L: 312mm*W: 58.8mm*T 9.4mm
Weight	MAX 343.2g
Type (Chemistry and Cell)	Li-Polymer (4S1P), 4-cell
Voltage	15.52 V
Battery Capacity	90Wh
Charging Time	On Charge Time (0- 100%) * 120 min Off Charge Time (0 - 80%) ** 60 min Off Charge Time (0 - 100%) ** 120 min
Operating Temperature Range	between 10°C (50°F) and 35°C (95°F)
Warranty	1 Year / 3 Year Available
Coin Cell Battery (Model)	CR2016

SECTION IV: BIOS / Certifications / Standards / Environmental

BIOS Specifications

WMI Support	Yes, if it is BIOS Setup change by WMI.
ROM-Based Setup Utility (F1)	Yes
Bootblock Recovery	No
Replicated Setup	Yes, it supported with SRSETUP tool.
Boot Control	Yes, it means Boot order change.
Discrete Mode	Yes
Memory Change Alert	N/A
Thermal Alert	N/A
Asset Tag	Yes
System/Emergency ROM Flash Recovery with Video	N/A But FW based ROM flash recovery is supported.
Remote Wakeup/Remote Shutdown	Yes, if Remote wakeup is Wake on LAN from S4/S5.

Keyboard-less Operation	N/A
Per-port Control	Yes, if it is I/O port enable/disable by BIOS Setup.
Adaptive Cooling	Yes, if it is thermal & fan control.
Security	Yes, BIOS password / Hard disk password / Finger print
Intel(R) AMT (includes ASF 2.0)	Yes. If you select vPro model
Intel(R) TXT	Yes. If you select vPro model
Memory Modes	N/A

EMC & Safety

EMC	<p>Published, Certified Existing Reports</p> <p>EMC - Australia EMC - Belarus EMC - Canada EMC - EU/EFTA EMC - Japan EMC - Kazakhstan EMC - New Zealand EMC - Russia EMC - United Kingdom EMC - USA/Territories</p>
Safety	<p>To access the latest User Guide and Safety and Warranty Guide, go to: https://support.lenovo.com</p> <p>Low Halogen Declaration of Conformance TNOT-2017-0040 Section 9 - Low Halogen Scorecard Homologation PCR B Compliant</p> <p>In the following countries: Albania, Algeria, Andorra, Angola, Antigua and Barbuda, Argentina, Armenia, Aruba, Australia, Azerbaijan, Bahamas, Bahrain, Bangladesh, Barbados, Belarus, Belize, Benin, Bermuda, Bolivia, Botswana, Burkina Faso, Burundi, Cambodia, Cameroon, Canada, Cape Verde, Cayman Islands, Central African Republic, Chad, China, Colombia, Comoros, Congo, Costa Rica, Djibouti, Dominican Republic, Egypt, El Salvador, Eritrea, Ethiopia, EU/EFTA, Fiji, Gabon, Gambia, Georgia, Ghana, Grenada, Guatemala, Guinea, Haiti, Honduras, Hong Kong, India, Indonesia, Israel, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Kuwait, Laos, Lebanon, Liberia, Macau, Madagascar, Malawi, Malaysia, Mali, Mauritania, Mauritius, Mexico, Moldova, Mongolia, Morocco, Mozambique, Namibia, Nepal, New Zealand, Nicaragua, Niger, Nigeria, Oman, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Qatar, Russia, Saudi Arabia, Senegal, Serbia, Seychelles, Sierra Leone, Singapore, South Africa, South Korea, Sri Lanka, Swaziland, Taiwan, Tajikistan, Tanzania, Thailand, Togo, Tunisia, Turkey, Turkmenistan, Uganda, Ukraine, United Arab Emirates, Uruguay, USA/Territories, Uzbekistan, Venezuela, Vietnam, Zambia, Zimbabwe, Brazil - Inmetro 170 Govt Bids, Guinea-Bissau, Lesotho</p>

Environmental

Energy Star	<p>ENERGY STAR® Version 8.0 For more information about ENERGY STAR, go to: https://www.energystar.gov</p>
EPEAT	EPEAT Certification Available on select models
IT ECO declaration	The latest environmental information about Lenovo products is available at:

	https://www.lenovo.com/ecodeclaration
Hazardous Substances	<p>The latest environmental information about Lenovo products is available at: https://www.lenovo.com/ecodeclaration European Union RoHS This Lenovo product, with included parts (cables, cords, and so on) meets the requirements of Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment ("RoHS recast" or "RoHS 2"). For more information about Lenovo worldwide compliance on RoHS, go to: https://www.lenovo.com/rohs-communication</p>

Manageability

Industry Standard Specifications	This product meets the following industry standard specifications for manageability functionality:
Remote Manageability Software Solutions	Lenovo ThinkManagement Console Microsoft System Center Configuration Manager LANDesk Management Suite for Lenovo Vantage Technologies (www.landesk.com/lenovo)
System Software Manager	Lenovo ThinkStation supports software management tools from the ThinkVantage System Update suite: System Update Update Retriever
Service, Support, and Warranty	On-site Warranty and Service: Three-years, limited warranty and service offering delivers on-site, next business-day service for parts and labor and includes free telephone support 8am to 5pm. Global coverage ensures that any product purchased in one country and transferred to another, non-restricted country will remain fully covered under the original warranty and service offering.