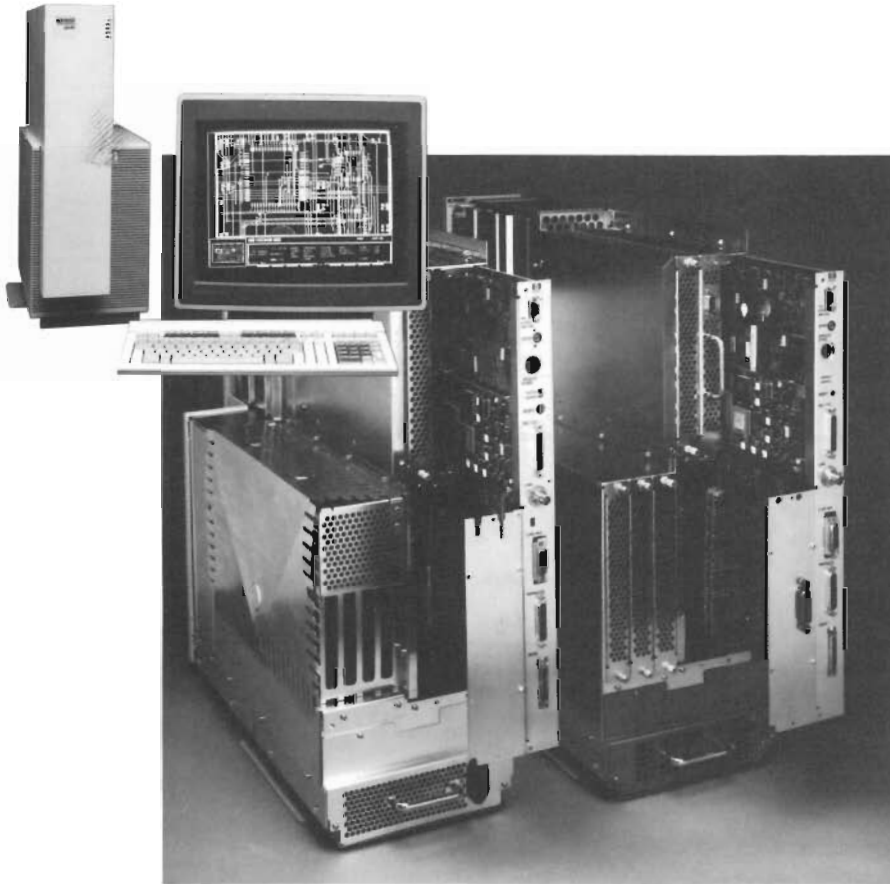


# HP Apollo 9000 Models 400s and 433s

Technical Data <sup>\*</sup>



## High-speed performance plus flexible expandability.

HP Apollo 9000 Models 400s and 433s deliver up to 26 MIPS and 4.5 MFLOPS of highly advanced workstation performance on a compact, deskside package. Part of the new Series 400 family of workstation products, Models 400s and 433s are designed for graphics-intensive applications such as mechanical engineering, industrial design, simulation and scientific visualization.

They are the first workstations to combine the innovation of Apollo with the quality and reliability of HP. They also are the first workstations capable of running your choice of either the HP-UX system or the Domain/OS operating system.

Model 400s is based on the MC68030 processor running at 50 MHz while Model 433s features the new MC68040 at 33 MHz. The MC68040 technology in the 433s improves integer performance up to 120% and floating point speed

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increases up to 9 times over the MC68030 processor. Model 400s buyers can upgrade to the MC68040 chip with no difference in list price from a Model 433s.

Flexible configurations give you the opportunity to tailor each workstation according to your specific application requirements. Memory can be configured from 8 to 128 Mbytes of ECC RAM. Two graphics slots are standard, with DIO-2, DIO, ISA, or EISA backplanes available as options.

Extensive SCSI and networking options are available along with a wide range of mass storage devices.

Color graphics options range from advanced 10-plane (8 bit + 2 overlay) systems for 2D applications through powerful 3D wireframes, solids and animation graphics with the PersonalVRX or TurboVRX graphics systems.

<sup>\*</sup> Data subject to change without notice.  
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*Full-speed  
power for  
performance  
levels that free  
you to work  
faster, more  
intuitively.*

## Technical Specifications

### System Processing Unit

	400s	433s
<b>Central Processor</b>	MC68030	MC68040
Clock	50 MHz	33 MHz
Wait States to Cache	1	0 internal, 1 external
Integer Performance	12 MIPS	26 MIPS
<b>Floating Point</b>	MC68882	On MC68040
Clock Frequency	50 MHz	25 MHz
Performance (DP Linpack)	0.5 MFLOPS	4.5 MFLOPS
<b>Memory Management Unit:</b>		
Type	On MC68030	On MC68040
Virtual memory (HP-UX)	4 Gbytes/process	4 Gbytes/process
(Domain)	2 Gbyte/process	2 Gbyte/process
Contexts	84 default, user-settable	84 default, user-settable
<b>Cache Memory On Chip</b>	Separate instruction & data	Separate instruction & data
Size	256 bytes each	4 Kbytes each
Average cycle time	20 nsec	40 nsec
<b>Cache Memory External</b>	Write through	Write through
Size	32 Kbytes	256 Kbytes optional
Average cycle time	60 nsec	60 nsec
<b>Main Memory:</b>		
Type	ECC (single bit correct, double bit detect)	ECC (single bit correct, double bit detect)
RAM	8 Mbytes standard	8 Mbytes standard
Bus width	32b address, 32b data	32b address, 32b data
System RAM access time	80 nsec/min	60 nsec/min
	140 nsec/max	120 nsec/max
Maximum memory	128 Mbytes	128 Mbytes
Memory increments	4, 8, 16, or 32 Mbyte	4, 8, 16, or 32 Mbyte

### Clock and Timers

	HP-UX	Domain/OS
<b>Real-time Clock:</b>		
Resolution	10 milliseconds	10 milliseconds
Accuracy	+ 5 seconds/day	+ 5 seconds/day
Battery backup	Lithium, expected life = 1 year	Lithium, expected life = 1 year
<b>Timers:</b>		<b>Timers:</b>
Match interrupt	Match on time of day 0.00 to 84,600.00 sec	Periodic 1/60 sec.
Delay interrupt	10 msec to 1.94 days	
Cyclical interrupt	10 msec to 1.94 days	
System timer	4 μ sec resolution accurate to 25 ppm	

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## Software

	HP-UX	Domain/OS
Operating System	Complies with the UNIX System V interface definition, X/OPEN and POSIX specifications, and will be full compliant with OSF.	Domain/OS is a single operating system that provides users a choice of UNIX System V Release 3, 4.3 BSD, or Aegis.
Revisions	Model 400s: HP-UX 7.0 or HP-UX 7.03. HP-UX 7.0 may be used for VRX color. Model 433s: HP-UX 7.03 or HP-UX 8.0 and on.	Domain 10.2+ PSK for 400s Domain 10.3+ PSK for 433s
Window Systems	X Window System, Version 11 (X11), Release 4	X Window System, Version 11 (X11) Apollo Domain Display Manager
Languages	C, Pascal, FORTRAN, BASIC, Tech BASIC, Ada, Common LISP	C, Pascal, FORTRAN, Ada, Common LISP, C++
User Interface	HP VUE 2.0	HP VUE 1.0, Apollo Domain Display Manager

## Human Interface

	HP-UX	Domain/OS
Keyboard	109 Key, low profile, HP-HIL. Available in 25 local languages	106 Key, 7-pin DIN serial interface. Available in 9 local languages
Mouse	3-button, rollerball, HP-HIL	3-button, rollerball, quadrature interface on keyboard
Audio	Three independent time generators controllable over 30db	Piezoelectric beeper in keyboard
Frequency range	81.46 Hz to 83.3 KHz	NA
Resolution	Capable of approximate chromatic scale over 5 octaves	NA
Duration	.01 sec. to 2.55 second/tone	NA
<b>Interface Specifications:</b>		
Type	HP-HIL, 1.0A	Domain keyboard
Device limit	7 per interface	1 per interface
Connector	AMP SMD	7-pin DIN
Audio Speaker	Built-in	Built-in
(Also available via external jack 250 mW @ 8 ohms)		



## Networking Options

	HP-UX	Domain/OS
LAN	IEEE 802.3 Ethernet interface with ThinMAU and BNC "T" connector and AUI (Jumper selectable)	IEEE 802.3 Ethernet interface with ThinMAU and BNC "T" connector and AUI (Jumper selectable). Apollo Token Ring interface with 9-pin D-sub network connector. IBM Token Ring, IEEE 802.5. Industry standard connectors: RJ connector with built-in mediafilters for voice-grade twisted pair, or 9-pin D-Sub connector for data-grade shielded twisted pair.
Networking Protocols	X.25, SNA, RJE, TCP-IP, HP Diskless	X.25, SNA, TCP-IP, Domain Network Services

## I/O Specifications (Internal Interfaces)

	HP-UX	Domain/OS
<b>Graphics Bus: (standard)</b>		
Width	32 bits address, 32 data	32 bits address, 32 data
Bandwidth	50 Mbytes/sec max.	50 Mbytes/sec max.
DMA channels	2, dynamically assigned	2, dynamically assigned
<b>LAN Interface: (standard)</b>		
Type	IEEE 802.3, ethernet 1.0	IEEE 802.3, ethernet 1.0
Data rate	10 Mbits/sec	10 Mbits/sec
Connectors	15-pin AUI (Attachment unit interface) and BNC tee	15-pin AUI (Attachment unit interface) and BNC tee
MAUs	10 BASE2 built-in 10 BASE5 requires P/N 30241A 10 BASE T requires P/N 28685A	10 BASE2 built-in 10 BASE5 requires P/N 30241A 10 BASE T requires P/N 28685A
<b>SCSI Interface*: (standard)</b>		
Type	SCSI-1 (ANSI x3.131-1986), single-ended	SCSI-1 (ANSI x3.131-1986), single-ended
Data rate	4 Mbytes/sec synchronous 1.5 Mbytes/sec asynchronous	4 Mbytes/sec synchronous 1.5 Mbytes/sec asynchronous
Device limit	7 per interface	7 per interface
Connector	ALT-1 of SCSI-2 50-pin high density	ALT-1 of SCSI-2 50-pin high density
Cable	Not included	Not included
<b>Serial Interface: (standard)</b>		
Type	EIA RS-232C, CCITT V.24/V.28 9-wire, 25-pin DTE female <sup>†</sup>	EIA RS-232C, CCITT V.24/V.28 7-wire, 25-pin DTE female; convertible to 3 x 7-wire with product no. K1015, 25-pin DTE female
Data rate	400s: to 38.4 Kbps 433s: to 460.8 Kbps with CTS/RTS bidirectional hardware flow control	To 56. Kbps
Device limit	1 per connector	1 per connector
Connector	25-pin female	25-pin female
<b>Parallel Interface: (standard)</b>		
Type	Centronics, $\overline{\text{ACK}}$ , $\overline{\text{BUSY}}$ and HP ScanJet handshakes	Centronics, $\overline{\text{ACK}}$ , $\overline{\text{BUSY}}$ and HP ScanJet handshakes
Data rate	300+ Kbytes/sec with DMA	300+ Kbytes/sec with DMA
Device limit	1 per interface	1 per interface
Connector	25-pin female (PC standard)	25-pin female (PC standard)
Cable	1m included	1m included
<b>DIO II Bus: (optional)</b>		
Width	32 bits address, 32 data	NA
Bandwidth	6 Mbytes/sec	NA
DMA channels	2, dynamically assigned	NA
<b>DIO Bus: (optional via A1401A)</b>		
Maximum	2 buses	NA
Width	24 bits address, 16 data	NA
Bandwidth	3 Mbytes/sec	NA
<b>ISA Bus: (optional)</b>		
Width:	NA	24 bits address 16 bits data
Bandwidth	NA	5.4 Mbytes/sec maximum
DMA Channels	NA	4 8-bit/3 16-bit
<b>EISA Bus: (optional on 433s)</b>		
Width:	32 bit address/32 bit address	32 bit address/32 bit address
Bandwidth:	14.8 Mbytes/sec maximum	14.8 Mbytes/sec maximum
DMA Channels	7	7

\* Support is limited to HP and selected non-HP peripherals listed in the HP 9000 Series 400 Support Matrix. Correct operation of unlisted devices should not be assumed, and support for such devices is strictly limited to consulting on a time-and-materials basis. SCSI interface, disk and serial driver source code is included with HP-UX. SCSI internals documentation is available separately for experienced UNIX driver developers.

† 2 additional available at HP-UX 8.0.

## I/O Specifications (continued.)

	HP-UX	Domain/OS
<b>HP-IB Interface: (optional)</b>		
Type	IEEE-488-1978, standard speed	NA
Data rate	350 Kbytes/sec	NA
Device limit	14 per interface, nominal	NA
Connector	24-pin stacking IEEE	NA
Cable	1m included	NA

## Optional Internal Mass Storage

	400s	433s
<b>Internal 330 Mbyte Disk</b>		
Operating System Support	HP-UX and Domain	HP-UX and Domain
Size	5.25 inch full height	5.25 inch full height
Formatted capacity	331 Mbytes	331 Mbytes
Average seek time	16.5 msec	16.5 msec
Average latency	7.5 msec	7.5 msec
Random I/Os per sec	38	38
Internal burst	20 Mbits/sec	20 Mbits/sec
Read throughput	800 Kbytes/sec	800 Kbytes/sec
<b>Internal 660 Mbyte Disk</b>		
Operating System Support	HP-UX and Domain	HP-UX and Domain
Size	5.25 inch full height	5.25 inch full height
Formatted Capacity	663 Mbytes	663 Mbytes
Average Seek Time	16.5 msec	16.5 msec
Average Latency	7.5 msec	7.5 msec
Random I/Os per sec	38	38
Internal burst	20 Mbits/sec	20 Mbits/sec
Read throughput	800 Kbytes/sec	800 Kbytes/sec
<b>Digital Audio Tape Drive</b>		
Operating System Support	NA	1 optional HP-UX only
Size		5.25 inch full height
Media type		60 meter (120 minute) DAT
Capacity		1.3 Gbytes
Format		Helical-scan DAT
Maximum burst data transfer rate		1.5 Mbytes/sec
Maximum sustained data transfer rate		183 Kbytes/sec
Average random access time		20 seconds
<b>QIC 1/4" Cartridge Tape Drive</b>		
Operating System Support	1 optional Domain only	1 optional HP-UX and Domain
Size	5.25 inch half height	5.25 inch half height
Recording standard	QIC-24	QIC-24
Capacity	60 Mbytes (600 foot cartridge)	60 Mbytes (600 foot cartridge)
Data transfer rate	90 Kbytes/sec	90 Kbytes/sec
Rewind time	85 seconds maximum	85 seconds maximum
Track selection time	600 msec maximum	600 msec maximum
<b>Internal CD-ROM Drive</b>		
Operating System Support	1 optional HP-UX only	1 optional HP-UX only
Size	5.25 inch half height	5.25 inch half height
Media diameter	4.7 inches	4.7 inches
Number of surfaces	1	1
Data capacity mode 1	599 Mbytes	599 Mbytes
Data capacity mode 2	683 Mbytes	683 Mbytes
Average data transfer rate	153 Kbytes/sec	153 Kbytes/sec
Average random access time	350 msec	350 msec

## Physical and Environmental Specifications

### SPU Power Specifications

<b>Source Consumption</b>	8.2 A max. Auto ranging from 88 to 269V
<b>Line Frequency</b>	47-63 Hz
<b>Power Consumption:</b>	
Watts maximum	500
BTU/hour	1910
Kcal/hour	482

### Physical Dimensions

Height	610 mm (24 in.)
Width	220 mm (8.7 in.)
Depth	595 mm (23.4 in.)
Net Weight	41.3 Kg (91 lbs.) maximum
Shipping Weight	47.6 Kg (105 lbs.) maximum

### Environmental Range

Without optional internal mass storage	
<b>Temperature:</b>	
Operating temperature	5°C to +50°C to 2286m (7500ft.)
Storage temperature	- 40°C to +70°C
Maximum wet bulb temperature	40°C
<b>Humidity:</b>	
Operating 40° C	15% to 95% R.H.
Non-operating 55° C	15% to 95% R.H.
<b>Altitude:</b>	
Operating	4,570m (15,000 ft.) to 47°C
Non-operating	15,240m (50,000 ft.)
<b>EMI</b>	Conducted and radiated interference meets FCC Class A, VCCI Class 1, VDE 1046/84 Level B
<b>Regulatory Compliance</b>	UL478, 5th edition; CSA 22.2 No. 220; IEC 950, 1st edition 1986

With internal mass storage	
<b>Temperature:</b>	
Operating temperature	5°C to +40°C to 2286m (7500ft.)
Storage temperature	- 10°C to +60°C
Maximum wet bulb temperature	27°C
<b>Humidity:</b>	(non-condensing)
Operating 40° C:	36% R.H. max
Non-operating 55° C:	15% R.H. max
<b>Altitude:</b>	
Operating	3,050m (10,000 ft.) to 36°C
Non-operating	15,240m (50,000 ft.)
<b>EMI</b>	Conducted and radiated interference meets FCC Class A, VCCI Class 1, VDE 1046/84 Level B
<b>Regulatory Compliance</b>	UL478, 5th edition; CSA 22.2 No. 220; IEC 950, 1st edition 1986

## 2D Graphics Systems

For information on 3D graphics capabilities and performance see the PersonalVRX and TurboVRX data sheets.

The following graphics systems are available on the 400s/433s:

HP-UX (Release 7.03)	Domain/OS (SR 10.2 + PSK)
VRX Mono	VRX Mono
VRX Color *	VRX Color
PersonalVRX	Personal VRX
TurboVRX	- - -

\* VRX Color is also supported on HP-UX Release 7.0.

### Monitors

Physical Characteristics	19" (98774A) Monochrome
Monitor Screen Refresh	72 Hz
Video Signals	RS-343 format (composite video)
<b>Monitor Dimensions:</b>	
Height	445mm (17.5 in)
Width	478mm (18.8 in)
Depth	430mm (16.9 in)
Net weight	21.3 kg (47 lbs)
Shipping weight	24.1 kg (53 lbs)

Physical Characteristics	16" (98789A) Color
Monitor Screen Refresh	60 Hz
Video Signals	RS-343
<b>Monitor Dimensions:</b>	
Height	380mm (15 in)
Width	406mm (16 in)
Depth	450 mm (17.7 in)
Net weight	26.5 kg (58.3 lbs)
Shipping weight	28 kg (62 lbs)

Physical Characteristics	19" (98754A) Color
Monitor Screen Refresh	60 Hz
Video Signals	RS-343
<b>Monitor Dimensions:</b>	
Height	431mm (17 in)
Width	480mm (18.9 in)
Depth	533 mm (19.9 in)
Net weight	30 kg (66.5 lbs)
Shipping weight	41.5 kg (91.3 lbs)

## Capabilities

The VRX Color and VRX Mono graphics are highly capable systems which provide high performance for a wide variety of applications. The following capabilities are available in these graphics products:

	VRX Mono	VRX Color
<b>Specifications:</b>		
Screen Resolution	1280 x 1024	1280 x 1024
Screen Refresh Rate	72 Hz	60 Hz
Color Planes	1	8 (256 colors)
Overlay Planes	0	2 (4 colors)
Frame Buffer	VRAM 2K x 1K	VRAM 2K x 1K
Form Factor	1 DIO-II slot	1 DIO-II slot
Monitor Sizes	19"	16" & 19"
<b>Other</b>		
	Fast bit-per-pixel addressing	Color palette (16.7M colors)
	Fast X performance:	3-operand bit block transfer
	Motif interface	(AND, OR, XOR)
	DDX driver	Pattern area fill
	R4 server (HP-UX)	Bit/byte-per-pixel addressing
		Double buffering (4/4-plane)
		Pixel clipping for window support
		PHIGS support:
		PHIGS 2.0 (Domain)
		3rd party PHIGS (HP-UX)
		Fast X performance:
		Motif interface
		DDX driver
		R4 server (HP-UX)

## Performance

Performance shown below was measured on the HP Apollo 9000 Model 400s and is based on the Motorola 68030 50 MHz

processor. The Model 433s (based on the 68040 processor) will perform at higher levels, but are not shown.

Performance through graphics application performance interfaces: Starbase (HP-UX) and GSR (Domain)		VRX Mono	VRX Color
2D Vectors/Sec (Peak performance, floating point, DC)		40K	130K
2D Vectors/Sec (10 pixel, random orientation, floating point, DC)		20K	100K
Screen Clear in seconds (1280 x 1024)	(Starbase) (GSR)	0.036 0.025	0.017 0.011
Block Transfer Rates (1280 x 1024, peak performance, main memory to frame buffer)	Bit/pixel pixels/sec Byte/pixel Pixel/sec	33M 2M	13M 2M
<b>X Window System performance (X11perf version 1.2)</b>			
Rectangles	(100x100 opaque stippled)	Pixels/sec	11M
Lines	(10 pixel line)	Lines/sec	25K
Lines	(100x10 wide line)	Lines/sec	662.
Circles	(100-pixel solid circle)	Polygons/sec	713.
Text	(characters in 80-character image line: 6x13)	Characters/sec	20K
Scroll	(100x100 pixels)	Pixels/sec	7M
Copy	(100x100 from window to window)	Pixels/sec	5M
Window operations	(create & map subwindows - 25 kids)	Ops/sec	1600.
			1830.



## X Terminals

The HP 700/X family of X Window graphics terminals provide cost-effective, online access to centralized files and applications.

Description	Product No.
X Window Terminal base unit with keyboard and cable, 3-button mouse and video monitor cable	C2301A
Monochrome X Window Terminal (17-inch 1024 x 768)	C2302A
Color X Window Terminal (14-inch 640 x 480)	C2303A
Color X Window Terminal (16-inch 1024 x 768)	C2304A

## Support Services

A wide range of hardware and software support services are available worldwide for all HP Apollo 9000 workstations. Contact your HP sales representative for details on available support services.

## Warranty Information

The warranty covering a specific system is determined by the HP WARRANTY AND INSTALLATION TERMS in effect at the time of purchase. These terms are specified in HP Pub. No. 5954-1617(D) for the United States and in similar documents for other countries.

For more information, call 1-800-752-0900 for the location of your local HP sales office. Or, call one of the regional Hewlett-Packard sales offices listed here.

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No. Hollywood, CA 91601  
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Hewlett-Packard Company  
2015 South Park Place  
Atlanta, GA 30339  
(404) 955 1500

**Apollo Systems Division:**  
300 Apollo Drive  
Chelmsford, MA 01824  
(508) 256 6600

**Canada:**  
Hewlett-Packard Ltd.  
6877 Goreway Drive  
Mississauga, Ontario L4V 1M8  
(416) 678 9430

**Japan:**  
Yokogawa-Hewlett-Packard Ltd.  
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Shinjuku-ku  
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(03) 5371 1351

**Latin America:**  
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(525) 202 0155

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22/F Bond Centre  
West Tower  
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8487777

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**Spain:**  
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**Sweden:**  
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**Switzerland:**  
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(022) 780 41 11 (Suisse Romande)  
(046) 05 15 05 (Customer  
Information Center)

**South Africa:**  
HiPerformance Systems  
(011) 802 5111

**Turkey:**  
175 29 70

**U.K.:**  
(0344) 369 369

**Middle East and Africa:**  
Geneva-Switzerland  
41/22 780 7111

**European Headquarters:**  
Hewlett-Packard S.A.  
150, Route du Nant d'Avril  
1217 Meyrin 2  
Geneva-Switzerland  
41/22 780 8111