INTRODUCTION AND OVERVIEW
Section 1

The Enhanced Micro TDC 3000 Control System is an extremely compact, yet fully functional control system in the Honeywell TDC 3000^X family. Figure 1-1 is an illustration of the basic Enhanced Micro TDC 3000 Control System. This control system communicates to the process via the Honeywell Universal Control Network (UCN). The process can be monitored and controlled by Program Manager or Advanced Process Manager.

This manual describes the Enhanced Micro TDC 3000 system. The system comes in two models. The model numbers are:

Model Number	Hardware Components
MX-DTAB01	K2LCN, 1 US, w/APM, 4MW AM, 875 MB HM.
MX-DTAC01	K2LCN, 1 US, w/APM, 8MW AM, 875 MB HM.

The Enhanced Micro TDC 3000 models have the following characteristics and features:

- Only "version A" models (with 1 US node) are offered as the base system. The old"version B" models (with 2 US nodes) are no longer offered as a base system (the old"version B" models are equivalent to a "version A" model, plus an optional US node).
- All nodes are equipped with K2LCN processors.
- The base models will include an Advanced Process Manager (APM) as standard equipment.
- The minimum AM processor memory is 4 MW (the base system models are offered with AM nodes in two memory sizes — either 4 MW or 8 MW).
- The US included with the base system has 6 MW processor memory and supports *'Universal'* personality.
- The US node in the base system is equipped with dual 150 MB Bernoulli cartridge 'multi-drives'. The new 'multi-drives' are compatible with 35 MB
- The HM included in the base system has a 875 MB hard drive and 3 MW processor memory.
- The NIM included in the base system has 3 MW processor memory.
- The US monitor and printer are <u>not</u> included with the "R500-Ready" Enhanced Micro TDC 3000 models. These two peripherals have their own model numbers and must be ordered separately. The operator's keyboard, however, is included with the base system model.
- The Enhanced Micro TDC 3000 models will not support U^{X}S or A^{X}M. There are currently no plans to provide U^{X}S or A^{X}M options with the system.

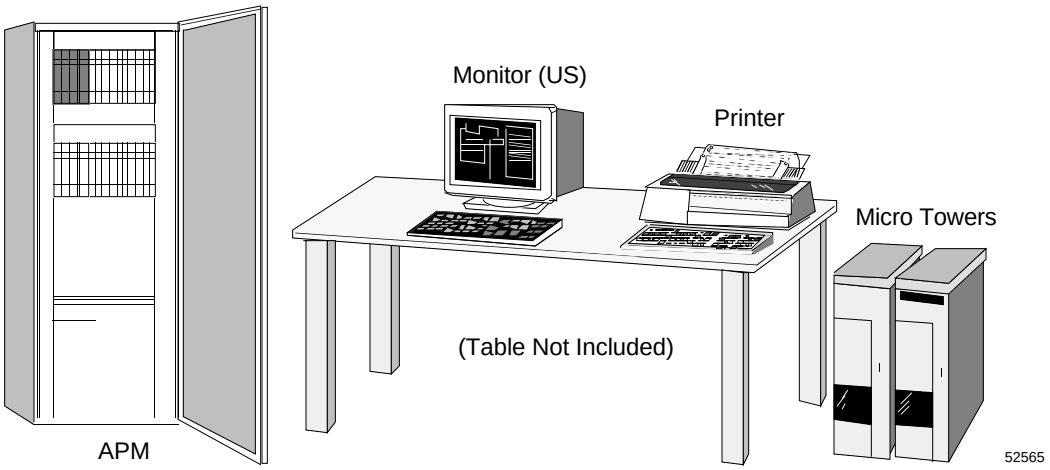


Figure 1-1 — Enhanced Micro TDC 3000 Control System

1.1 GENERAL DESCRIPTION

The Enhanced Micro TDC 3000 Control System consists of two cabinets (also called "towers") which together contain the electronics, two cartridge disk drives, and a history module. The cabinet electronics support up to four color monitors, four keyboards, and optional touchscreens or trackballs. A printer is also connected to the system.

Two electronics modules, one housed in each tower, provide all of the electronics for the Enhanced Micro TDC 3000 Control System (excluding peripherals). These modules, called Multinode Modules, are each capable of holding four TDC 3000 Nodes.

Although the Advanced Process Manager (APM) is part of the Enhanced Micro TDC 3000 Control System, it is not described in this manual. See subsection 1.5 for a list of publications that discuss the Advanced Process Manager and the Universal Control Network (UCN).

Figure 1-2 is a representation of some of the nodes used to construct a sample Enhanced Micro TDC 3000 Control System.

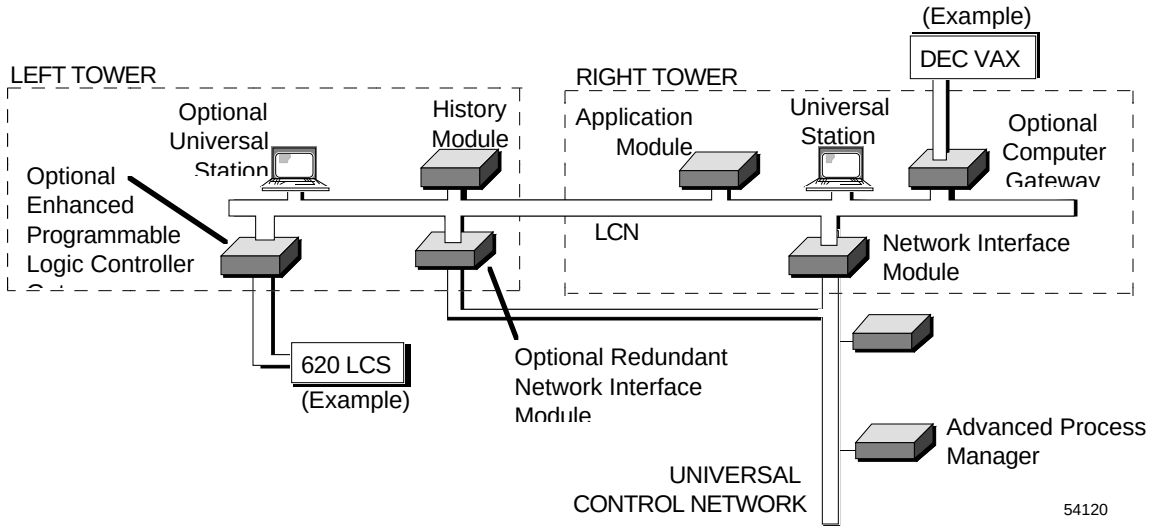


Figure 1-2 — Typical Enhanced Micro TDC 3000 Control System

1.1.1 Basic Enhanced Micro TDC 3000 Systems

The Enhanced Micro TDC 3000 Control System is furnished with one basic version. This is the single US Micro TDC 3000.

The base version consists of two 4-node towers, an operator's keyboard, an engineer's keyboard, a color monitor and printer (ordered seperately), and the Advanced Process Manager. Four nodes are contained within the two towers:

1. **US—UNIVERSAL STATION** A window to the process—allows all information supplied from process-connected devices, instrumentation subsystems, and computers to be seen and used. The color monitor, two keyboards, an optional touchscreen or trackball, two cartridge disk drives, and the ASPI-41 printer are integral parts of the Universal Station.

2. **AM—APPLICATION MODULE** Performs calculations and control strategies that are not possible or practical using only process-connected devices. The Application Module has 4 or 8 megawords of memory.

3. **NIM—NETWORK INTERFACE MODULE** Connects the Enhanced Micro TDC 3000 Control System to a process controller, generally to a Advanced Process Manager.

4. **HM—HISTORY MODULE** Provides mass storage of software, system data, and customer/user data.

1.1.2 Options to the System

Monitors, touchscreens or trackballs, and printers are options to all the Universal Stations in all versions of systems. A touchscreen or trackball allows you to "point" to areas on the graphic display and select operations to be performed. Without either of these options, you must use directional keys (arrows) on the keyboards to navigate across the screen.

Up to four additional nodes, making a total of eight nodes, may be added to basic Enhanced Micro TDC 3000 Control System. Choose from the following:

1. **NIM—REDUNDANT NETWORK INTERFACE MODULE** Provides a second path to the process controller in the event of an electrical failure.

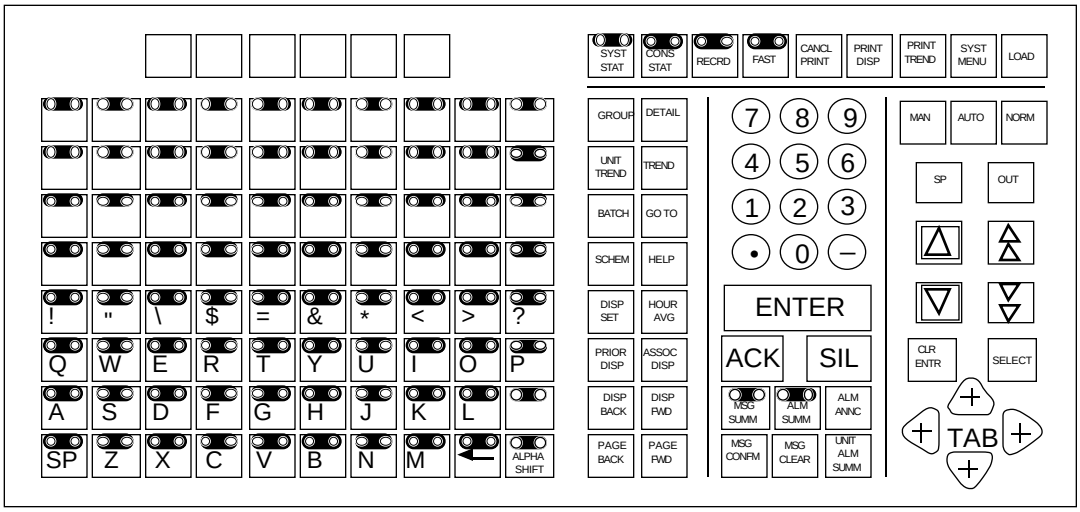
2. **US—UNIVERSAL STATION** (4Mw and 6Mw) Provides a window to the process.

3. **EPLCG—ENHANCED PROGRAMMABLE LOGIC CONTROLLER GATEWAY** Provides a path to one or more Programmable Logic Controllers.

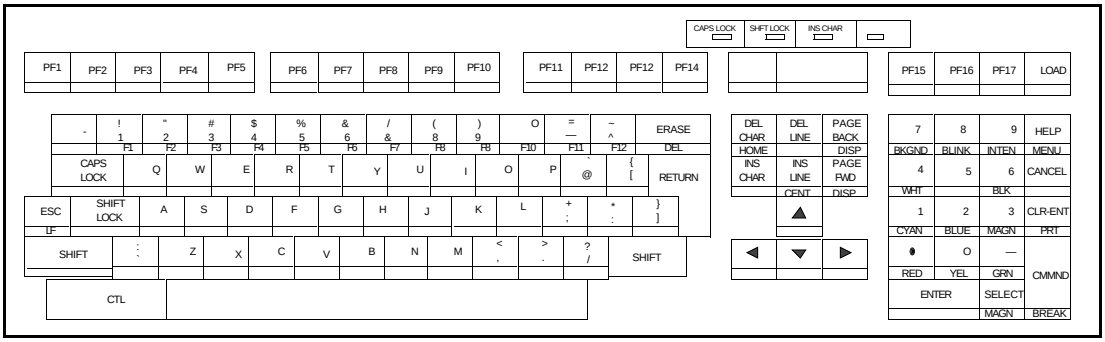
4. **PLNM—PLANT NETWORK MODULE** Provides the hardware and software to link the LCN to the VAX interfaces.

5. **CG—COMPUTER GATEWAY** Provides a path to a host computer.

6. **NG—NETWORK GATEWAY** Provides a path to an alternate network for an integrated plant solution (single and dual cable).



Qwerty Operator's Keyboard



Engineer's Keyboard

Figure 1-3 — Enhanced Micro TDC 3000 Keyboards

5891

1.1.3 The Operator's Keyboard

The Operator's Keyboard (Figure 1-3) is a flat, chemically resistant, membrane keyboard installed in a metal frame, placeable by the operator, and connected to the keyboard connector on the transition panel. A three-function annunciator horn is built into these keyboards.

Unmarked keys on the left side of the operator's keyboard may be configured by the user (or, perhaps, be preconfigured at the factory). An insert sheet is available that is placed between the outside protective membrane and the keyboard electronics. To replace or install a new insert, remove the two corner screws beneath the metal frame. Lift the frame from the keyboard assembly, grasp the plastic insert using the thumb-slot at the top of the keyboard and remove it. Replace it with the new insert. Reassemble the keyboard and frame, then install and tighten the two corner screws.

Additional operator's keyboards are supplied with optional Universal Stations.

1.1.4 The Engineer's Keyboard

At least one engineer's keyboard (Figure 1-3), similar in design to a personal computer keyboard, will be connected to the system. The engineer's keyboard is especially designed so that it may be disconnected and/or reconnected while the system is in operation. This way, the keyboard may be removed when an engineer wishes to deny operator access to special engineering functions, or the engineer may carry "his" keyboard to any operating system.

To connect this keyboard, insert the plug on its cable into the small connector located on the side of the operator's keyboard. Note that the plug will only fit one way.

An engineer's keyboard is optionally available, but not supplied with, the optional second, third, or fourth Universal Station.

1.1.5 The Local Control Networks

All the nodes in both towers communicate with each other through the TPLCN (Twisted Pair Local Control Network) data communications network, using the RS-485 communications interface standard. This network is similar to the LCN (Local Control Network) used in other TDC 3000^X equipment, but the noncoaxial RS-485 (twisted pair) network has been chosen here because of its simplicity and the short physical distances between nodes.

High-speed serial data is passed between nodes at 5 megabits per second (mega = million) and follows a token-passing protocol. This protocol is identical to that used on the LCN.

There is a user-installed kit that connects the base Enhanced Micro TDC 3000 to a standard LCN system. The kit includes an LCN cabinet that accommodates 4 or 6 empty chassis; a fan module, power supply, and I/O card for each chassis; Winchester Disk Adapter (WDA) Module; and History Module. Refer to subsection 2.9 for additional information on the LCN upgrade.

1.2 OPERATING PRACTICES AND HOUSEKEEPING

Listed here are some do's and don'ts pertaining to operating practices and general housekeeping that should be followed during startup and normal everyday operations.

1.2.1 Before Startup

1. Thoroughly clean all operating areas, subfloor areas, cable raceways, heating and air-conditioning ducts, and plenums.

2. Make sure that all control-room windows are sealed.

3. Place impregnated mats at each entrance to a control area to prevent dirt and dust from being tracked in.

4. Provide a coat rack and/or closet outside the operating area for removal of any outer clothing made of nylon or other synthetic fabrics, except where flame-retardant uniforms are mandatory at all times.

5. Make sure that the furniture and carpets are not made of materials that can combine with clothing to create static electricity.

6. Prepare a regular cleaning schedule for specific area requirements and for cleaning of consoles, cabinets, and peripheral devices where necessary. (Caution: Do not attempt to clean the printed-wiring boards themselves.)

7. Establish a "no-smoking" rule in the operating area. Smoke and other fine dust particles can damage cartridge disks and drives.

8. When swapping or handling printed-circuit cards, use a static-control device, such as a wrist strap; see *Circuit Card Handling*, subsection 1.3 of this manual.

1.2.2 After Startup

1. Continue your "no-smoking" rule in the operating area. Smoke and fine dust particles can damage cartridge disks and drives.

2. Maintain humidity levels (ideally) between 40 and 60% (lower humidity may cause static-discharge problems).

3. Control humidity fluctuations to a rate-of-change less than 6% per hour.

4. Do not defeat temperature and humidity controls by opening doors and windows (for example, to enhance operator comfort).

5. Keep traffic in the control-room operating areas to a minimum. Restrict access to authorized personnel, whose duties require control room entry.

6. Review procedures for extinguishing electrical fires and establish fire-fighting procedures. Refer to a qualified fire-fighting systems contractor for assistance.

7. Plant personnel frequently use hand-held radios ("walkie-talkies"), or citizens-band radios mounted in maintenance vehicles, for communications. To avoid RFI problems, review the following:

    - If radio communications must take place within an operating area or process controller area, a base-station transceiver with an external antenna should be used.

    - For other applications, radio transmitters with outputs rated as high as 5 watts must be kept at least 3 meters (10 ft.) from the Enhanced Micro TDC 3000 equipment during operation. Transmitters with outputs higher than 5 watts must be kept as far as possible from your equipment. Keep equipment doors closed while operating.

    Other sources of RFI include generators, arcing relays, or motor contacts, etc.

8. Follow proper cleaning procedures when cleaning the operator area or the control room:

    - Do not use water freely. Mop should be only dampened, not wet or dry.

    - Use a lint-free, antistatic-type dust cloth to remove dust.

    - Do not sweep around areas containing cartridge disks or drives.

    - Use a vacuum cleaner on carpets—preferably one connected to an external system.

    - Do not allow liquids to be placed on the Enhanced Micro TDC 3000 keyboards and equipment. Liquid spills will damage electronic components.

9. Clean the cartridge disk drive as outlined in the *Universal Station Service* manual in the *LCN Service - 1* binder to prevent errors and loss of data when loading programs.

10. Regularly clean the CRT face to minimize operator fatigue. Cleaning procedures are found in *Universal Station Service* manual in the *LCN Service - 1* binder.

11. Clean the printer before startup and periodically thereafter, as described in the *Universal Station Service* manual in the *LCN Service - 1* binder.

12. Periodically clean the operator and engineer keyboards by dampening a cloth with mild detergent and wiping the keys. Do not spray detergent solution on the keys as moisture may ruin the circuits underneath.

13. Periodically check and clean or replace the air filters in each cabinet. Refer to subsection 6.3.1 of this manual for filter removal and cleaning procedures.

1.3 CIRCUIT CARD HANDLING

The circuit cards or Printed Wire Boards (PWBs) are adequately protected from damage caused by Electrostatic Discharge (ESD) only while installed in the system module, or packed inside the conductive plastic bag in which they are shipped. To avoid ESD damage when the card is handled outside its enclosure, to guard against electrical overstress, and to maintain personnel safety, the following practices and procedures must be followed:

- Turn off power to the module before removing or inserting the card.
- Handle the card only by its edges. Do not touch the printed wire board runs, connectors, or components unless you are wearing a grounded wrist-strap and the card is on a conductive work-surface.
- When applying power to the system before installation is complete, terminate all loose wires within the cabinet or console. Make sure power is off when doing any wiring work.
- ESD-generating materials, such as plastic, rubber, nylon, polyester, vinyl, silk, or synthetic materials or garments, should not be allowed in the area of the cards. If you are wearing clothing of such material, you must stand on a grounded floor-mat while wearing a grounded shoe-strap, or you must wear a grounded wrist-strap while handling cards. Note: take special care to always keep the cards away from such material because static charges cannot be drained off, except by discharge.
- Do not carry unprotected cards across carpeting, unless it is grounded conductive carpet such as conventional fiber with woven-in ground wires. Always keep the circuit card in its protective bag until it is actually needed.
- All test equipment and tools must be connected to the metal chassis or module frame with a ground wire, before touching the card or internal wiring.
- Cards must be handled and transported to and from the job site in their protective bags (see approved material list).
- Personnel must wear an approved wrist-strap connected to the chassis before removing the card from its protective bag or card slot.
- When shipping a suspected defective card, pack it in its protective bag before placing it in the shipping carton. Note that cards must be protected against further damage so that failure analysis can be accomplished.
- Do not use standard Bubble Pack mailers.
- Do not allow unprotected cards to come in contact with Styrofoam packing material.

For additional ESD information, refer to the *LCN Planning* manual in the *System Site Planning - 1* binder.

1.4 CARTRIDGE DISK HANDLING AND STORAGE

Upon receipt of cartridge disks, inspect them for signs of shipping damage. Allow at least one hour for temperature adjustment to the computer-room environment before using.

Recommended storage is on shelves in the computer or control room.

Although the cartridge protects the disk from most accidental damage, the following cartridge handling rules should be observed:

- Do not try to open the cartridge when it is outside the drive.
- Do not insert objects into the cartridge or drive.
- Remove the cartridge from the drive after use and store in its protective jacket.
- Do not expose the cartridge to direct sunlight or moisture.
- Do not expose the cartridge to magnetic fields greater than 30 oersteds.
- Protect the cartridge from dirt, spills, and harsh environments.
- Avoid handling the front edge of the cartridge, since oils can be transferred from the hands to the cartridge disk.

1.4.1 Cartridge Loading and Removal

1. Drive power must be on before the cartridge can be inserted. If power to the drive is off, the latch pin in the drive will prevent cartridge insertion.

2. The cartridge is inserted into the drive shutter first. The cartridge edge containing the shutter faces toward the stop button on the front of the drive (see Figure 1-4). Interlocks in the system prevent improper cartridge insertion.

CAUTION

If the cartridge is difficult to insert, check its orientation and try again. Do not force the cartridge into the drive. Objects inserted into the cartridge opening in the front of the drive may cause damage to the drive. Such action will void the manufacturer's warranty.

3. After loading a cartridge, the green indicator on the front of the drive, next to the stop button, blinks as the motor is coming up to speed. When the indicator stops blinking and stays lit, the drive is READY (see Figure 1-4).

NOTE

The yellow LED flashes briefly as the drive reads initialization information from the disk. If the drive fails to initialize correctly, an error condition exists. If this occurs, reinsert the cartridge to ensure proper seating. If this does not correct the problem, the media may require reformatting or the drive may require service (see Figure 1-4).

4. To remove the cartridge, push the stop button. The green LED then begins to blink as the motor spins down. When the motor has stopped, the green LED turns off and the latch pin disengages. The cartridge can now be removed (see Figure 1-4).

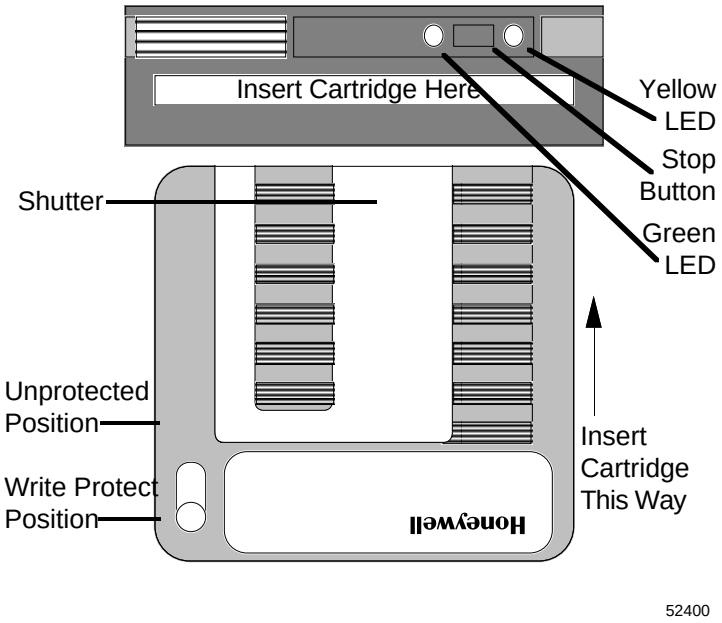


Figure 1-4 — Cartridge Drive and Disk

1.4.2 Cartridge Media Protection

To protect stored media (programs and data) on a cartridge from being accidentally erased, you must move the protect switch (lower left in Figure 1-4) to the write protect position.

CAUTION

DON'T attempt to move the protect switch on the cartridge while the cartridge is installed in the drive.

If the protect switch is moved to the unprotected position, the cartridge is free to be written on by the Enhanced Micro TDC 3000 system—data and programs may be lost.

1.5 EMC DIRECTIVE

The Enhanced Micro TDC 3000 system is being brought into compliance with European guidelines for ElectroMagnetic Compatibility (EMC). The European EMC directive (89/366/EEC) requires that an electronics product operate reliably in its intended EMC environment. It also requires that the product not detrimentally affect other products operating in their own environment.

Eventually the Enhanced Micro TDC 3000 hardware will display a product certification label to indicate the hardware is in compliance. This label is placed inside, at the bottom front of the tower. As shown in Figure 1-5, a "CE" logo on the product label indicates the product is in compliance with the European EMC directive along with other descriptive information about the product.

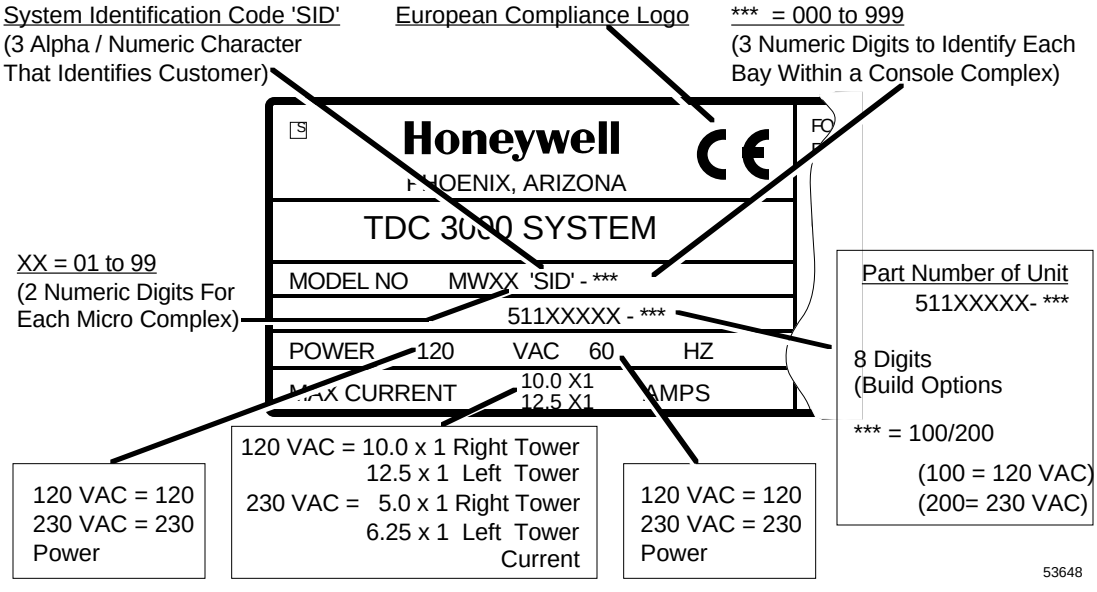


Figure 1-5 — Product Certification Label

1.6 RELATED PUBLICATIONS

The following publications apply to the Enhanced Micro TDC 3000 system and should be referred to as required and available:

Title	Binder
8 Node Enhanced Micro TDC 3000 Specification and Technical Data	System Summary - 2
8 Node Enhanced Micro TDC 3000 User's Manual [this pub]	Implementation/8-Node Enhanced Micro TDC 3000
8 Node Multinode Module Service	Implementation/8-Node Enhanced Micro TDC 3000
History Module Service	LCN Service - 2
System Maintenance Guide	LCN Service - 1
Test System Executive	LCN Service - 3
Hardware Verification Test System	LCN Service - 3
Core Module Test System	LCN Service - 3
Maintenance Test Operations	LCN Service - 1
Process Operations Manual	Operation/Process Operations
Universal Control Network Planning	System Site Planning - 1
Universal Control Network Installation	Installation/Universal Control Network
Universal Control Network Guidelines	Installation/Universal Control Network
Universal Control Network Specification and Technical Data	System Summary - 2
PM and APM Planning	System Site Planning - 1
Process Manager/Advanced Process Manager Installation	Implementation/PM/APM
Process Manager/Advanced Process Manager Implementation Guidelines	Implementation/Advanced Process Manager - 1
Process Manager/Advanced Process Manager Checkout	Implementation/PM/APM
Process Manager/Advanced Process Manager Service	PM/APM/HPM Service -1
Process Manager Module Test System (PMMTS)	PM/APM/HPM Service -2
Process Manager Test System (PMTS)	PM/APM/HPM Service -2
Process Manager Test Executive (PMEX)	PM/APM/HPM Service -2

Title	Binder
Enhanced Programmable Logic Controller Gateway Planning, Installation, and Service	Implementation/EPLC Gateway
Enhanced Programmable Logic Controller Gateway Specification and Technical Data	System Summary - 2
Enhanced Programmable Logic Controller Gateway Control Functions	ImplementationE/PLC Gateway
Enhanced Programmable Logic Controller Gateway Parameter Reference Dictionary	Implementation/EPLC Gateway
Enhanced Programmable Logic Controller Gateway Forms	Implementation/EPLC Gateway
MTX-MTLU11 Upgrade Kit Installation Instructions	Not Applicable
MTX-MTLU12 Upgrade Kit Installation Instructions	Not Applicable
MTX-MTLU13 Upgrade Kit Installation Instructions	Not Applicable
MTX-MTLU14 Upgrade Kit Installation Instructions	Not Applicable