
CTC Hardware

Technical Brochure



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CTC's Hardware Product Family

CTC offers a full line of hardware solutions to meet your machine control needs. You can choose one of CTC's PowerStations, Industrial PCs or Industrial Monitors to meet your machine's particular requirements.

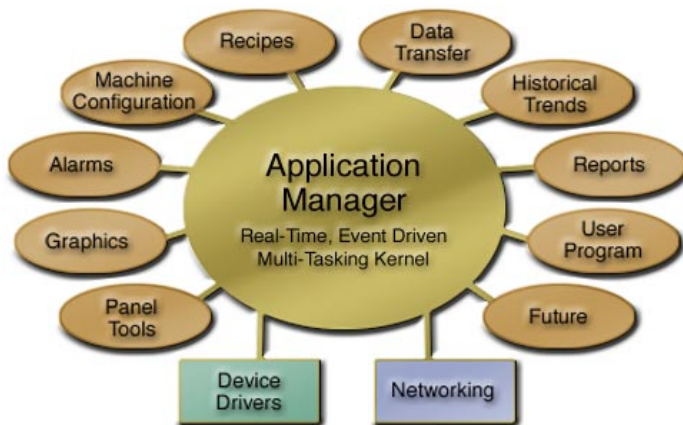
PowerStation Workstations

CTC's PowerStation running **MachineShop™** is a powerful, cost-effective solution for machine control that is unmatched by any other product. MachineShop is an integrated software suite of Windows-based tools for the creation of high performance machine control applications. The MachineShop suite contains Interact HMI Software and MachineLogic™ PC-based Control Software; you can select either or both of these software solutions to run on your PowerStation workstation. PowerStation workstations come bundled with Interact's Application Manager, Panel ToolKit Module, Graphics Monitoring Module, Alarm Management Module and Networking Module.

Interact HMI Software

Interact is a modular software package that can be customized to meet your project's particular needs. The heart of Interact is its Application Manager, a real-time multi-tasking kernel that makes Interact the fastest software solution available. The Application Manager handles communications between the Application Modules and the Device Drivers.

Interact Architecture and Product Configuration



You can build your application by selecting from a complete family of application modules ranging from control panel tools to historical trending, machine configuration and networking. Interact's modularity allows you to choose only the software pieces you need for your current application -- modules can be added later to meet your future needs. The MachineShop development environment is Windows98/ME/2000/NT compatible.

Interact also offers a variety of connectivity options for programmable controllers and intelligent control equipment. A Software Developer's Kit allows you to add your own application-specific software or your own driver to communicate with any intelligent control device.

P1H Basic HMI

The P1H PowerStation is a low cost HMI workstation for simple push button replacement applications; it is an ideal solution for less complex projects where cost is a major concern. The P1H has a 5.7" display, and comes bundled with CTC's Interact Panel Toolkit Runtime and Networking Runtime software, as well as all of Interact's standard communication drivers. Users can develop screens with CTC's MachineShop software or the low cost MachineShop Basic HMI Package created specifically for P1H applications. The P1H can also be easily upgraded in the future to add more advanced HMI functionality (such as alarming, reporting and trending) as application needs change.

MotionPanel™ HMI for the Compumotor 6K Motion Controller

Designed to work with the Parker 6K family of Compumotor controllers, MotionPanel is a PC-based graphical interface that offers high speed Ethernet communication, upload/download capabilities and built-in intelligence -- right out of the box.

It is a flexible HMI that features a 5.7" display and over 70 preconfigured Interact Panel Toolkit (PTM) screens. MotionPanel includes Runtime software for the Panel Toolkit Module and the Compumotor communication driver. Users have the ability to modify the PTM screens and driver configuration: additional modules and drivers may be used with MotionPanel by purchasing Runtime Upgrades and a standard MachineShop Development Software Package. Alarming and free-form graphics functionality can be added by purchasing a MotionPanel upgrade that includes Runtime software for Interact's Graphics Monitoring Module (GMM), Alarm Management Module (AMM) and Networking Module (NET).

Industrial PCs

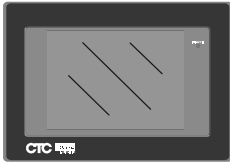
When you need a robust PC designed specifically for shop floor use, choose one of CTC's flat panel Industrial PCs. Not only is there a wide range of Industrial PC models to select from, but you can customize the PC with a variety of hardware options to meet the needs of your particular project. Each unit includes features such as Ethernet network connectivity, and has been industrially tested and rated to provide a reliable, durable hardware platform for your factory floor applications.

Industrial Monitors

CTC's line of Industrial Monitors offers an industrial flat panel SVGA or XGA solution for the factory floor. These rugged, high-resolution monitors enhance the overall look and functionality of any machine, and are available in 12" or 15" models.

PowerStation Workstation Models

The PowerStation family includes a range of workstations to meet the needs of every machine you build – from a 5.7” panel replacer up to a 15” open architecture PC. PowerStations are flexible solutions – you can select processors, displays, expansion and storage capabilities to get the right PowerStation for your application. There are even remote systems available in which an enclosed back shell can be mounted in an enclosure and cable-connected to one of CTC’s flat panel industrial monitors.



P1/P1H PowerStation and MotionPanel

The P1 PowerStation is a compact unit designed for panel replacement applications that require a small footprint with panel tools, animated graphics, detailed alarming, and a wide range of connectivity. This bundled workstation is perfect for OEM applications.

The P1H PowerStation provides another alternative for customers seeking a low cost solution for simple push button replacement applications. This "basic" HMI includes runtime software for panel tools and networking, as well as all of Interact’s standard communication drivers. Customers can use either MachineShop or the MachineShop Basic HMI Package (which includes only PTM) to develop P1H screens. The P1H can be easily upgraded to a fully functional P1 by users in the field.

MotionPanel is a PC-based graphical interface for the Compumotor 6K family of motion controllers, and includes Interact PTM (only) and the Compumotor communication driver. It comes with over 70 pre-configured Panel Toolkit screens; the ability to modify the PTM screens and driver configuration is included with MotionPanel.

Display: 5.7” Monochrome LCD or 5.7” Color STN

Processor: 80386SX/40 MHz

Hard Drive: not available



P1P

The P1P Pentium PowerStation is a small workstation that offers high speed and high functionality; it has an open architecture and offers expansion capabilities. The P1P comes bundled with CTC’s core Interact HMI software modules (panel tools, graphics, alarming and networking). With the TFT unit, users can also bundle any or all of CTC’s Interact software modules, as well as incorporating MachineLogic™ software. P1P applications can migrate across the entire family of PowerStation workstations.

Display: 5.7” QVGA Color STN or 6.4” VGA Color TFT

Processor: Pentium 166

Hard Drive: not available



PS10 PowerStation

The PS10 PowerStation is a flexible 10” display workstation, allowing users to choose a display type, PC/104 or ISA/PCI expansion capabilities, and hardware options such as floppy disk and CD ROM drives. The PS10 comes bundled with CTC’s core Interact HMI modules (panel tools, graphics, alarming and networking); it is also an open platform that can run Windows, advanced HMI capabilities such as recipe handling, trending and reporting, or CTC’s MachineLogic PC-based control software.

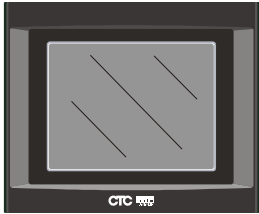
Display: 9.4” Monochrome STN, 10.4” VGA Color TFT (200 NIT or 300+ NIT)

Processor: Pentium MMX 266

Hard Drive: 2.1 GB formatted*

Expansion Cards: PC/104 or ISA/PCI

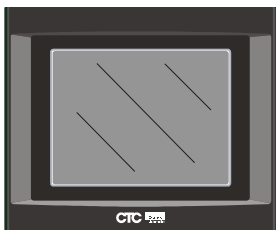
* For complete details regarding Hard Drive capacity, refer to the Hard Drive Storage Capacity chart on page 22.



PS12 PowerStation

The PS12 PowerStation is a flexible 12" display workstation, allowing users to choose PC/104 or ISA/PCI expansion capabilities and hardware options such as floppy disk and CD ROM drives. The PS12 comes bundled with CTC's core Interact HMI modules (panel tools, graphics, alarming and networking); it is also an open platform that can run Windows, advanced HMI capabilities such as recipe handling, trending and reporting, or CTC's MachineLogic PC-based control software.

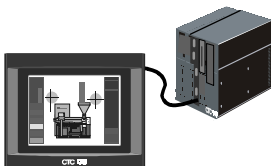
Display: 12.1" SVGA TFT
Processor: Pentium MMX 266
Hard Drive: 2.1 GB formatted *
Expansion Cards: PC/104 or ISA/PCI



PS15 PowerStation

The PS15 PowerStation is a flexible 15" display workstation, allowing users to choose PC/104 or ISA/PCI expansion capabilities and hardware options such as floppy disk and CD ROM drives. The PS15 comes bundled with CTC's core Interact HMI modules (panel tools, graphics, alarming and networking); it is also an open platform that can run Windows, advanced HMI capabilities such as recipe handling, trending and reporting, or CTC's MachineLogic PC-based control software.

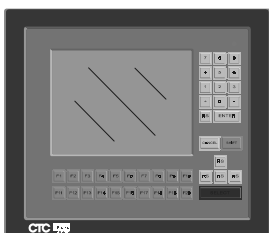
Display: 15.1" XGA TFT
Processor: Pentium MMX 266
Hard Drive: 2.1 GB formatted *
Expansion Cards: PC/104 or ISA/PCI



RS00 Remote System

The RS00 includes all of the power, expandability and serviceability of the PS PowerStations in a Remote System that can be mounted in an enclosure and cable-connected to one of CTC's 10", 12" or 15" flat panel industrial monitors.

Processor: Pentium MMX 266
Hard Drive: 2.1 GB formatted *
Expansion Cards: PC/104 or ISA/PCI

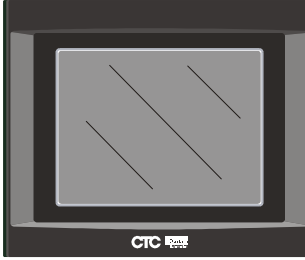


P5 Function Key PowerStation

The P5 Function Key PowerStation model includes arrows for cursor control and features 40 function keys (20 plus Shift) for operators who prefer traditional function key operation. A variety of options provide full functionality and an open PC architecture allows users to run Interact and other DOS/Windows programs.

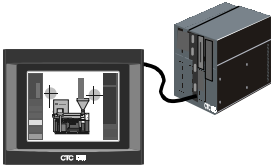
Display: 9.4" Monochrome LCD, 10.4" Color STN or TFT
Processor: Pentium 166, 266 MHz
Hard Drive: 2.1 GB formatted*

* For complete details regarding Hard Drive capacity, refer to the Hard Drive Storage Capacity chart on page 22.



P9 High Functionality PowerStation

The P9 is a full sized high performance PowerStation solution for applications that require full-featured industrial functionality on the plant floor. Both 12" and 15" display options offer features like CD-ROM drives, CPUs up to Pentium III 850 MHz, and ISA and PCI expansion capability. The P9 is a highly serviceable platform with field-replaceable hard drive, CD-ROM, floppy drive and CPU board.



RS9 "Remote System"

The RS9 includes all of the power, expandability and serviceability of the P9 in a Remote System that can be mounted in an enclosure and cable-connected to one of CTC's 12" or 15" flat panel industrial monitors.

Display (P9): 12" SVGA or 15" XGA Color TFT

Processor: Celeron 566 MHz; Pentium III 850 MHz

Hard Drive: 2.1 GB formatted*

* For complete details regarding Hard Drive capacity, refer to the Hard Drive Storage Capacity chart on page 22.

PowerStation Features and Specifications (P1 and P1P Models)

Workstation	P1/P1H/MotionPanel	P1P
Software MachineShop with Interact Run-Time	P1: PTM, AMM, GMM, NET P1H: PTM, NET only MotionPanel: PTM only	PTM, AMM, GMM, NET
Display Type Backlight Monochrome/Color Resolution Size	For more display specifications, see page 20. Flat Panel Cold Cathode Fluorescent Tube Mono - LCD; Color – STN 1/4 VGA (320 x 240) 5.7" (145 mm) Diagonal	For more display specifications, see page 20. Flat Panel Cold Cathode Fluorescent Tube Color – STN, TFT STN: 1/4 VGA (320 x 240) TFT: VGA (640 x 480) 5.7" (145 mm) Diagonal (STN) 6.4" (163 mm) Diagonal (TFT)
CPUs	80386 SX/40 MHz	Pentium 166 MHz
System Memory Standard Maximum	8 MB standard Expandable to 16 MB (expandable, not configurable)	16 MB Expandable to 64 MB (expandable, not configurable)
Storage Memory Compact FLASH Floppy Disk Drive Hard Drive	8 MB Compact FLASH (P1: 128 MB max) (Field replaceable FLASH Disk) N/A N/A	8 MB Compact FLASH (128 MB max) (Field replaceable FLASH Disk) N/A N/A
I/O Ports Serial Ethernet Parallel Expansion Slots External Video	(1) RS232/422/485 (1) RS232 10 MBPS; 10Base-T with RJ45 connector IBM Enhanced PC/104 (16 bit) N/A	(1) RS232/422/485 (1) RS232 10/100Base-T with RJ45 connector IBM Enhanced PC/104 (16 bit) N/A
User Interface Function Key Numeric Entry Touchscreen Select Key Cancel Key Keyboard Port Mouse	On Screen On Screen Analog Resistive N/A N/A IBM AT with Y-cable PS/2 with Y-cable	On Screen On Screen Analog Resistive N/A N/A IBM AT with Y-cable PS/2 with Y-cable
Package Designed for Temperature Range Rel. Humidity (non-condensing) Vibration Shock Weight Overall Size (H x W x D)	NEMA 4, 4X 0-45°C 5-95% 10-150 Hz, 1G (Sin) 10-500 Hz .5G (RMS Random) 10G, 11 msec (operating) 30G, 11 msec (non-operating) 3.3 lbs. (1.5 Kg) 5.6" x 7.75" x 3.2" (197 mm x 142.7 mm x 81 mm)	NEMA 4, 4X 0-45°C 5-95% 10-150 Hz, 1G (Sin) 10-500 Hz 1.5G (RMS Random) 10G, 11 msec (operating) 30G, 11 msec (non-operating) 3.26 lbs. (1.48 Kg) 8.7" x 6.3" x 3.25" (221 mm x 160 mm x 82.5 mm)
Power Requirements AC Max. Power Consumption DC Max. Power Consumption	90-260 VAC; 50/60 Hz; (ext. opt) 50 Watts max 18-30 VDC 25 Watts	90-260 VAC; 50/60 Hz; (ext. opt) 50 Watts max 18-28 VDC 25 Watts
Agency Approval	CE UL/CUL Class 1 Div. 2 (DC units only)	CE UL/CUL Class 1 Div. 2 (DC units only)

PowerStation Features and Specifications (PS10 and PS12 Models)

Workstation	PS10	PS12
Software MachineShop with Interact Run-Time	PTM, AMM, GMM, NET	PTM, AMM, GMM, NET
Display Type Backlight Monochrome/Color Resolution Size	For more display specifications, see page 20. Flat Panel Cold Cathode Fluorescent Tube Mono - STN; Color - TFT VGA (640 x 480) 9.4" (239 mm) Diag. (Mono/STN) 10.4" (264 mm) Diag. (Color/TFT) – 200 or 300+ NITS	For more display specifications, see page 20. Flat Panel Cold Cathode Fluorescent Tube Color - TFT SVGA (800 x 600) 12.1" (310 mm) Diagonal (Color/TFT)
CPUs	Pentium MMX 266 MHz	Pentium MMX 266 MHz
System Memory Standard Maximum	32 MB 256 MB	32 MB 256 MB
Storage Memory Compact FLASH (Type II connectors) Floppy Hard Drive CD ROM Video Memory	8 MB Compact FLASH (128 MB max) (1 external and 1 internal); also supports MicroDrive in low shock and vibration environments Optional (external, surface or panel mount) 2.1 GB (formatted)* EIDE Interface Optional 24x Super Slim CD ROM 2 MB High Speed SDRAM	8 MB Compact FLASH (128 MB max) (1 external and 1 internal); also supports MicroDrive in low shock and vibration environments Optional (external, surface or panel mount) 2.1 GB (formatted)* EIDE Interface Optional 24x Super Slim CD ROM 2 MB High Speed SDRAM
I/O Ports Serial Ethernet Parallel Expansion Slots: PC/104 models ISA/PCI models External Video USB	(1) RS232/422/485; (2) RS232 10/100Base-T w/ RJ45 connector (1) 25-Pin D-sub connector (supports Bi-directional SSP/SPP/ECP) (3) PC/104 cards are supported (3) ¾ length (2 ISA/PCI configurable) or (2 PCI 1 ISA/PCI Configurable) Note: 1 PC/104 card is supported in this configuration. (1) Analog 15-Pin D-sub connector (supports simultaneous video mode) (2) USB ports	(1) RS232/422/485; (2) RS232 10/100Base-T w/ RJ45 connector (1) 25-Pin D-sub connector (supports Bi-directional SSP/SPP/ECP) (3) PC/104 cards are supported (3) ¾ length (2 ISA/PCI configurable) or (2 PCI 1 ISA/PCI Configurable) Note: 1 PC/104 card is supported in this configuration. (1) Analog 15-Pin D-sub connector (supports simultaneous video mode) (2) USB ports
User Interface Function Key/Numeric Entry Touchscreen Keyboard/Mouse Port	Pop-up On Screen Analog Resistive (8-wire, 1024 x 1024 resolution) (1) PS/2 Keyboard port and 1 PS/2 Mouse port	Pop-up On Screen Analog Resistive (8-wire, 1024 x 1024 resolution) (1) PS/2 Keyboard port and 1 PS/2 Mouse port
Package Designed for Temperature Range Rel. Humidity (non-cond.) Vibration Shock Weight: PC/104 model ISA/PCI model Size (H x W x D): PC/104 models ISA/PCI models	NEMA 4, 4X 0-50°C 5-95% 10-150 Hz, 1G (Sin): 10-500 Hz .5G (RMS Random) 10G, 11 msec (operating) 30G, 11 msec (non-operating) 13.4 lbs. (6.07 Kg) 17.2 lbs. (7.8 Kg) 11.02" x 13.78" x 4.29" (280 mm x 350 mm x 109 mm) 11.02" x 13.78" x 6.97" (280 mm x 350 mm x 177 mm)	NEMA 4, 4X 0-50°C 5-95% 10-150 Hz, 1G (Sin): 10-500 Hz .5G (RMS Random) 10G, 11 msec (operating) 30G, 11 msec (non-operating) 20.6 lbs. (9.4 Kg) 22.9 lbs. (10.4 Kg) 12.11" x 15.06" x 5.64" (307 mm x 382 mm x 143 mm) 12.11" x 15.06" x 8.32" (307 mm x 382 mm x 211 mm)
Power Requirements AC -- Max. Pwr. Consump. DC -- Max. Pwr. Consump.	90-250 VAC; 50/60 Hz; (external – purchased separately) --110 Watts max 18-28 VDC -- 78 Watts max	90-250 VAC; 50/60 Hz; (external -- purchased separately) --110 Watts max 18-28 VDC -- 78 Watts max
Agency Approval	CE; UL/CUL; Class 1 Division 2	CE; UL/CUL; Class 1 Division 2

* For complete details regarding Hard Drive capacity, refer to the Hard Drive Storage Capacity chart on page 22.

PowerStation Features and Specifications (PS15 and RS00 Models)

Workstation	PS15	RS00
Software MachineShop with Interact Run-Time	PTM, AMM, GMM, NET	PTM, AMM, GMM, NET
Display Type Backlight Monochrome/Color Resolution Size	For more display specifications, see page 20. Flat Panel Cold Cathode Fluorescent Tube Color - TFT XGA (1024 x 768) 15.1" (380 mm) Diagonal (Color/TFT)	Monitor purchased separately See Industrial Monitors, page 19
CPUs	Pentium MMX 266 MHz	Pentium MMX 266 MHz
System Memory Standard Maximum	32 MB 256 MB	32 MB 256 MB
Storage Memory Compact FLASH (Type II connectors) Floppy Hard Drive CD ROM Video Memory	8 MB Compact FLASH (128 MB max) (1 external and 1 internal); also supports MicroDrive in low shock and vibration environments Optional (external, surface or panel mount) 2.1 GB (formatted)* EIDE Interface Optional 24x Super Slim CD ROM 2 MB High Speed SDRAM	8 MB Compact FLASH (128 MB max) (1 external and 1 internal); also supports MicroDrive in low shock and vibration environments Optional (external, surface or panel mount) 2.1 GB (formatted)* EIDE Interface Optional 24x Super Slim CD ROM 2 MB High Speed SDRAM
I/O Ports Serial Ethernet Parallel Expansion Slots: PC/104 models ISA /PCI models External Video USB	(1) RS232/422/485; (2) RS232 10/100Base-T w/ RJ45 connector (1) 25-Pin D-sub connector (supports Bi-directional SSP/SPP/ECP) (3) PC/104 cards are supported (3) ¾ length (2 ISA/PCI configurable) or (2) PCI 1 ISA/PCI Configurable) Note: 1 PC/104 card is supported in this configuration. (1) Analog 15-Pin D-sub connector (supports simultaneous video mode) (2) USB ports	(1) RS232/422/485; (2) RS232 10/100Base-T w/ RJ45 connector (1) 25-Pin D-sub connector (supports Bi-directional SSP/SPP/ECP) (3) PC/104 cards are supported (3) ¾ length (2 ISA/PCI configurable) or (2) PCI 1 ISA/PCI Configurable) Note: 1 PC/104 card is supported in this configuration. (1) Analog 15-Pin D-sub connector (supports simultaneous video mode) (2) USB ports
User Interface Function Key/Numeric Entry Touchscreen Keyboard/Mouse Port	Pop-up On Screen Analog Resistive (8-wire, 1024 x 1024 resolution) (1) PS/2 Keyboard port and 1 PS/2 Mouse port	Pop-up On Screen Analog Resistive (8-wire, 1024 x 1024 resolution) (1) PS/2 Keyboard port and 1 PS/2 Mouse port
Package Designed for Temperature Range Rel. Humidity (non-cond.) Vibration Shock Weight PC/104 model ISA/PCI model Size (H x W x D) PC/104 models ISA/PCI models	NEMA 4, 4X 0-50°C 5-95% 10-150 Hz, 1G (Sin): 10-500 Hz .5G (RMS Random) 10G, 11 msec (operating) 30G, 11 msec (non-operating) 23.9 lbs. (10.8 Kg) 26.1 lbs. (11.8 Kg) 13.31" x 16.81" x 6.16" (338 mm x 427 mm x 156 mm) 13.31" x 16.81" x 8.57" (338 mm x 422 mm x 218 mm)	NEMA 4, 4X 0-50°C 5-95% 10-150 Hz, 1G (Sin): 10-500 Hz .5G (RMS Random) 10G, 11 msec (operating) 30G, 11 msec (non-operating) 12.5 lbs. (5.7 Kg) 15 lbs (6.8 Kg) 11.12" x 14.01" x 3.57" (282 mm x 356 mm x 91 mm) 11.12" x 14.01" x 6.25" (282 mm x 356 mm x 159 mm)
Power Requirements AC -- Max. Pwr. Consump. DC -- Max. Pwr. Consump.	90-250 VAC; 50/60 Hz; (external – purchased separately) --110 Watts max 18-28 VDC -- 78 Watts max	90-250 VAC; 50/60 Hz; (external – purchased separately) --110 Watts max 18-28 VDC -- 78 Watts max
Agency Approval	CE; UL/CUL; Class 1 Division 2	CE; UL/CUL; Class 1 Division 2

* For complete details regarding Hard Drive capacity, refer to the Hard Drive Storage Capacity chart on page 22.

PowerStation Features and Specifications (P5 Model)

Workstation	P5 Function Key
Software MachineShop with Interact Run-Time	PTM, AMM, GMM, NET
Display Type Backlight Monochrome/Color Resolution Size	For more display specifications, see page 20. Flat Panel Cold Cathode Fluorescent Tube Mono – LCD, Color - STN/TFT VGA (640 x 480) 9.4" (239 mm) Diagonal (Mono/LCD) 10.4" (264 mm) Diagonal
CPUs	Pentium 166,266 MHz
System Memory Standard Maximum	8 MB 256 MB
Storage Memory Compact FLASH Floppy Hard Drive	8 MB Compact FLASH (128 MB max) (Field replaceable FLASH Disk) 1.44 MB, Side Access 2.1 GB (formatted)* EIDE Interface
I/O Ports Serial Ethernet Parallel External Video Expansion Slots	(1) RS232/422/485 (1) RS232 10/100Base-T w/ RJ45 connector IBM Enhanced SVGA CRT Monitor (TFT only) (2) Full length, (1) ½ length (ISA 16-Bit)**
User Interface Function Key Numeric Entry Touchscreen Select Key Cancel Key Keyboard/Mouse Port	40 (20 plus Shift) Yes Analog Resistive Yes Yes PS/2 or IBM AT with adapter cable
Package Designed for Temperature Range Rel. Humidity (non-cond.) Vibration Shock Weight Size (H x W x D)	NEMA 4, 4X 0-50°C 5-95% 10-500 Hz, 0.5G (RMS Random) 10G, 11 msec (operating) 30G, 11 msec (non-operating) 23.4 lbs. (10.6 Kg) 14.0" x 16.0" x 7.0" (356 mm x 406 mm x 178 mm)
Power Req'mts. AC Maximum Power Consumption DC Maximum Power Consumption	90-250 VAC; 50/60 Hz 110 Watts max 20-36 VDC 110 Watts max
Agency Approval	CE UL/CUL Class 1 Division 2

** One ¾ length slot may be used for full-length card via an expansion slot cover

* For complete details regarding Hard Drive capacity, refer to the Hard Drive Storage Capacity chart on page 22.

PowerStation Features and Specifications (P9 and RS9 Models)

Workstation	P9	RS9
Software MachineShop with Interact Run-Time	PTM, AMM, GMM, NET	PTM, AMM, GMM, NET
Display Type Backlight Color Resolution Size	For more display specifications, see page 20. Flat Panel Dual Cold Cathode Fluorescent Tube TFT 12" SVGA (800 x 600); 15" XGA (1024 x 768) 12.1" (310 mm) Diag.; 15.1" (380 mm) Diag.	Monitor purchased separately See Industrial Monitors, page 19
CPUs	Celeron 566 MHz Pentium III 850 MHz	Celeron 566 MHz Pentium III 850 MHz
System Memory Standard Maximum	32 MB SDRAM 512 MB SDRAM (requires 2 DIMM slots) (expandable, not configurable)	32 MB SDRAM 512 MB SDRAM (requires 2 DIMM slots) (expandable, not configurable)
Storage Memory Compact FLASH Floppy Hard Drive CD-ROM	8 MB Compact FLASH (optional) (128 MB max) (Field replaceable FLASH Disk) 1.44 MB, Side Access 2.1 GB formatted (min)* EIDE Interface 32x min CD-ROM drive	8 MB Compact FLASH (optional) (128 MB max) (Field replaceable FLASH Disk) 1.44 MB, Side Access 2.1 GB formatted (min)* EIDE Interface 32x min CD-ROM drive
I/O Ports Serial Ethernet Parallel External Video Expansion Slots	(1) RS232/422/485; (3) RS232 10/100Base-TX with RJ45 connector IBM Enhanced SVGA TFT display (12"); XGA TFT display (15"); XVGA CRT monitor (2 ISA and 1 PCI) or 3 ISA slots (configurable)	(1) RS232/422/485; (3) RS232 10/100Base-TX with RJ45 connector IBM Enhanced SVGA TFT display (12"); XGA TFT display (15"); XVGA CRT monitor (2 ISA and 1 PCI) or 3 ISA slots (configurable)
User Interface Function Key Numeric Entry Touchscreen Select Key Cancel Key Keyboard Port Mouse	Onscreen Onscreen Analog Resistive N/A N/A PS/2 or IBM AT with adapter cable (included) PS/2	Onscreen Onscreen Analog Resistive N/A N/A PS/2 or IBM AT with adapter cable (included) PS/2
Package Designed for Temperature Range Rel. Humidity (non-condensing) Vibration Shock Weight Size (H x W x D)	NEMA 4, 4X 0-50°C 5-95% 10-500 Hz, 0.5g (RMS) 10-500 Hz, 1g (RMS) Compact FLASH 10G, 11 msec (operating) 30G, 11 msec (non-operating) 12" display: 27.8 lbs. (12.6 Kg) 15" display: 31.1 lbs. (14.1 Kg) 12" – 12.1" x 15.1" x 10.0" (308 mm x 383 mm x 254 mm) 15" – 13.3" x 16.8" x 10.0" (338 mm x 427 mm x 254 mm)	NEMA 4, 4X 0-50°C 5-95% 10-500 Hz, 0.5g (RMS) 10-500 Hz, 1g (RMS) Compact FLASH 10G, 11 msec (operating) 30G, 11 msec (non-operating) 21.1 lbs (9.6 Kg) 11.1" x 14" x 8.6" (282 mm x 356 mm x 218 mm)
Power Requirements AC – Max. Pwr. Consumption DC – Max. Pwr. Consumption	90-260 VAC autoranging - 120 Watts N/A	90-260 VAC autoranging - 120 Watts N/A
Agency Approval	CE - Consult Factory UL/CUL Class 1 Div. 2	CE - Consult Factory UL/CUL Class 1 Div. 2

* For complete details regarding Hard Drive capacity, refer to the Hard Drive Storage Capacity chart on page 22.

MachineShop Software Suite for PowerStation Workstations

Interact and MachineLogic™ are part of the MachineShop™ Suite

CTC's MachineShop is an integrated suite of Windows-based software tools for developing Interact HMI and MachineLogic PC-based control applications. MachineShop's convenient toolbar includes a Project Manager, Environment Navigation, and a PowerStation Transfer area. Whether you use Interact, MachineLogic*, or both, these tools make it easy to manage, create, integrate and transfer your machine applications.



MachineShop Toolbar

Project Management

MachineShop's Project Management is a simple, intuitive way to configure and manage automation projects. It conveniently collects configuration data and run-time files under one project name. Development tasks are simplified by allowing MachineLogic and Interact projects to appear in a single integrated environment.

Project Management allows the user to...

- Backup and restore data from storage devices such as disks, hard drives and networks
- Document all project information
- Access data on runtime storage requirements and components used for the application
- Easily perform project tasks with the guidance of "Wizards"
- Use a common tag list for MachineLogic* and Interact

Environment Navigation

The Environment Navigation area of the toolbar allows the user to switch between any Windows applications, much like the toolbars found in popular software suites used in the office environment. The MachineShop Suite includes Interact HMI Software and MachineLogic PC-based Control Software*. Users can opt to use either or both of these programs, and the toolbar allows for easy navigation between these programs during application development.

Interact HMI Software: Interact is a feature-rich software package that can be tailored to meet the needs of any HMI project. It provides the ease of use of Windows for development, with the reliability of DOS in a runtime environment. You can build an Interact application by selecting from a complete family of software modules* ranging from 3-D panel tools, to trending*, networking* and machine configuration*. Interact's modular architecture allows you to choose only the software pieces needed to meet the specific cost and functionality requirements of your application. Interact software is designed to run on a variety of platforms. Interact can run on a PC-compatible computer or any of CTC's family of flat-panel PowerStation workstations.

MachineLogic PC-based Control Software: MachineLogic is a new type of control software that gives machine builders a *no risk* way to move from PLCs to PCs. It combines the reliability, familiarity and cost-effectiveness of PLCs with the open architecture and integrated development features of PC-based packages. MachineLogic is a reliable and affordable alternative to Windows NT/CE soft control solutions and, as a PC-based solution, MachineLogic effectively delivers the "open systems" advantages of connectivity, integrated development and standardization. This full-featured product supports all five languages of the emerging IEC-61131-3 programming standard - including ladder logic.

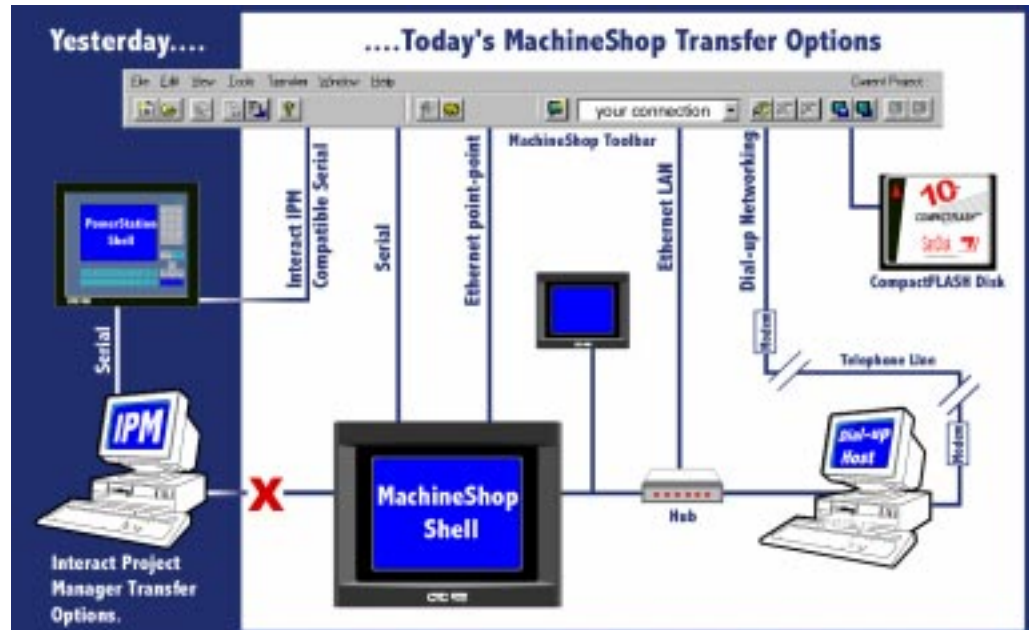
* MachineShop for MotionPanel and MachineShop Basic HMI (for the P1H) development packages DO NOT support MachineLogic or Interact modules other than Panel Toolkit (PTM) or Networking (NET). Upgrades must be purchased to enable the additional Interact software components.

MachineShop Transfer

Once an application has been developed, MachineShop manages the transfer of all the files needed to create or update a runtime system. Convenient tools simplify the transfer process, so projects can go online quickly. The transfer section of the toolbar will transfer files to one of CTC's PowerStations or any PC with the MachineShop Shell installed on it.

MachineShop Transfer...

- Automatically transfers run-time projects including Interact and/or MachineLogic
- Backs up and restores runtime projects
- Transfers projects via the Internet
- Transfers with a serial connection or direct to Compact FLASH
- Helps users select transfer options, using Wizard-based guidance.



MachineShop can transfer a complete project, transfer updated files only, create or restore project backups,

all using a "connection" to the runtime workstation. A connection refers to the method used to transfer files to or from a runtime system. The types of transfer connections available are MachineShop Network, Interact IPM Compatible Serial and disk transfers. Multiple connections can be defined, each with a unique user defined name for different types of connections. Connections can even be defined with the same connection type, but for different target runtime systems. For instance, different connections can be defined for runtime workstations on a Local Area Network (LAN). Any one of the workstations may be selected for a transfer by choosing it from the connection drop down list found on the toolbar.

Interact IPM Compatible Serial: This type of connection is used to transfer projects to a CTC PowerStation that has the PowerStation Shell installed on it. This connection supports the transfer of Interact projects only, and is supplied for backward compatibility with existing systems. This connection uses a serial port connection between the MachineShop development system and the PowerStation. *Note:* This connection replaces IPM connectivity. IPM is a DOS-based utility that is optimized for handling serial ports and the transfer of files through them. This connection will provide the same capability as IPM. Creating MachineShop files does not prevent you from continuing to use IPM to download projects to the PowerStation Shell; however, you cannot use IPM to download projects to the MachineShop Shell. MachineShop is also capable of reading project backups that were created using IPM. When you restore a project backup that was created with IPM, MachineShop maintains the directory structure for Interact projects.

MachineShop Shell

With the release of MachineShop, CTC's PowerStations are delivered with the MachineShop Shell installed. The MachineShop Shell is a necessary software component that must be used on the run-time system for use with the MachineShop development suite features, and is required for the use of MachineLogic. PowerStations (P1-P9 and PowerStation RS) with a hard drive or Compact FLASH may be updated to use the new MachineShop Shell. CTC recommends that an 8 MB Compact FLASH card be used with the new MachineShop Shell.

Industrial PC Models

The CTC Industrial PC family includes a range of options to meet the needs of any factory floor application – from a compact 10" unit up to a 15" large screen PC. CTC's Industrial PCs are flexible solutions – you can select from processors, display types, expansion and storage capabilities to get the right PC for your application. There are even remote systems available in which an enclosed back shell can be mounted in an enclosure and cable-connected to one of CTC's flat panel industrial monitors.



PC10

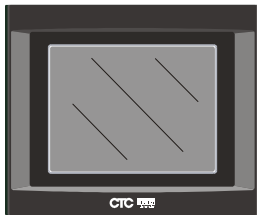
The PC10 is a flexible 10" display PC with Windows, allowing users to choose a display type, PC/104 or ISA/PCI expansion capabilities, and hardware options such as floppy disk and CD ROM drives.

Display: 10.4" VGA Color TFT (200 NIT or 300+ NIT)

Processor: Pentium MMX 266

Hard Drive: 10 GB (std.) or 20 GB (large capacity) minimum unformatted storage area*

Expansion Cards: PC/104 or ISA/PCI



PC12

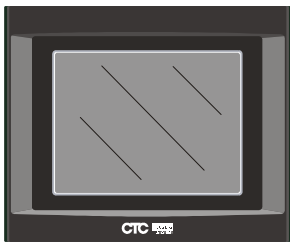
The PC12 is a flexible 12" display PC with Windows, allowing users to choose PC/104 or ISA/PCI expansion capabilities and hardware options such as floppy disk and CD ROM drives.

Display: 12.1" SVGA TFT

Processor: Pentium MMX 266

Hard Drive: 10 GB (std.) or 20 GB (large capacity) minimum unformatted storage area*

Expansion Cards: PC/104 or ISA/PCI



PC15

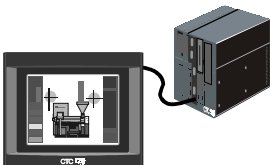
The PC15 is a flexible 15" display PC with Windows, allowing users to choose PC/104 or ISA/PCI expansion capabilities and hardware options such as floppy disk and CD ROM drives.

Display: 15.1" XGA TFT

Processor: Pentium MMX 266

Hard Drive: 10 GB (std.) or 20 GB (large capacity) minimum unformatted storage area*

Expansion Cards: PC/104 or ISA/PCI



RC00 Remote System

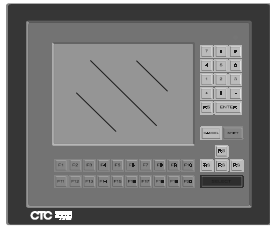
The RC00 includes all of the power, expandability and serviceability of the PC10, 12 or 15 in a Remote System that can be mounted in an enclosure and cable-connected to one of CTC's 10", 12" or 15" flat panel industrial monitors.

Processor: Pentium MMX 266

Hard Drive: 10 GB (std.) or 20 GB (large capacity) minimum unformatted storage area*

Expansion Cards: PC/104 or ISA/PCI

* For complete details regarding Hard Drive capacity, refer to the Hard Drive Storage Capacity chart on page 22.



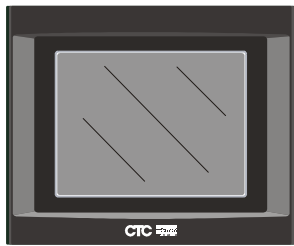
PC5 Function Key PC

The P5 Function Key PC model includes arrows for cursor control and features 40 function keys (20 plus Shift) for operators who prefer traditional function key operation. Features include: Compact FLASH storage media, built-in Ethernet port and a NEMA 4/4X rating.

Display: 9.4" Monochrome LCD, 10.4" Color STN or TFT

Processor: Pentium 166, 266 MHz

Hard Drive: 10 GB minimum unformatted storage area*

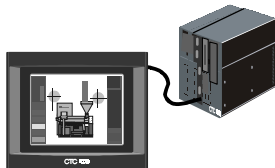


PC9 High Functionality PC

The PC9 is a full sized high performance PC solution for applications that require full-featured industrial functionality on the plant floor. Both 12" and 15" display options offer features like CD-ROM drives, CPUs up to Pentium III 850 MHz, and ISA and PCI expansion capability. The PC9 is a highly serviceable platform with field-replaceable hard drive, CD-ROM, floppy drive and CPU board.

RSPC9 "Remote System"

The RSPC9 includes all of the power, expandability and serviceability of the PC9 in a Remote System that can be mounted in an enclosure and cable-connected to one of CTC's 12" or 15" flat panel industrial monitors.



Display: 12" SVGA or 15" XGA Color TFT

Processor: Celeron 566 MHz; Pentium III 850 MHz

Hard Drive: 4.8 GB (std.) or 6.4 GB (large capacity) minimum unformatted storage area*

* For complete details regarding Hard Drive capacity, refer to the Hard Drive Storage Capacity chart on page 22.

Industrial PC Features and Specifications (PC10 and PC12 Models)

	PC10	PC12
Operating System	DOS, Windows 98/2000/NT	DOS, Windows 98/2000/NT
Display	For more display specifications, see page 20.	For more display specifications, see page 20.
Type	Flat Panel	Flat Panel
Backlight	Cold Cathode Fluorescent Tube	Cold Cathode Fluorescent Tube
Color	Color – TFT 200 or 300 NIT	Color - TFT
Resolution	VGA (640 x 480)	SVGA (800 x 600)
Size	10.4" (264 mm) Diagonal (Color/TFT)	12.1" (310 mm) Diagonal (Color/TFT)
CPUs	Pentium MMX 266 MHz	Pentium MMX 266 MHz
System Memory		
Standard	32 MB	32 MB
Maximum	256 MB	256 MB
Storage Memory		
Compact FLASH (Type II connectors)	8 MB Compact FLASH (128 MB max) (1 external and 1 internal); also supports MicroDrive in low shock and vibration environments	8 MB Compact FLASH (128 MB max) (1 external and 1 internal); also supports MicroDrive in low shock and vibration environments
Floppy	Optional (external, surface or panel mount)	Optional (external, surface or panel mount)
Hard Drive	10 GB (std.) or 20 GB (large capacity) minimum unformatted storage area* EIDE Interface	10 GB (std.) or 20 GB (large capacity) minimum unformatted storage area* EIDE Interface
CD ROM	Optional 24x Super Slim CD ROM	Optional 24x Super Slim CD ROM
Video Memory	2 MB High Speed SDRAM	2 MB High Speed SDRAM
I/O Ports		
Serial	(1) RS232/422/485; (2) RS232	(1) RS232/422/485; (2) RS232
Ethernet	10/100Base-T w/ RJ45 connector	10/100Base-T w/ RJ45 connector
Parallel	(1) 25-Pin D-sub connector (supports Bi-directional SSP/SPP/ECP)	(1) 25-Pin D-sub connector (supports Bi-directional SSP/SPP/ECP)
Expansion Slots: PC/104 models ISA /PCI models	(3) PC/104 cards are supported (3) ¾ length (2 ISA/PCI configurable) or (2 PCI 1 ISA/PCI Configurable) Note: 1 PC/104 card is supported in this configuration.	(3) PC/104 cards are supported (3) ¾ length (2 ISA/PCI configurable) or (2 PCI 1 ISA/PCI Configurable) Note: 1 PC/104 card is supported in this configuration.
External Video	(1) Analog 15-Pin D-sub connector (supports simultaneous video mode)	(1) Analog 15-Pin D-sub connector (supports simultaneous video mode)
USB	(2) USB ports	(2) USB ports
User Interface		
Function Key/Numeric Entry	Application Specific	Application Specific
Touchscreen	Analog Resistive (8-wire, 1024 x 1024 resolution)	Analog Resistive (8-wire, 1024 x 1024 resolution)
Keyboard/Mouse Port	(1) PS/2 Keyboard port and 1 PS/2 Mouse port	(1) PS/2 Keyboard port and 1 PS/2 Mouse port
Package		
Designed for	NEMA 4, 4X	NEMA 4, 4X
Temperature Range	0-50°C	0-50°C
Rel. Humidity (non-cond.)	5-95%	5-95%
Vibration	10-150 Hz, 1G (Sin): 10-500 Hz .5G (RMS Random)	10-150 Hz, 1G (Sin): 10-500 Hz .5G (RMS Random)
Shock	10G, 11 msec (operating) 30G, 11 msec (non-operating)	10G, 11 msec (operating) 30G, 11 msec (non-operating)
Weight:		
PC/104 model	13.4 lbs. (6.07 Kg)	20.6 lbs. (9.4 Kg)
ISA/PCI model	17.2 lbs. (7.8 Kg)	22.9 lbs. (10.4 Kg)
Size (H x W x D): PC/104 models	11.02" x 13.78" x 4.29" (280 mm x 350 mm x 109 mm)	12.11" x 15.06" x 5.64" (307 mm x 382 mm x 143 mm)
ISA/PCI models	11.02" x 13.78" x 6.97" (280 mm x 350 mm x 177 mm)	12.11" x 15.06" x 8.32" (307 mm x 382 mm x 211 mm)
Power Requirements		
AC -- Max. Pwr. Consump.	90-250 VAC; 50/60 Hz; (external – purchased separately) --110 Watts max	90-250 VAC; 50/60 Hz; (external – purchased separately) --110 Watts max
DC -- Max. Pwr. Consump.	18-28 VDC -- 78 Watts max	18-28 VDC -- 78 Watts max
Agency Approval	CE; UL/CUL; Class 1 Division 2	CE; UL/CUL; Class 1 Division 2

* For complete details regarding Hard Drive capacity, refer to the Hard Drive Storage Capacity chart on page 22.

Industrial PC Features and Specifications (PC15 and RC00 Models)

	PC15	RC00
Operating System	DOS, Windows 98/2000/NT	DOS, Windows 98/2000/NT
Display	For more display specifications, see page 20.	Monitor purchased separately
Type	Flat Panel	
Backlight	Cold Cathode Fluorescent Tube	
Color	Color - TFT	See Industrial Monitors, page 19
Resolution	XGA (1024 x 768)	
Size	15.1" (380 mm) Diagonal (Color/TFT)	
CPU	Pentium MMX 266 MHz	Pentium MMX 266 MHz
System Memory		
Standard	32 MB	32 MB
Maximum	256 MB	256 MB
Storage Memory		
Compact FLASH (Type II connectors)	8 MB Compact FLASH (128 MB max) (1 external and 1 internal); also supports MicroDrive in low shock and vibration environments	8 MB Compact FLASH (128 MB max) (1 external and 1 internal); also supports MicroDrive in low shock and vibration environments
Floppy	Optional (external, surface or panel mount)	Optional (external, surface or panel mount)
Hard Drive	10 GB (std.) or 20 GB (large capacity) minimum unformatted storage area* EIDE Interface	10 GB (std.) or 20 GB (large capacity) minimum unformatted storage area* EIDE Interface
CD ROM	Optional 24x Super Slim CD ROM	Optional 24x Super Slim CD ROM
Video Memory	2 MB High Speed SDRAM	2 MB High Speed SDRAM
I/O Ports		
Serial	(1) RS232/422/485; (2) RS232	(1) RS232/422/485; (2) RS232
Ethernet	10/100Base-T w/ RJ45 connector	10/100Base-T w/ RJ45 connector
Parallel	(1) 25-Pin D-sub connector (supports Bi-directional SSP/SPP/ECP)	(1) 25-Pin D-sub connector (supports Bi-directional SSP/SPP/ECP)
Expansion Slots: PC/104 models ISA /PCI models	(3) PC/104 cards are supported (3) ¾ length (2 ISA/PCI configurable) or (2) PCI 1 ISA/PCI Configurable) Note: 1 PC/104 card is supported in this configuration.	(3) PC/104 cards are supported (3) ¾ length (2 ISA/PCI configurable) or (2) PCI 1 ISA/PCI Configurable) Note: 1 PC/104 card is supported in this configuration.
External Video	(1) Analog 15-Pin D-sub connector (supports simultaneous video mode)	(1) Analog 15-Pin D-sub connector (supports simultaneous video mode)
USB	(2) USB ports	(2) USB ports
User Interface		
Function Key/Numeric Entry	Application Specific	Pop-up On Screen
Touchscreen	Analog Resistive (8-wire, 1024 x 1024 resolution)	Analog Resistive (8-wire, 1024 x 1024 resolution)
Keyboard/Mouse Port	(1) PS/2 Keyboard port and 1 PS/2 Mouse port	(1) PS/2 Keyboard port and 1 PS/2 Mouse port
Package		
Designed for	NEMA 4, 4X	NEMA 4, 4X
Temperature Range	0-50°C	0-50°C
Rel. Humidity (non-cond.)	5-95%	5-95%
Vibration	10-150 Hz, 1G (Sin); 10-500 Hz .5G (RMS Random)	10-150 Hz, 1G (Sin); 10-500 Hz .5G (RMS Random)
Shock	10G, 11 msec (operating) 30G, 11 msec (non-operating)	10G, 11 msec (operating) 30G, 11 msec (non-operating)
Weight:		
PC/104 model	23.9 lbs. (10.8 Kg)	12.5 lbs. (5.7 Kg)
ISA/PCI model	26.1 lbs. (11.8 Kg)	15 lbs (6.8 Kg)
Size (H x W x D):		
PC/104 models	13.31" x 16.81" x 6.16" (338 mm x 427 mm x 156 mm)	11.1" x 14.01" x 3.57" (282 mm x 356 mm x 91 mm)
ISA/PCI models	13.31" x 16.81" x 8.57" (338 mm x 422 mm x 218 mm)	11.12" x 14.01" x 6.25" (282 mm x 356 mm x 159 mm)
Power Requirements		
AC -- Max. Pwr. Consump.	90-250 VAC; 50/60 Hz; (external – purchased separately) --110 Watts max	90-250 VAC; 50/60 Hz; (external – purchased separately) --110 Watts max
DC -- Max. Pwr. Consump.	18-28 VDC -- 78 Watts max	18-28 VDC -- 78 Watts max
Agency Approval	CE; UL/CUL; Class 1 Division 2	CE; UL/CUL; Class 1 Division 2

* For complete details regarding Hard Drive capacity, refer to the Hard Drive Storage Capacity chart on page 22.

Industrial PC Features and Specifications (PC5, PC9 and RSPC9 Models)

	PC5	PC9	RSPC9
Operating System	Windows 98/2000/NT (opt.)	Windows 98/2000/NT (opt.)	Windows 98/2000/NT (opt.)
Display	For more display specs, see page 20. Type Flat Panel Backlight Cold Cathode Fluorescent Tube Color Color - STN/TFT Resolution VGA (640 x 480) Size 10.4" (264 mm) Diag.	For more display specs, see page 20. Flat Panel Cold Cathode Fluorescent Tube TFT 12" SVGA (800 x 600) 15" XGA (1024 x 768) 12.1" (310 mm) Diag. 15.1" (380 mm) Diag.	Monitor purchased separately See Industrial Monitors, page 19
CPUs	Pentium 166, 266 MHz	Celeron 566 MHz Pentium III 850 MHz	Celeron 566 MHz Pentium III 850 MHz
System Memory	Standard 16 MB Maximum 512 MB (2 SIMM Slots - 2 32 MB SIMMs) (expandable, not config.)	32 MB SDRAM 512 MB SDRAM (expandable, not configurable)	32 MB SDRAM 512 MB SDRAM (expandable, not configurable)
Storage Memory	Compact FLASH N/A Floppy 1.44 MB, Side Access Hard Drive 10 GB minimum unformatted storage area* EIDE Interface CD-Rom No	8 MB Compact FLASH (128 MB max) (Field replaceable FLASH Disk) 1.44 MB, Side Access 4.8 GB or 6.4 GB (min) unformatted storage area* EIDE Interface 32x min CD-ROM drive	8 MB Compact FLASH (128 MB max) (Field replaceable FLASH Disk) 1.44 MB, Side Access 4.8 GB or 6.4 GB (min) unformatted storage area* EIDE Interface 32x min CD-ROM drive
I/O Ports	Serial (1) RS232/422/485 (1) RS232 Ethernet (NE 2000 compatible) 10/100Base-T with RJ45 connector Parallel IBM Enhanced External Video SVGA Monitor (TFT only) Expansion Slots (ISA) (2) Full length, (1) ½ length (ISA 16-Bit)	(1) RS232/422/485 (3) RS232 (non-isolated) 10Base-T/100Base-TX with RJ45 connector IBM Enhanced SVGA TFT monitor (12") from factory XVGA TFT monitor (15") from factory (2) ISA and 1 PCI) or 3 ISA slots (configurable)	(1) RS232/422/485 (3) RS232 (non-isolated) 10Base-T/100Base-TX with RJ45 connector IBM Enhanced (2) ISA and 1 PCI) or 3 ISA slots (configurable)
User Interface	Function Key 40 (20 plus Shift) Numeric Entry Yes Touchscreen Analog Resistive Select Key Yes Cancel Key Yes Keyboard/Mouse Port PS/2 or IBM AT with adapter cable	Onscreen N/A Analog Resistive N/A N/A N/A PS/2 or IBM AT with adapter cable	Onscreen N/A Analog Resistive N/A N/A PS/2 or IBM AT with adapter cable
Package	Designed for Temperature Range 0-50°C Rel. Humidity (non-cond.) 5-95% Vibration 10-500 Hz .5G (RMS Random) Shock 10G, 11 msec (operating) 30GG, 11 msec (non-operating) Weight 23.4 lbs. (10.6 Kg) Size (H x W x L) 14.0" x 16.0" x 7.0" (356 mm x 406 mm x 178 mm)	NEMA 4, 4X 0-50°C 5-95% 10-500 Hz, 0.5g (RMS Random) 10-500 Hz, 1g (RMS) Compact FLASH 10G, 11 msec (operating) 30G, 11 msec (non-operating) 12" display: 27.8 lbs. (12.6 Kg) 15" display: 31.1 lbs. (14.1 Kg) 12" - 12.1" x 15.1" x 10.0" (308 mm x 383 mm x 254 mm) 15" - 13.3" x 16.8" x 10.0" (338 mm x 427 mm x 254 mm)	NEMA 4, 4X 0-50°C 5-95% 10-500 Hz, 0.5g (RMS Random) 10-500 Hz, 1g (RMS) Comp.FLASH 10G, 11 msec (operating) 30G, 11 msec (non-operating) 21.1 lbs (9.6 Kg) 11.1" x 14" x 8.6" (281.9 mm x 355.6 mm x 218.4 mm)
Power Requiremnts.	AC - Max.Pwr. Consump. 90-260 VAC; 50/60 Hz-110 Watts DC - Max.Pwr. Consump. 20-36 VDC - 110 Watts max	90-260 VAC autoranging - 120 Watts N/A	90-260 VAC autoranging - 120 Watts N/A
Agency Approval	CE; UL/CUL; Class 1 Div. 2	UL/CUL; Class 1 Div 2	UL/CUL; Class 1 Div 2

* For complete details regarding Hard Drive capacity, refer to the Hard Drive Storage Capacity chart on page 22.

Industrial Monitors



CTC's Industrial Monitors offer a flat panel solution for the factory floor. These rugged, high-resolution monitors are available in 12" or 15" models, and enhance the overall look and functionality of any machine.

Industrial Monitors Features and Specifications

	12" Model	15" Model
Display Type Backlight Color Resolution Size	For more display specifications, see page 20. Flat Panel Cold Cathode Fluorescent Tube TFT 12" SVGA (800 x 600) 12.1" (310 mm) Diagonal	For more display specifications, see page 20. Flat Panel Cold Cathode Fluorescent Tube TFT 15" XGA (1024 x 768) 15.1" (380 mm) Diagonal
User Interface Touchscreen Video Controls	Analog Resistive On Screen Display (OSD) controlled by rear panel buttons	Analog Resistive On Screen Display (OSD) controlled by rear panel buttons
Package Designed for Temperature Range Rel. Humidity (non-condensing) Vibration Shock Weight Size (H x W x D)	NEMA 4, 4X 0-50°C 95% 10-500 Hz, 0.5g (RMS) 10G, 11 msec (operating) 30G, 11 msec (non-operating) 14.6 lbs. (6.6 Kg) 12.1" x 15.1" x 3.6" 308 mm x 383 mm x 91 mm	NEMA 4, 4X 0-50°C 95% 10-500 Hz, 0.5g (RMS) 10G, 11 msec (operating) 30G, 11 msec (non-operating) 17.2 lbs. (7.8 Kg) 13.3" x 16.8" x 3.8" 338 mm x 427 mm x 96 mm
Power Requirements AC - Maximum Power Consumption DC - Maximum Power Consumption	90-260 VAC; 50/60Hz (Ext.Opt.) 50 Watts max. 20-36 VDC 30 Watts max.	90-260 VAC; 50/60Hz (Ext.Opt.) 50 Watts max. 20-36 VDC 30 Watts max.
Agency Approval	CE UL/CUL Class 1 Div 2	CE UL/CUL Class 1 Div 2

Note: For 10" monitor details, please consult the factory.

Notes on Workstation Features and Specifications

Display	Resolution	Colors	Brightness	Viewing Angle	Bulb Life*
Mono LCD (5.7")	320 x 240 ¼ VGA	16 shades of gray	200 NIT	+/- 30° L/R, 20°U, 30°D	10,000 Hrs.
Color STN (5.7")	320 x 240 ¼ VGA	256 colors	110 NIT	+/- 50° L/R, +/- 30°U/D	10,000 Hrs.
Color TFT (6.4")	640 x 480 VGA	262,144 colors	300 NIT	+/- 55° L/R, 15°U, 35°D	20,000 Hrs.
Color STN (10.4")	640 x 480 VGA	256 colors	160 NIT	+/- 35° L/R, 45°U/D	25,000 Hrs.
Mono LCD (9.4")	640 x 480 VGA	16 shades of gray	110 NIT	+/- 50° L/R, 20°U, 30°D	10,000 Hrs.
Color TFT (10.4")	640 x 480 VGA	262,144 colors	200 NIT	+/- 70° L/R, 40°U, 70°D	50,000 Hrs.
Bright Color TFT (10.4")	640 x 480 VGA	256 colors	300 NIT	+/- 70° L/R, 40°U, 70°D	25,000 Hrs.
Color TFT (12.1")	800 x 600 SVGA	262,144 colors	270 NIT	+/- 70° L/R, +/- 55°U/D	30,000 Hrs.
Color TFT (15.1")	1024 x 768 XGA	262,144 colors	200 NIT	+/- 70° L/R, +/- 60°U/D	50,000 Hrs.

* Hour specs are typical lives to half brightness. Manufacturer rating for TFT/LCD/STN bulbs is a minimum of 10,000 hours of use before the bulbs reach half brightness. This rating represents 416 days of continuous use 24 hours per day. Bulb life can also be affected by the number of times the bulbs are turned on. Bulb replacement takes approximately 15 minutes.

I/O Ports

- 25-pin IBM enhanced parallel port
- P1, P5, P9, PC5, PC9 and RSPC9 units include one 9-pin RS232 port and one 9-pin RS232/422/485 port
- All PS units include one 9-pin RS232/422/485 port and two 9-pin RS232 ports
- P9/PC9 units support 3 9-pin RS232 ports and one 9-pin RS232/422/485 port
- RJ45 Ethernet port standard on all units. P1 and P1H units support 10Base-T Ethernet ; all other units support 10/100Base-T

Total Available Power to All Expansion Slots

P1/P1H/MotionPanel

PC/104: 8-bit

- P1 Model Only
- +5V @ 0.75 A
- +12V @ 0.1 A

P1P

PC/104: 8-bit

- +5V @ 0.75A
- +12V @ 0.1 A

PS10/PC10/PS12/PC12/PS15/PC15

- +3.3V @ 1.5 A
- -5V @ 0.075 A
- +12V @ 0.5 A
- -12V @ 0.150 A
- +5V @ 1.5 A

PC5 - 5x86

ISA: 16-bit

- +5V @ 2.25 A
- -5V @ 0.30 A
- +12V @ 1.0 A
- -12V @ 1.0 A

PC5 – Pentium

ISA: 16-bit

- +5V @ 2.5 A
- -5V @ 0.25 A
- +12V @ 1.0 A
- -12V @ 0.75 A

P9/PC9/RS9

ISA/PCI:

- 3.3VDC @ 1 A
- 5VDC @ 2.5 A
- 12VDC @ 0.2 A
- -5VDC @ 0.1 A
- -12VDC @ 0.1 A

Electrical and Testing Criteria

Showering arc	NEMA showering arc
Surge withstand capability	IEEE 472-1974 IEC 1000-4-5
Operating temperature	IEC 68-2-1
European Harmonized EMI Std.	EN50082-2
European Harmonized Safety Std.	EN60950
Operating vibration	IEC 68-2-6
Mechanical shock	IEC 68-2-27
Random vibration	MIL-STD-810D

Front Bezel and Overlay Construction

The front bezel of all units (except for the P1) is made from a structural foam resin covered with an epoxy paint for additional durability. The P1 front bezel is made of ABS injection molded plastic. This durable bezel construction allows the workstation to withstand the harshest factory floor environments. In addition, the front bezel meets NEMA 4X requirements due to the elimination of all corrosive material.

The overlay is made from a material that is resistive to most commonly used cleaners and acids. The overlay is also covered with a factory hardcoat for additional chemical, puncture and tear resistance. The touchscreen and bezel can resist the chemicals listed; however, it is not recommended that these chemicals be applied for long periods of time or in excessive quantity.

Acetic Acid	Engine Oil	Isopropyl Alcohol	Nitric Acid 10%	Sodium Chloride 26%
Acetone	Ethanol	Kerosene	Phosphoric Acid 10%	Sodium Hydroxide 10%
Ammonia Water 10%	Gas Oil	Machine Oil	Potassium Hydroxide	Sulfuric Acid 10%
Butyl Cellosolve	Gasoline	MEK	Salad Oil	Toluene
Carbon Tetrachloride	Glycerin	Methanol	Silicone	Trichloroethylene
Cleanser	Grease	Methylene Chloride	Silicone Grease G31	Xylene
Cottonseed Oil	Hexane	Motor Oil	Silicone Oil	Zinc Chloride 81%
Cyclohexanone	Hydrochloric Acid 10%			

Workstation Memory Guidelines

Storage Memory

The storage memory is similar to a PC's floppy or hard disk. Non-volatile storage memory is available as solid state FLASH cartridges and hard drives.

All units support SanDisk Compact FLASH cartridges. These cartridges are interchangeable and replaceable with each other – however, different models require different hardware drivers, etc. Please refer to your documentation for details. CTC can install these FLASH cartridges at the factory, or you can install them in the field.

A PCMCIA FLASH adapter is also available for use with Compact FLASH cartridges. This adapter allows you to plug a Compact FLASH cartridge into the adapter, plug the adapter into a PCMCIA slot on your PC, and copy application files from your PC to the FLASH disk. The Compact FLASH cartridge may then be installed to the unit simply by powering down the unit, removing the old cartridge and inserting the new one! Due to advances in FLASH technologies, logging to Compact FLASH is now supported.

Tips for Ordering Workstation Memory

Development Software

Typically MachineShop applications are first developed in Windows95/98/2000/NT, and then downloaded to a PowerStation for run-time. MachineShop may also be developed on a hard drive PowerStation with Windows95/98/2000/NT. Note that MachineShop runtime software is *DOS-based*, so all applications must be *run* under DOS.

Runtime Software

The following chart outlines some important memory rules. Use these rules as a guideline when sizing your system, but keep in mind that they are only *guidelines*, and that memory requirements vary with each application.

FLASH Storage	16 MB of FLASH stores PTM, AMM, GMM, NET, 4 additional Run-Time modules, 2 drivers and approximately 30 screens. Extra Interact modules require more storage (4 modules per 1 MB).
System DRAM	8 MB system memory runs PTM, GMM, AMM, NET, 3 additional Run-Time modules, plus 2 drivers. Extra modules require more system memory (5 modules per 2 MB).
Logging	Data may be logged to a hard disk, floppy disk or Compact FLASH.
Hard Disk Storage	A 2.1 GB hard drive provides plenty of storage for most any application. However, there are other important considerations to be aware of when selecting a hard drive for storage.

Hard Drive Storage Capacity

Unit	Software Selection	Standard Hard Drive Size	High Capacity Hard Drive Size	Formatting Configuration
PS10, PS12, PS15 and RS00	Interact (with choice of OS)	10 GB (or greater)	20 GB (or greater)	2.1 GB Formatted
PC10, PC12, PC15 and PC00	Windows 98	10 GB (or greater)	20 GB (or greater)	2.1 GB Formatted
PC10, PC12, PC15 and PC00	Windows NT and Windows 2000	10 GB (or greater)	20 GB (or greater)	4 GB Formatted
P5	Interact (with choice of OS)	10 GB (or greater)	N/A	2.1 GB Formatted
PC5	Windows 98	10 GB (or greater)	N/A	2.1 GB Formatted
PC5	Windows NT and Windows 2000	10 GB (or greater)	N/A	4 GB Formatted
P9 and RS9	Interact (with choice of OS)	4.8 GB (or greater)	6.4 GB (or greater)	2.1 GB Formatted
PC9 and RSPC9	Windows 98	4.8 GB (or greater)	6.4 GB (or greater)	2.1 GB Formatted
PC9 and RSPC9	Windows NT and Windows 2000	4.8 GB (or greater)	6.4 GB (or greater)	4 GB Formatted

Storage Solutions: Compact FLASH vs. Hard Drives

Choosing the right storage option for your workstation is one of the most important decisions concerning its reliable operation throughout its installed life. Compare hard drive and Compact FLASH features, and then review the requirements of your application to determine which solution is the best fit for your needs.

Feature	Hard Drive	Compact FLASH
Storage Capacity	2.1 GB formatted (min)* for DOS units, 10 GB (min)* for PC units	8, 16, 32, 48, 96, 128 MB
Shock (operating)	10 Gs	2,000 Gs
Shock (non-op)	30-120 Gs	2,000 Gs
Vibration (operating)	1G (operating); .00015 - .18 G ² /Hz (non-op.)	15 Gs
MFG. MTBF est.	300,000 hrs.	>1,000,000 hrs.
Component reliability	750 - 2000 DPPM (defective parts/million); .5% - 2% w.f.r.	Less than 500 DPPM

* For complete details regarding Hard Drive capacity, refer to the Hard Drive Storage Capacity chart on this page.

There are no “across the board” advantages to using either hard drive technology or Compact FLASH. The decision to use either technology depends entirely on the requirements of the particular application. The table below lists important application requirements that affect which storage media you should use.

Application Requirements	Relationship to Storage Media
Windows	<p>If you need to run Windows software, the only choice that is practical and cost-effective using today’s technology is a hard drive.</p> <p>If you do not need Windows software, then the choice depends on your storage requirements. Currently, CTC offers Compact FLASH technology in 8, 16, 32, 48, 96, 128 MB capacities. If you still need more storage, then select a hard drive.</p>
Mounting	<p>If shock and vibration is a concern in your application, we recommend using Compact FLASH for most reliable operation. Certain types of machine mounting (i.e. using a swing arm) can promote a vibration environment. This obviously depends on the machine and the mounting mechanisms it employs.</p>
Continuous Operation (24 Hours/7 Days a week)	<p>The expected life of a hard drive running 24 hours a day, 7 days a week is approximately 1 year. Hard drive manufacturers cite the limitations are due to heat and the technology of the internal construction materials. There are no industrially rugged hard drives currently available that support “24/7” operation.</p> <p>However, there are some measures that can be used to extend the life of a hard drive. First, you can remove power during periods of non-production and maintenance. Secondly, we strongly recommend using a power saving feature in the CMOS settings that allows the hard drive to spin down during periods of inactivity. This “sleep mode” feature is similar to a screen saver for displays. The setting is selectable from 1 to 15 minutes, which means that if there is no activity reading from or writing to the disk, the drive will “rest” until the next read or write request occurs. You should be aware that it might take several seconds for the drive to spin up again after it has been at rest. For example, it may take 2 or 3 seconds to load a new panel as the drive spins back up after it has been at rest. However, it is easy to adjust the sleep mode feature for your application so that it is transparent during normal operation. Taking advantage of the sleep mode feature will greatly extend the life of the hard drive in 24/7 applications. Hard drive manufacturer’s design is for 3-5 years lifetime under normal operating conditions (i.e. not 24/7).</p> <p>CTC recommends Compact FLASH for “24/7” applications. Compact FLASH does not have the mechanical life limitations found in current hard drive technology. If the application does not require data to be logged, the Compact FLASH should last indefinitely. If the application does require data to be logged, please review the Logging to Compact FLASH section below.</p>
Data Logging	<p>If your application requires logging data to the drive, do you need to store more data than can be supported by Compact FLASH? If so, you must select the hard drive option. Also, if you can use Compact FLASH while logging data faster than once/second, you should plan on replacing the FLASH drive during yearly maintenance periods. Remember the Compact FLASH is field replaceable and is as simple as replacing a floppy disk.</p>

Logging to Compact FLASH

In the past, FLASH technology was not recommended to be used for logging data due to the limited number of writes possible to FLASH memory. However, advances in FLASH technology have made it feasible to log data to some types of FLASH storage which allow a large number of writes before the FLASH becomes unusable. All CTC workstation models utilize Compact FLASH™ technology that supports a larger number of writes. Once this maximum number of writes has been reached, the FLASH is no longer usable. However, the life of the FLASH can be extended for your Interact applications by adjusting the frequency that logged data is actually written to the disk. The following table displays the expected FLASH life of a Compact FLASH disk for various logging intervals.

Logging Frequency	FLASH Life (8MB)	FLASH Life (16MB)	FLASH Life (32MB)	FLASH Life (48MB)	FLASH Life (64MB)	FLASH Life (128MB)
.5 sec	3 yrs	6 yrs	12 yrs	18 yrs	24 yrs	48 yrs
1 sec	6 yrs	12 yrs	24 yrs	36 yrs	48 yrs	96 yrs
30 sec	180 yrs	360 yrs	720 yrs	1080 yrs	1440 yrs	2880 yrs
1 min	360 yrs	720 yrs	1440 yrs	2160 yrs	2880 yrs	5760 yrs

When logging data to FLASH there are two factors to consider. First, Interact supports buffering with logging of that block of buffered data at a designated interval. This time interval can be set as low as once per every 9,999 hours or as high as once per second (faster logging intervals may be set based on a data change). This limits the number of writes to FLASH versus writing data to FLASH immediately as it comes in.

Secondly, FLASH has a limited number of spare storage areas. The number of “spares” increases with the storage capacity of the Compact FLASH disk. This means that the life of a 48MB Compact FLASH disk is 10 times as long as that of a 8MB Compact FLASH disk. The estimated life of Compact FLASH technology is illustrated in the table below.

DRAM Information

System Memory

PowerStation DRAM system memory is identical to a PC's system memory where programs are loaded from storage to execute. You can easily expand your PowerStation's system memory by adding DRAM on the motherboard.

P1 Valid System DRAM Configurations

Memory Size	# SIMMs	SIMM Type
8 MB	1	1 MBit x 32

P1P Valid System DRAM Configurations

Memory Size	# SODIMMs	SODIMM Type
16 MB	1	4 MBit x 32

PS10/PC10/PS12/PC12/PS15/PC15 Valid System DRAM Configurations

On-board	DIMM (added)	Total
32 MB		32 MB
32 MB	32 MB	64 MB
32 MB	64 MB	96 MB
32 MB	128 MB	160 MB
32 MB	256 MB	256 MB*

* 256 MB is the maximum memory supported

P5 Pentium 166/266 Valid System DRAM Configurations

Memory Size	SODIMM	SODIMM
8 MB	8 MB	
16 MB	8 MB	8 MB
16 MB	16 MB	
24 MB	16 MB	8 MB
32 MB	16 MB	16 MB
32 MB	32 MB	
40 MB	32 MB	8 MB
48 MB	32 MB	16 MB
64 MB	32 MB	32 MB

P9 Valid System DRAM Configurations

Memory Size	# DIMMs	DIMM Type
32 MB	1	4 MBit x 64
64 MB	2	4 MBit x 64
64 MB	1	8 MBit x 64
128 MB	1	16 MBit x 64
128 MB	2	8 MBit x 64
256 MB	1	32 MBit x 64
256 MB	2	8 MBit x 64
512 MB	2	32 MBit x 64

Workstation Electrostatic Discharge Warning

CTC's workstation products are designed to allow you to perform upgrades, installation of I/O cards and some maintenance in the field. Upgrades such as ISA expansion cards, DRAM, FLASH memory and display backlight replacement can be purchased from CTC and installed on site by you at your convenience.

Before performing any maintenance on your workstations, we ask that you read the following paragraphs regarding ESD control.

ESD is an electronic discharge from a charged object that touches a conductive material, such as the workstation's sheet metal or logic board assembly, with its electronic components. A charged object can be the person performing the upgrade, a piece of plastic film or tape, a coffee cup, or even a shirt cuff. An example of ESD occurs when a person walks across a

carpet then touches a doorknob, generating a spark (and the person feels a shock). Many of the unit's components, such as displays, DRAM, FLASH, and the CPU can be easily damaged by ESD. You can even cause ESD damage without being aware that it has happened.

It is very important that you take proper precautions against the risk of Electrostatic Discharge (ESD) damage, while performing upgrades or maintenance functions to your workstation products. Failure to do so can cause random or hard failures of these products. These precautions include:

- Transport the product in ESD preventive packaging.

The packaging includes ESD bags or conductive boxes that contain the electronic components. CTC ships all electronic components in ESD-preventive bags, and these components should be removed only when the unit is properly grounded and ready for their immediate installation.

- Install components using an ESD Field Upgrade Kit and following ESD-preventive procedures.

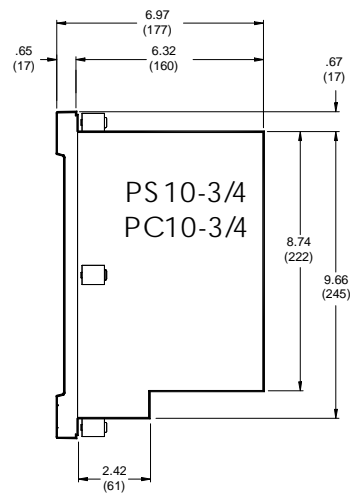
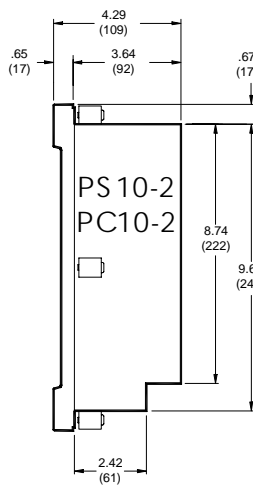
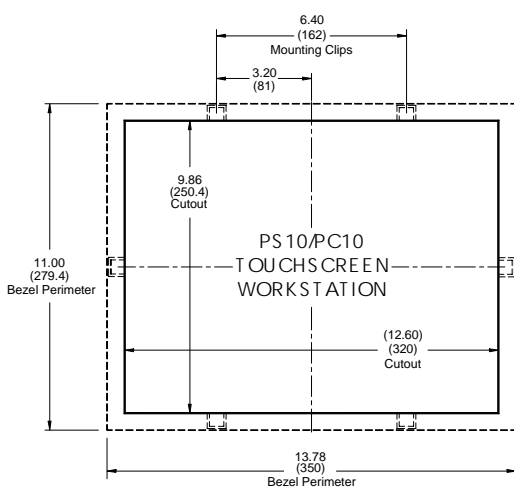
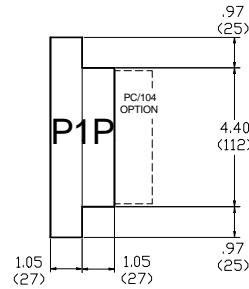
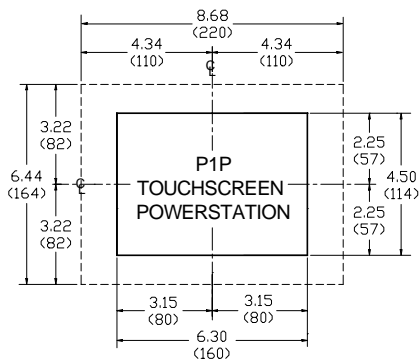
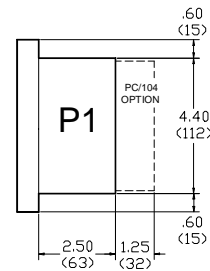
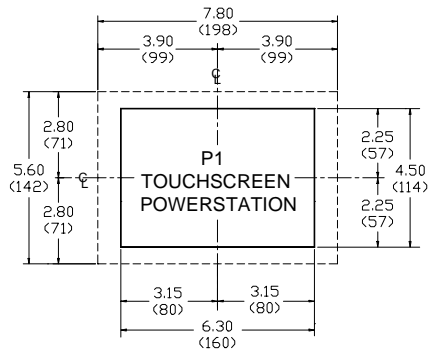
An ESD Field Upgrade Kits typically consist of a wrist wrap, a unit ground cord, and a portable ESD-protective mat. Manufacturers such as 3M provide such kits at a minimal cost.

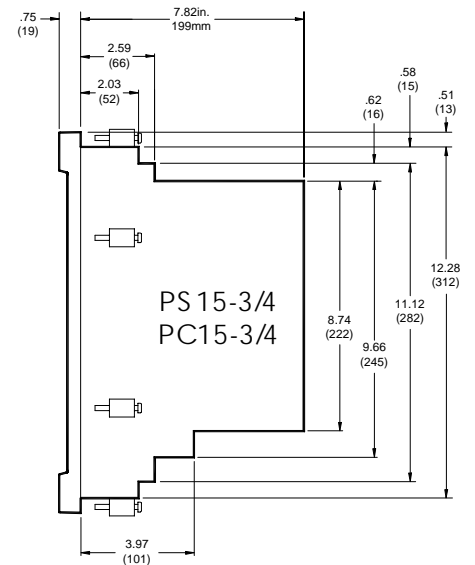
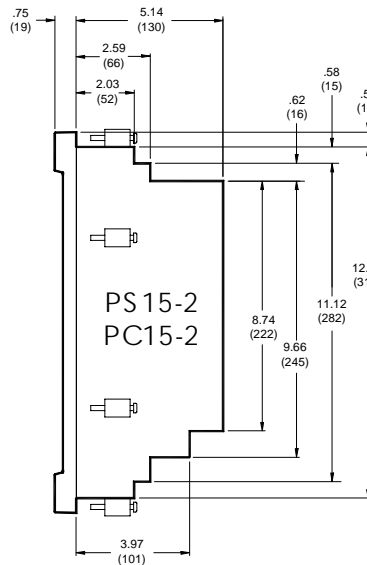
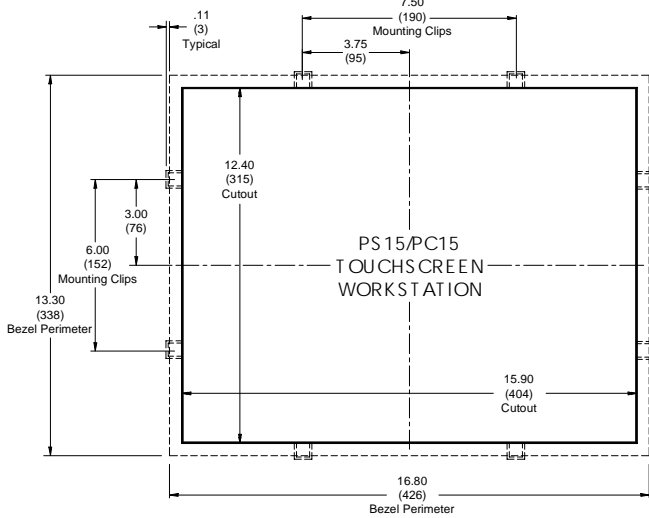
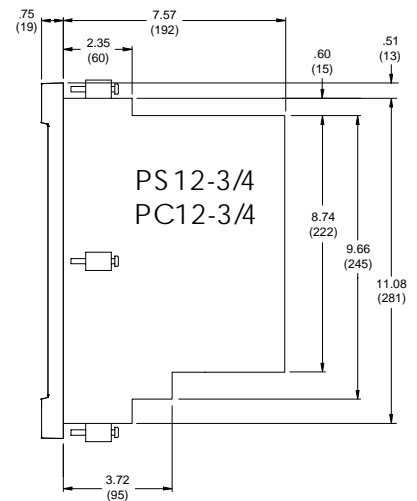
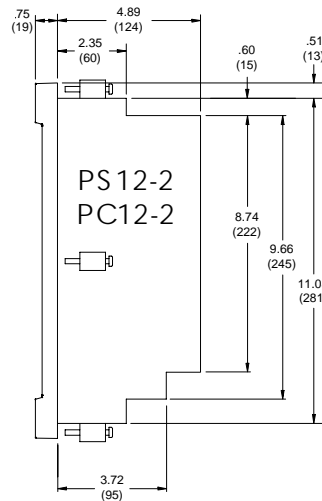
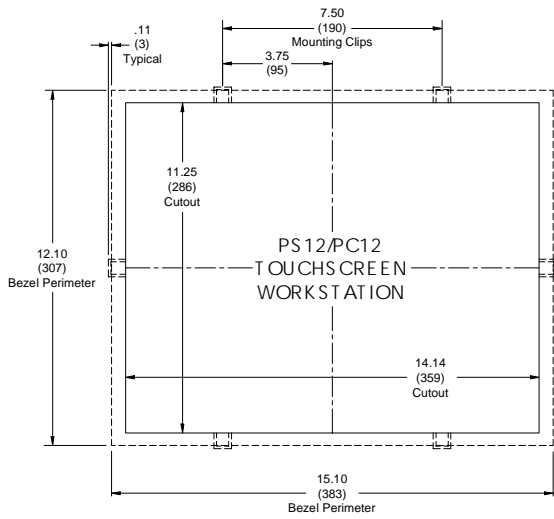
CTC builds its workstation products in an ESD-controlled environment to ensure their reliability when you receive them. It is important that you follow the preceding precautions when performing upgrade or maintenance functions. This will ensure the continued reliability of your units.

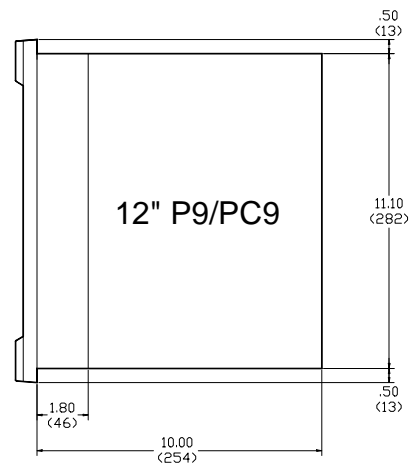
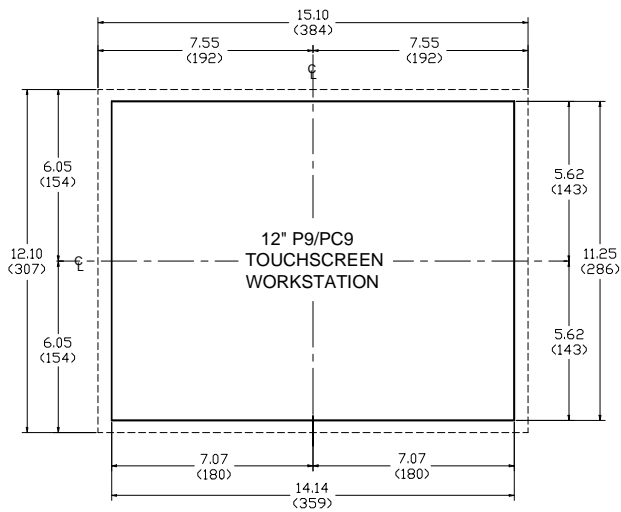
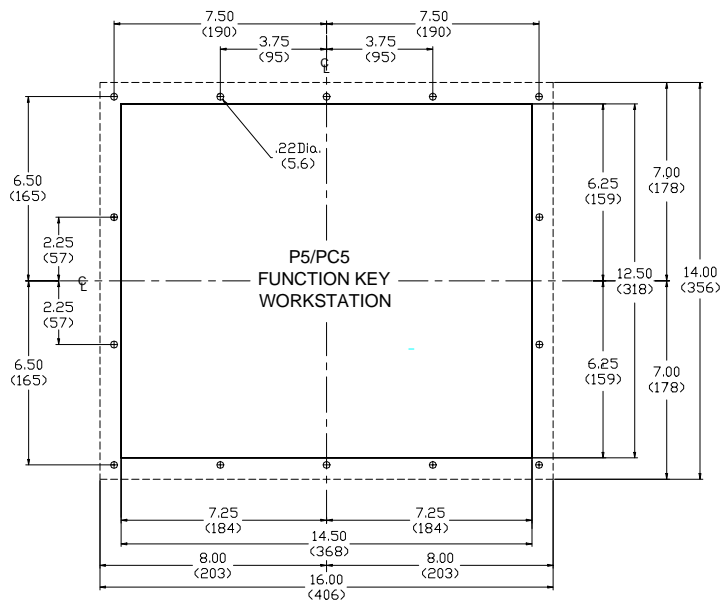
Please contact CTC if you would like more information on how to prevent ESD damage to your workstation products.

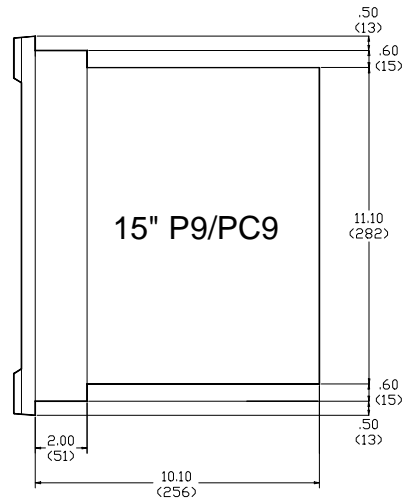
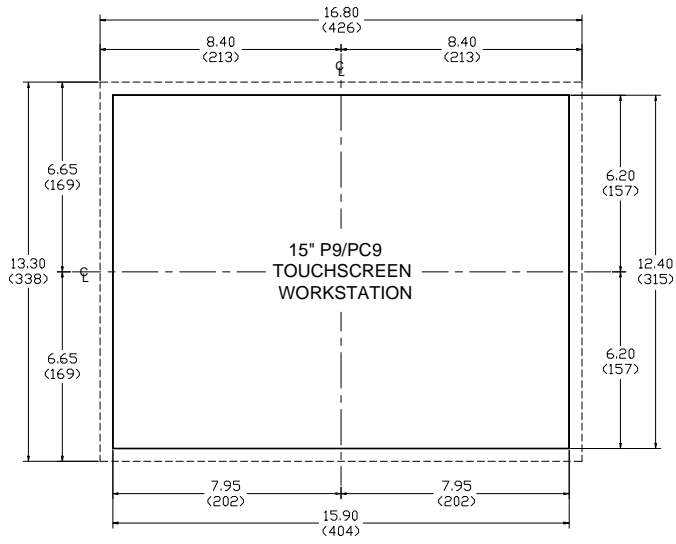
Workstation and Industrial PC Cutout Dimensions

Illustrated below are the cutout dimensions for each model (additional space for cable connections not included).



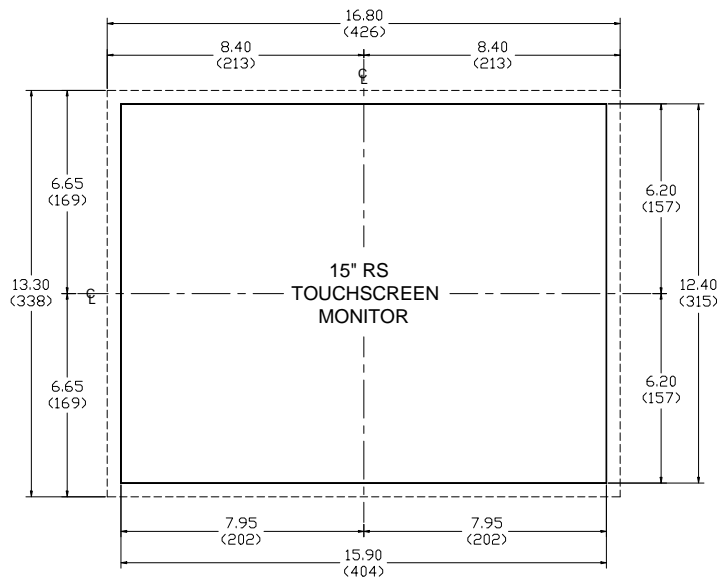
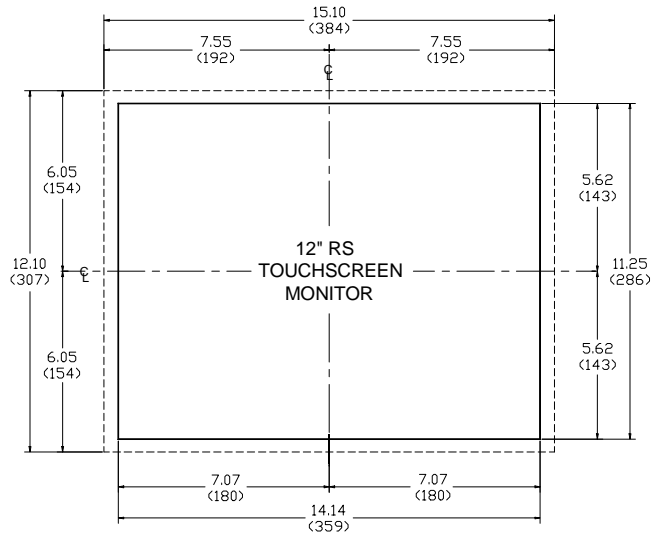






Industrial Monitor Cutout Dimensions

Illustrated below are the cutout dimensions for each monitor model (additional space for cable connections not included).



CTC Professional Services

CTC takes pride in the long-term commitment we make to each of our customers. When you purchase our products, you buy more than high-quality, complete machine control solutions for your factory floor applications. You also receive a permanent partnership of service and support.

CTC offers a full range of professional services, such as the MachineShop Product Support Program, a variety of technical training courses, professional consulting services and OEM programs. These services are designed to help you get up to speed quickly – and keep you up-to-date with new developments to help you use our products as effectively as possible.

CTC Product Support Program (PSP)

The easiest way to keep your applications up-to-date is by joining the CTC Product Support Program, a service available to all CTC software users. For a small annual registration fee, members are entitled to a wide variety of benefits.

- ◆ Free software upgrades and utilities
- ◆ Free copies of newly-released device drivers
- ◆ Discounts on technical training
- ◆ Password to CTC's Internet site containing technical information, upgrades and utilities

And much more! CTC is continually adding new benefits that make your continued PSP membership even more valuable.

Training Programs

CTC is dedicated to providing its customers with the latest, most advanced information available, and we want to ensure that you get up to speed as quickly as possible to apply our technologies to your applications.

That's why we have instituted a full range of courses at our training facility. Courses are taught by a professional staff, and class sizes are limited to ensure individualized instruction and abundant hands-on experience.

Complete technical training is available at CTC's training facility, at regional locations across the U.S., or at a customer site. Regularly scheduled courses are available at CTC's training facility; classes can also be customized for specific needs. For more details about CTC's technical training, contact CTC for class dates or check CTC's web site at www.ctcusa.com.

Application Engineering

CTC's Application Engineering department is always working to develop new ways to help our customers get the widest range of functionality from our products.

For instance, our Application Engineers can help you develop new applications, write programs for MachineLogic, or even convert existing applications to Interact. They can also develop customers' Interact modules or drivers, and install/configure Interact or other network and dynamic data exchange software packages. CTC's Application Engineering department has already helped customers:

- Convert existing HMI applications to Interact/MachineShop
 - Develop custom drivers
 - Convert from existing PLC ladder logic to MachineLogic
 - Make software applications more appealing for demo or trade show machines
-

Pioneers in Factory Floor Automation Since 1980

Since 1980, CTC has been a pioneer in providing the automation industry with innovative Human-to-Machine Interface (HMI) solutions for the plant floor that offer machine builders “The Shortest Distance Between Man and Machine”.

In 1998, the company became an operating unit of Parker Hannifin Corporation. As part of the Parker organization, CTC has the resources to make an even stronger commitment to meet emerging trends on the factory floor with product solutions.

Building Hardware and Software Solutions as Your Single Source

Automation users today need a company that can provide both hardware and software products and bundle them together as a single solution. Not only can CTC provide this bundled solution, but because the hardware and software are designed and tested under the same roof, CTC's engineering team can optimize them to yield the best possible system performance. A single source supplier for PC-based machine control/HMI hardware and software also benefits the machine builder by simplifying integration, support, and training efforts.

CTC bundles PowerStation hardware and Interact HMI software together, and it also now integrates MachineLogic PC-based control. CTC is truly a single source for PC-based machine control/HMI solutions.



Parker Hannifin Corporation
Automation Group - CTC
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The Shortest Distance Between Man and Machine