

## SYSTEM OVERVIEW

The Telesis® TMP7000/470 PINSTAMP® marking system permanently prints messages into materials such as steel, aluminum, and plastic.

A hardened pin is pneumatically accelerated to indent dot matrix characters into the item being marked.

The shape, size, density, and location of characters are determined by the user through the system software.

The marking head moves the pin cartridge through X- and Y-axis motions to reach the correct position for each dot of the characters to be marked.

The system software controls pin extension and retraction to mark the message.

The system is compliant with UL, CSA, CE, and RoHS specifications.

**TMP7000 Marking Head.** The TMP7000 marking head includes the mechanical motion components to position the marking pin at precise X/Y positions and the pneumatic components to drive the marking pin from and return the pin to the pin cartridge.

The TMP7000 marking head is an X/Y-traversing mechanism. Using two stepper motor drives, it positions the pin at coordinate-defined locations in marking window within .001 in (.025 mm).

The TMP7000 accommodates the positioning of the marking pin through a system of rigid rails and ball bearing saddles, timing belts, and direct-drive, toothed pulleys.

The floating pin design permits high-quality, consistent marks on irregular, slightly curved surfaces. It also accommodates applications where marking surfaces cannot be positioned at a consistent distance from the marker.

**Marker Cable.** The marker cable connects the marker to the controller. The highly flexible cable is 13 ft (4 m). Optional extension cables are available for greater distances.

**Marking Pin.** The marking pin for the TMP7000 can be selected from the 150-series. The 150-pin is available in various cone angles and can be constructed from powdered metal or tool steel with a carbide tip. Refer to the marking head installation drawing for pin stroke dimensions.

**Filter/Regulator Unit.** The filter/regulator unit includes two regulators with pressure gauges to control the drive air and return air.

The first regulator contains a filter to help remove contaminants from the supply air.

Two air lines connect the regulated air to the marking head. Drive air fires the impact pin; return air pushes it back into the cartridge. The standard air lines are 13 ft (4 m) and are made of 6 mm tubing.

# TMP7000/470 Marking System

---

**TMC470 Controller.** The TMC470 controller provides a text-only operator interface and allows full operational control of the TMP7000 marking head. It contains an integrated keyboard with an LCD display. The back panel provides the electrical interface for connecting to optional remote I/O sources. Refer to *TMC470 Controller Specifications* for details.

## SYSTEM OPTIONS

- Tool Post Assembly
- Marking Head Extension Cables
- Auxiliary Axis Driver Board Kit
- Motorized Z-Axis Tool Post with Programmable Travel
- Motorized Theta-Axis with Programmable Rotary Drive Unit
- TMC470 Controller Wall-Mounting Bracket Kit
- TMC470 Controller Panel-Mounting Bezel/Bracket Kit
- TMC470N NEMA® Enclosure
- Bar Code Scanner or Bar Code Wand with Cable
- Foot Switch (Start Print) or Pushbutton Station (Start/Abort)
- Backup Utility Software
- Upgrade Utility Software
- Logo/Font Generator Software

## SYSTEM SETUP

When designing a fixture, allow for 3-axis adjustment to aid in horizontal, vertical, and lateral alignment of the marking head.

**Note:** Telesis recommends mounting the marking head with the pin pointed downward to help prevent debris from falling into the marking head cavity.

### CAUTION

**Mounting bolts must not extend more than 3/8 in (10 mm) into the marking head.**

1. Secure the marking head to the optional tool post assembly (or other suitable fixture) using a minimum of four M8-1.25 mounting bolts.
2. Mount the filter/regulator assembly within 12 ft (3.6 m) of the marker.
3. Connect the drive air and return air lines from the filter/regulator assembly to the marking head.
4. Connect the supply air to the input port on the filter/regulator assembly.

### CAUTION

**The TMC470 is not a sealed unit. Protect it from potentially damaging conditions and contaminants. Do not block the vents in the bottom of the case. Ensure the marking system is electrically isolated from any devices that might generate extreme electromagnetic interference (EMI).**

5. Locate the controller as close as practical to the marking head. Standard marker cable length is 13 ft (4 m).
6. Install the controller as a tabletop, wall-mounted, panel-mounted, or enclosure-mounted unit.
7. Ensure the controller power switch is **OFF**.
8. Connect the marker cable to the marking head.
9. Connect the marker cable to the controller.
10. Connect the power cable to the controller.
11. Position the controller power switch to **ON**.
12. Adjust the pin stroke, drive air, and return air for impact depth.

## TMP7000 MARKING HEAD

### Specifications

The TMP7000 marking head specifications are subject to change without prior notice.

Dimensions.....	see <i>TMP7000 Mounting Drawing</i>
Weight .....	22 lb (10 kg)
Noise .....	94.4 dB (max); 83.2 dB (LEQ) See <i>Marking Noise</i> for details
Operating Temperature....	32° to 122° F (0° to 50° C), non-condensing
Air Supply.....	Clean and dry, 40 to 100 psi (2.8 to 6.9 bar)
Air Consumption.....	0.04 SCFM (idle) 0.60 SCFM (marking)
Marking Area .....	6.0 x 4.0 in (150 x 100 mm)
Number of Impact Pins.....	1
Pin Types.....	150-series
Pin Material.....	Powdered metal or tool steel with carbide tip

### Marking Characteristics

The TMP7000 can produce characters as small as .06 in (1.5 mm), printed at any angle within the 6.0 x 4.0 in (150 x 100 mm) X/Y marking window. Character strings can be marked at any angle (0° to 359° rotation) in 1° increments.

The system can also print arcs, arc text, geometric objects, and 2D matrix symbols.

Printing resolution can be selected from 10 dots/in (4 dots/cm) to 200 dots/in (79 dots/cm) for an engraved look.

### Pin Life

Pin life depends largely on the type of material being marked, how hard or abrasive it is, and the required marking depth. On typical metals with a hardness of Rockwell Rb47, marking at a depth of .127 mm (.005 in), powdered steel pins average about 3 million impressions before needing sharpened; carbide pins average about 9 million impressions.

### Marking Speeds

Marking speeds vary depending on character size, drive air pressure, dot density, pin stroke, and pin type.

Increased character size, increased dot density, increased pin stroke, or decreased drive air pressure result in decreased marking speeds.

Using a carbide pin might increase marking time by as much as 25 percent due to the increased weight of the pin. Specific times and speeds can be verified by a Telesis representative.

### Marking Depth

The depth of mark can be adjusted by adjusting the pin stroke and the drive air pressure.

### Marking Noise

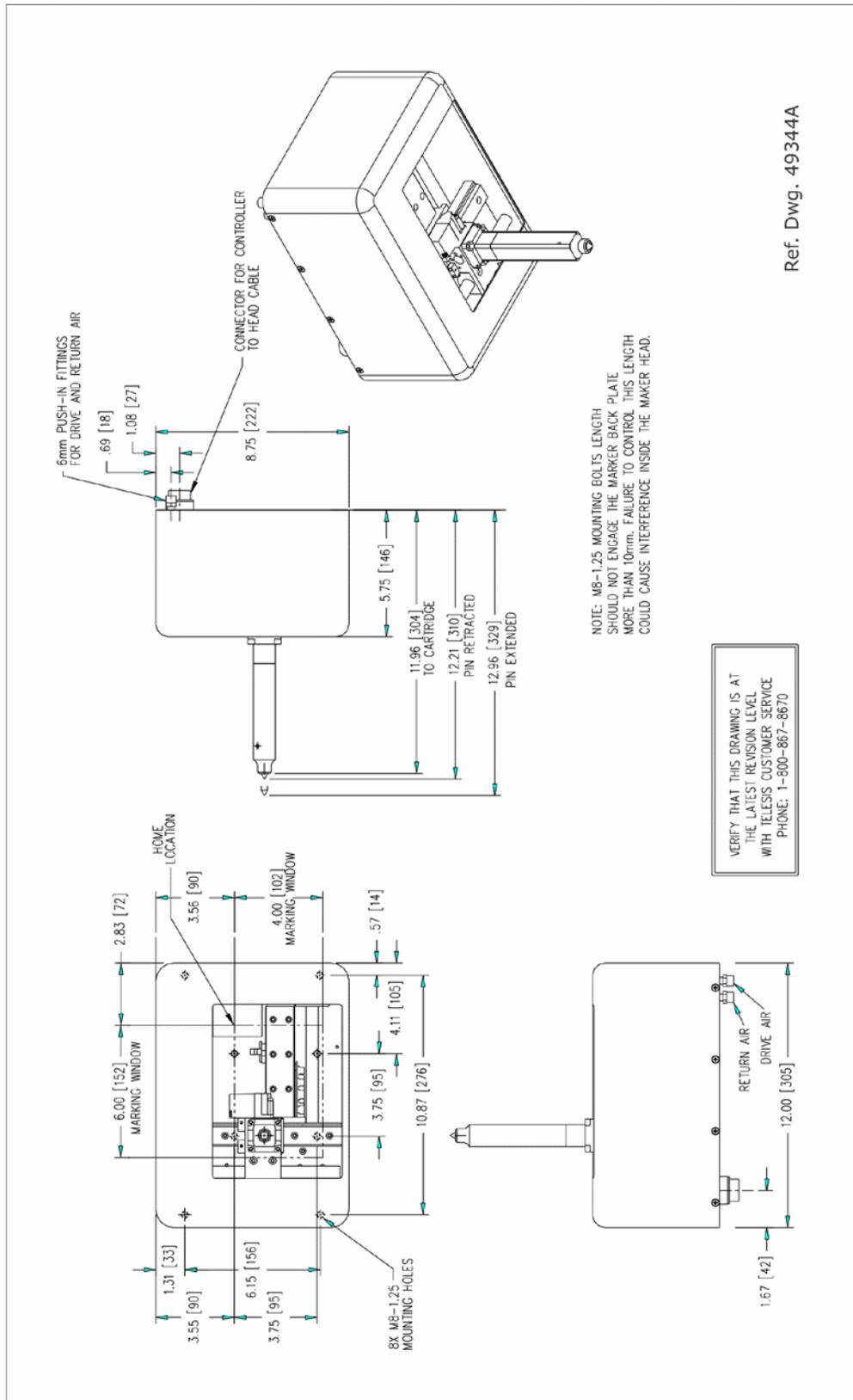
Sound pressure level tests were conducted on the TMP7000 Marking System using a Larson-Davis Model 710 sound pressure meter while dry firing the marker at a 50 percent duty cycle.

The maximum sound pressure level during the test cycle was measured at 94.4 dB. The time-weighted average (LEQ) using the 3 db rule without threshold was 83.2 dB. Typical applications average a 20-30% duty cycle where the time-weighted average would not exceed 78.8 dB(A).

The sound pressure level tests were conducted under controlled conditions imitating predicted normal operation. However, noise level is heavily dependent on the part being impacted. Conditions such as the material being marked, the rigidity of the work piece, machine settings, and ambient noise can vary during operational use. Such variables can alter the noise level.

Despite detailed guidance provided with each machine, variable operating conditions are beyond the control of Telesis. The responsibility of establishing safe working levels of use remains with end users. End users should conduct their own sound pressure level tests for their application while marking actual work pieces.

# TMP7000/470 Marking System



TMP7000 Dimensions and Mounting Details

## TMC470 CONTROLLER

The TMC470 controller can be installed as a tabletop, wall-mounted, panel-mounted, or enclosure-mounted unit. All configurations provide features and connectivity for external communications. Differences occur only in the mounting configuration.

### TMC470 Specifications

The TMC470 controller specifications are subject to change without notice.

Compliance.....	CE, RoHS
Configurations.....	Tabletop, wall-, panel-, or enclosure-mounted
Rating.....	NEMA 1 (I.P. 30), tabletop or wall-mounted NEMA 12 (I.P. 65), panel-mounted using appropriate customer-supplied panel NEMA 12 (I.P. 65), enclosure-mounted using Telesis-supplied TMC470N enclosure
Dimensions.....	refer to the <i>TMC470 Mounting Drawings</i>
Weight .....	3.69 lb (1.68 kg), controller only 3.90 lb (1.77 kg), with wall-mount kit 5.52 lb (2.51 kg), with panel-mount kit 28.1 lb (12.77 kg), with TMC470N enclosure
Operating Temperature ...	32° to 122° F (0° to 50°C)
Operating Humidity .....	10% to 80% non-condensing
Cooling.....	Internal, thermostatically controlled fan
Power Requirements .....	95 to 250 VAC, 2 amps, 50-60 Hz, single phase
Communications.....	TTL, Discrete I/O, RS232, RS485, TCP/IP, and USB (data backup & transfer)
Input Signals .....	Twelve (12) total, optically isolated: 8 dedicated, 1 programmable, 3 available 10 VDC (minimum voltage) 30 VDC (maximum voltage) 12 to 24 VDC (nominal voltage) 2.3 mA @ 12VDC; 4.9 mA @ 24 VDC (nominal current)
Output Signals .....	Six (6) total, optically isolated: 4 dedicated, 2 available 0.25 amps (maximum current) 0.50 ohms (maximum On resistance) 40 VDC (maximum line voltage) 12 to 24 VDC (nominal line voltage)

### Environmental Considerations

The following environmental considerations must be taken into account when installing the TMC470 controller.

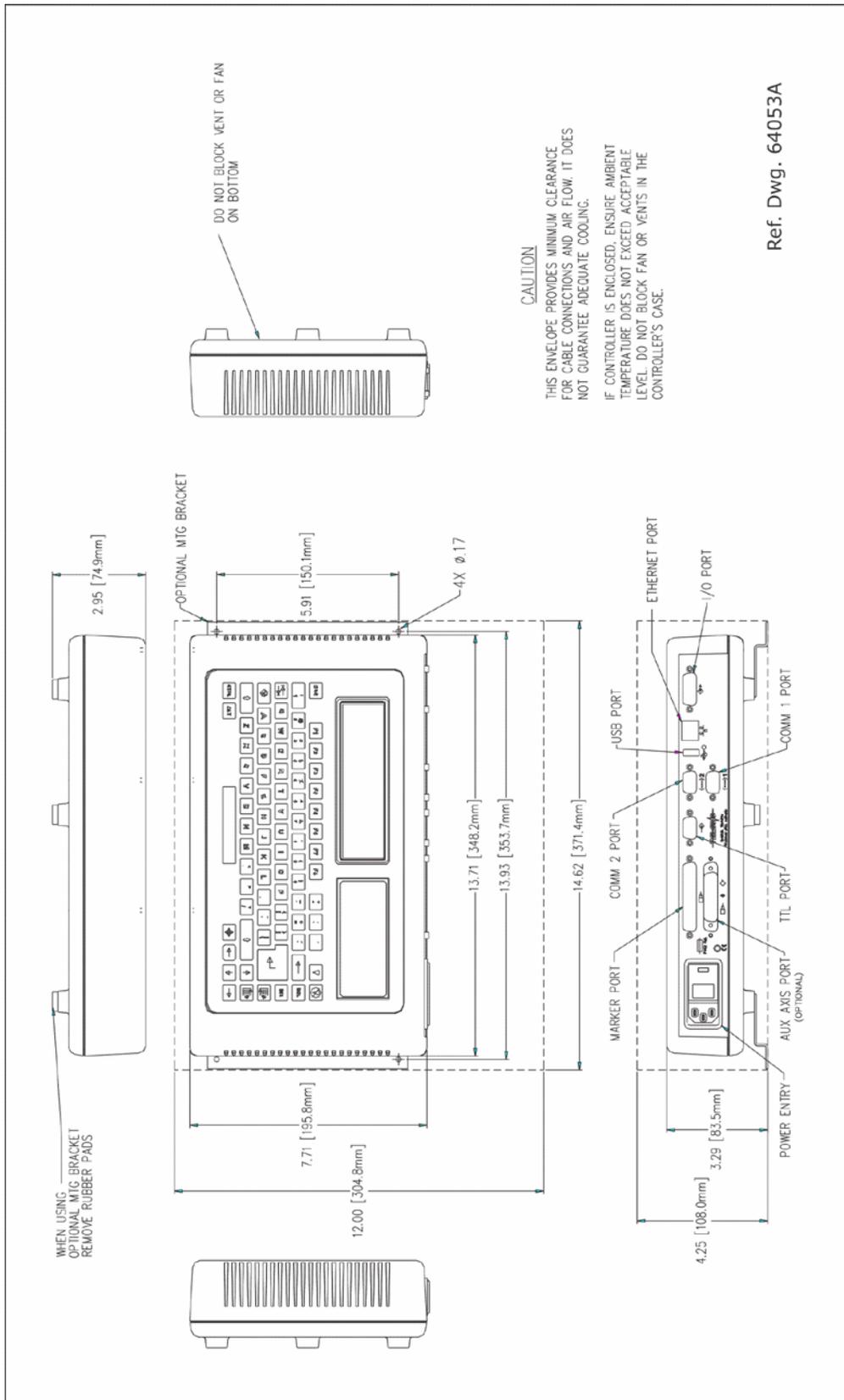
**Contaminants.** The vented TMC470 is rated NEMA 1 (IP30) and contains a thermostatically controlled, variable-speed fan.

In environments where solid or liquid contaminants are present, the contaminants can be drawn into the TMC470 controller and cause the equipment to fail.

For that reason, in these types of environments, the controller **must** be located in a sealed industrial enclosure. To facilitate such installations, Telesis offers an optional panel mounting kit for use with an appropriate customer-supplied panel or enclosure. Telesis also offers an optional TMC470N NEMA 12 (I.P. 65) enclosure in which the controller can be mounted.

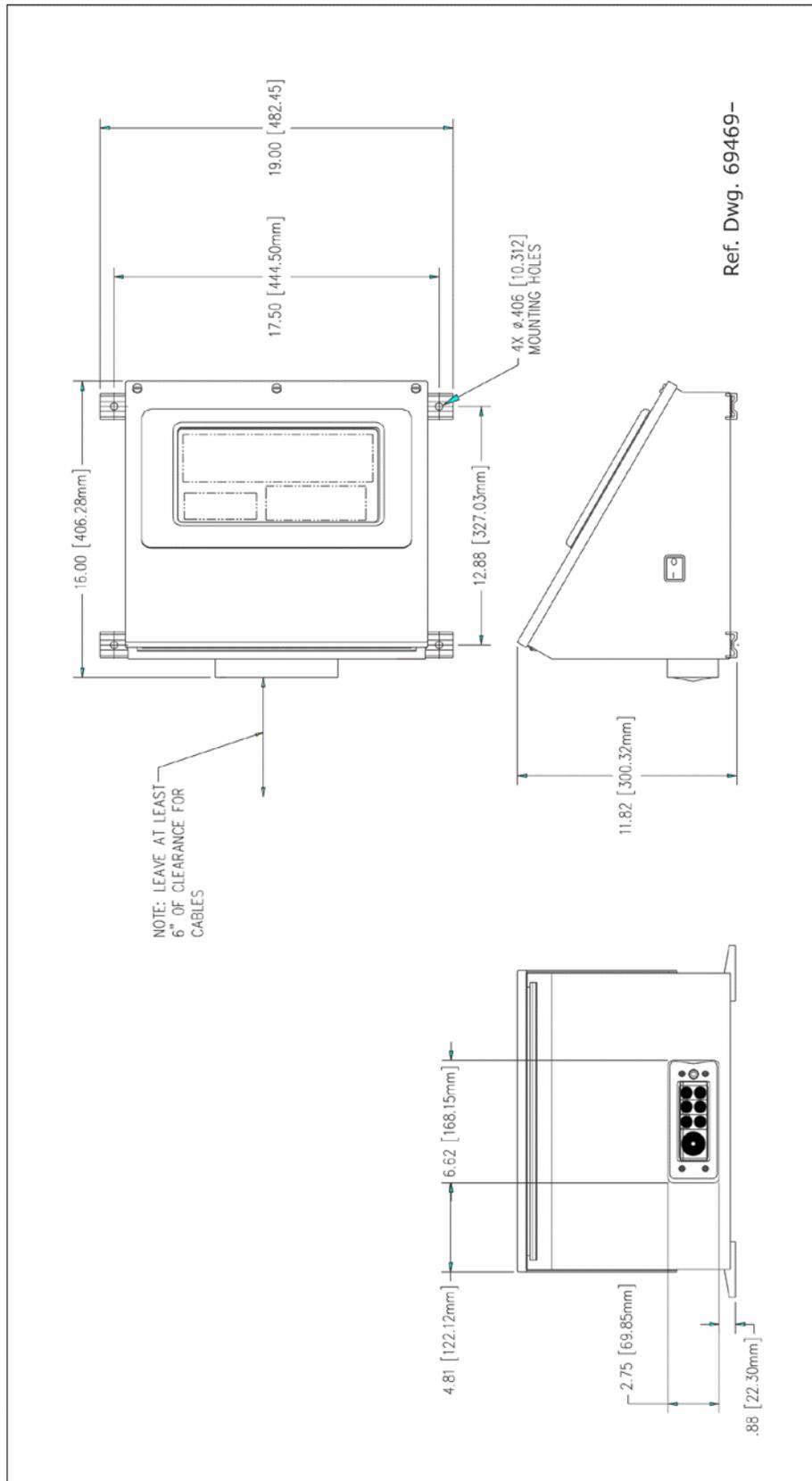
**EMI Susceptibility.** Although the system has been found to be in compliance with pertinent susceptibility standards, care should be taken when installing near welders and other extreme generators of electromagnetic interference (EMI). Particular care should be taken to ensure welder currents are not injected through the marking head chassis. The marking head chassis is connected to the electrical service earth ground through the marking head cable. The marking head should be electrically isolated from all surfaces which could become part of a welder current path.

# TMP7000/470 Marking System



TMC470 Controller Dimensions – Tabletop and Wall-Mounted Configurations





TMC470 Controller Dimensions – Enclosure-Mounted Configuration

## **TMC470-Based System Software**

The system software provides the user interface for the operator to control the marker and is permanently installed in the controller.

The software also provides a library for storing, loading, and editing user-defined patterns. *Patterns* are files stored in the controller's memory. Depending on the size of the pattern files, the controller can store up to 200 patterns.

Each pattern contains one or more fields; each field defines a single object.

Printable objects can be created to define text strings, arc-text strings, geometric shapes, graphics, and machine-readable data matrix symbols.

Non-printable objects can be defined for specific commands to the marker (for example, Pause, Go to, Input, or Output).

Printable text fields can include alphanumeric characters, symbols, and special message flags.

Message flags insert data, such as serial numbers, times, dates, and user-defined codes, into the text string.

## **Interface Panel**

The back panel of the controller provides ports for connecting the marker, host computers, logic controllers, optional accessories, and remote I/O devices.

**Serial Interface.** The Comm 1 and Comm 2 ports allow connection to remote serial devices such as a host computer or a bar code scanner. See *Host Communications* for details.

**Discrete I/O Interface.** The optically isolated I/O port allows you to connect a Programmable Logic Controller (PLC) or other DC I/O source for remotely controlling marker operations. See *Discrete I/O Controls* for details.

**TTL Interface.** The TTL port allows the system to connect with a simple contact closure circuit such as a remote push button station or foot pedal switch. These types of devices can remotely control Start Print and Stop Print operations.

**TCP/IP Interface.** The Ethernet port typically connects to a PC over a local area network (LAN). It allows you to define the controller as a client or a server socket using Telesis Extended Protocol. See *Host Communications* for details.

**USB Interface.** The USB port allows you to connect a memory stick/flash drive for pattern storage or retrieval and for software upgrades.

**Auxiliary Axis Interface (optional).** The Auxiliary Axis port allows the system to connect with up to four optional motion devices such as motorized tool posts, rotational drive units, and linear slides or actuators.

## **Discrete I/O Controls**

The TMC470 is configured for 12 VDC to 24 VDC I/O only and is provided to connect a PLC or other DC I/O source. The optically isolated I/O port allows you to remotely select and load patterns, start printing, stop printing, place the marker online, and monitor the system output signals. Cable connectors and connector pins are supplied with the controller for constructing appropriate interface cables.

**Input Signals.** Input signals provide the following controls:

INPUT COMM .....	For all inputs (+ or – supply)
START PRINT .....	Begins print cycle
STOP .....	Stops the print cycle
SEL_0 thru _6 * .....	Remotely selects & loads up to 127* pattern files
SPARE_1, 2, 3 .....	Three (3) spares for custom applications

\* The system software allows the SEL\_6 signal to be configured for remotely selecting patterns or for remotely placing the marker online. If used to place the marker online, pattern selection is reduced to a maximum of 63 patterns.

**Output Signals.** Output signals indicate the following states:

OUTPUT COMM .....	For all outputs (+ or – supply)
DONE .....	Print cycle is complete
READY .....	System is ready for message or for start print command
PAUSED .....	System is paused (waiting timeout or command)
NO FAULT .....	System status (normal or fault detected)
SPARE_1, 2 .....	Two (2) spares for custom applications

## Host Communications

The marking system software allows you to configure communication parameters to transmit data to and from a host computer.

To provide maximum integration flexibility, the system software supports RS-232 and RS-485 serial interfaces and Ethernet TCP/IP interfaces.

The system software also provides Programmable Protocol and Extended Protocol.

**RS-232 Interface.** The serial (RS-232) communications interface is most often used with remote devices such as host computers, terminals, or bar code scanners.

The Comm 1 RS-232 interface supports both Telesis Extended Protocol and Telesis Programmable Protocol.

The Comm 2 RS-232 interface supports only Telesis Programmable Protocol.

**RS-485 Interface.** The RS-485 interface is normally used for long transmission distances or multi-drop networks of up to 31 TMC470 controllers. **You must use Telesis Extended Protocol with the RS-485 interface.**

The serial data character format on all transmissions to and from the TMC470 controller is described as follows:

- Asynchronous
- 1200, 2400, 4800, 9600, 19200, 38400, or 115200 Baud
- 1 or 2 Stop Bits
- 7 or 8 Data Bits
- None, Even, or Odd Parity

**TCP/IP Interface.** The Ethernet (TCP/IP) interface is most often used with host computers communicating over a local area network (LAN). **You must use Telesis Extended Protocol with the TCP/IP interface.**

The Port parameter identifies the host computer socket that is assigned to the marking system. If more than one marking system is installed in a network configuration, each system must use a separate and unique port number.

The Address parameter identifies the IP address of the host computer. The marking system software supports both fixed addressing and dynamic addressing.

**Programmable Protocol.** Use this protocol where very simple one-way communications are required (such as with bar code scanners). Programmable Protocol provides no error checking or acknowledgment of the transmitted data. Note that XON/XOFF Protocol applies even when Programmable Protocol is selected.

**Starting Character** specifies where the software begins to count character positions. This number must be entered in decimal format (for example, "2" for ASCII Start of Text "STX").

**Terminating Character** identifies the end of transmitted string (usually "13" for the ASCII carriage return character).

**Character Position** counts from the starting character and ignores all characters preceding it.

**Character Length** accepts variable-length messages (if set to 0) or messages of a pre-specified, fixed number of characters.

**Ignore Character** identifies the character to ignore when sent from the host (usually "10" for the ASCII line feed character)).

**Message Type** allows message-type recognition, which defines how the marking system uses data it receives from the host.

- 1** Message type 1 overwrites the first line of the first text field with data extracted from the host
- P** Message type P loads a specific pattern identified by data extracted from host
- Q** Message type Q updates the text in the first query buffer with data extracted from the host
- V** Message type V updates the first variable text flag found in the pattern with data extracted from the host
- 0** Message type 0 (zero) indicates the host will provide the message type, field number (if applicable), line number (if applicable), and data; delegates message type selection to the host on a message-by-message basis. The host message must use the format:

**Tnn<string>**

where:

**T** 1, P, Q, or V indicates the message type.

**nn** Two-digit field number or query text buffer where data will be placed.

**Note:** Not used with Message Type P.

**<string>** For Message Type P, indicates the pattern name to be loaded. For Message Type 1, Q, or V, indicates the data to be inserted into the field or the query text buffer.

**Extended Protocol.** This protocol selection includes error checking and transmission acknowledgment. It should be used in applications where serial communication is a vital part of the marking operation. All communications are carried out in a parent/child relationship with the host being the parent. Only the host can initiate communications. If the host does not receive a response within three seconds, it should retransmit its original message. If no response is received after three tries, it should declare the link to be down.

The following describes the Extended Protocol message format as sent from the host to the TMC470 controller.

## SOH TYPE [##] STX [DATA] ETX BCC CR

where:

**SOH** ASCII Start of Header character (001H). The controller ignores all characters received prior to the SOH.

**TYPE** A single, printable ASCII character that defines the meaning (type) and content of the message downloaded from the host, where:

**1** overwrites a specific field in currently loaded pattern with data supplied in the host message. See [DATA] for details.

**C** clears the error from the screen.

**G** initiates a print cycle to mark the currently loaded pattern.

**I** requests the marker return the status of standard output and input signals. The system returns a hexadecimal code for the 6 output signals and 12 input signals in the following format:

**O O ; I I I**

where:

bit 1 READY 0x01

bit 2 DONE 0x02

bit 3 PAUSED 0x04

bit 4 NO\_FAULT 0x08

bit 5 SPARE\_1 0x10

bit 6 SPARE\_2 0x20

bit 1 START 0x001

bit 2 STOP 0x002

bit 3 SEL\_0 0x004

bit 4 SEL\_1 0x008

bit 5 SEL\_2 0x010

bit 6 SEL\_3 0x020

bit 7 SEL\_6 \* 0x040

bit 8 SEL\_4 0x080

bit 9 SEL\_5 0x100

bit 10 SPARE\_1 0x200

bit 11 SPARE\_2 0x400

bit 12 SPARE\_3 0x800

**Note:** Input SEL\_6 can be configured to place the machine online (default) or to remotely select a pattern.

**O** resets the marker and places it online.

**P** specifies the pattern name to be loaded for printing. See [DATA] for details.

**Q** updates a specific query buffer with data supplied in the host message. See [DATA] for details.

**S** requests the error status.

**V** updates the variable text in a specific text field of the currently loaded pattern with data supplied in the host message. See [DATA] for details.

**[##]** Optional two-digit ASCII number that specifies the Station ID of the controller when used in multi-drop network applications. The Station ID can range from 00-31. Note that "00" is reserved for applications where only one controller is used. In such applications, this field can be eliminated and "00" is assumed.

**STX** ASCII Start of Text Character (002H).

**[DATA]** Optional character string that may be required for certain message types (for example, Type 1, P, Q, and V).

Data is typically sent in the format:

**nn<string>**

where:

**nn** = two-digit field number or query text buffer where data will be placed.

**Note:** Not used with Message Type P.

**<string>** = For Message Type P, indicates the pattern name to be loaded. For Message Type 1, Q, or V, indicates the data to be inserted into the field or the query text buffer.

**ETX** ASCII end of text character (003H).

**BCC** Optional Block Check Code that is generated and sent to improve link reliability by providing fault detection. The BCC is calculated by taking an eight-bit addition of the TYPE and DATA TEXT characters and transmitting them as a three-digit ASCII decimal number in the range from 000 to 255. If the sum is greater than 255, the most significant bit overflows and is discarded.

**CR** ASCII Carriage Return Character (00DH).

## **TRADEMARKS**

**Telesis** and **PINSTAMP** are registered trademarks of Telesis Technologies, Inc. in the United States.

**NEMA** is the registered trademark and service mark of the National Electrical Manufacturers Association.