

## SYSTEM OVERVIEW

The Telesis® TMM5400/470 PINSTAMP® is a high-speed, multi-pin marking system that permanently prints messages into materials such as steel, aluminum, and plastic. Hardened pins are 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 pneumatic pin extension and retraction to mark the message.

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

**TMM5400 Marking Head.** The TMM5400 marking head includes the mechanical motion components to position the marking pins at precise X/Y positions and the pneumatic components to drive the marking pins from and return the pins to the pin cartridge.

The TMM5400 marking head is an X/Y-traversing mechanism. Using two stepper motor drives, it positions the pin cartridge at coordinate-defined locations in marking window within .008 mm (Fine mode) and .032 mm (Standard mode).

The TMM5400 uses a rack-and-pinion drive system to position the pin cartridge and to accommodate the rigorous dynamics of impacting and rebounding.

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

**Pin Cartridges.** The standard system uses non-lubricated, lightweight pin cartridges for the 25S-series pins.

Pin cartridges are available in two configurations:

- Eight (8) pins spaced on 6 mm centers
- Eight (8) pins spaced on 12 mm centers

The cartridge configuration dictates the size of the marking window along the X-axis. Refer to the marking head installation drawing for details.

**Marking Pins.** The TMM5400 uses 25S-series marking pins. These pins are available in various cone (tip) angles and are made powdered steel, carbide, or stainless steel with diamond tip. Refer to the marking head installation drawing for pin stroke (pin extension) dimensions.

**Marker Cable.** The marker cable connects the marking head to the controller. The highly flexible cable is hard-wired to the marking head and is 4 m long. Optional extension cables lengths are available.

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

The first regulator contains 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.

Standard air lines are 4 m and are made of 6 mm tubing.

**TMC470 Controller.** The TMC470 controller provides the electrical interface and software control of the TMM5400 marking head. Refer to *TMC470 Controller Specifications* for details.

### SYSTEM OPTIONS

- Backup Utility Software
- Bar Code Scanner
- Bar Code Wand
- Custom Cartridges (pin quantity and spacing)
- Logo/Font Generator Software
- Marking Head Extension Cables
- TMC470 Controller Panel-Mounting Bezel/Bracket Kit
- TMC470 Controller Wall-Mounting Bracket Kit
- TMC470N NEMA® Enclosure
- Upgrade Utility Software

### SYSTEM SETUP

Complete installation procedures are provided in the *TMM5400* and the *TMC470 Installation/Maintenance Manuals*. The following procedures are listed only for reference to provide a general overview of the installation process.

1. When designing a fixture, allow for 3-axis adjustment to aid in horizontal, vertical, and lateral alignment of the marking head.
2. Mount the marking head to a suitable fixture using two M6-1.00 bolts. **Mounting bolts must not extend more than 10 mm into the marking head.**
3. Use the provided brackets to mount the filter/regulator assembly within 4 m (13.1 ft) of the marking head.
4. Connect the drive air and return air lines to the connectors on the back of the marking head.
5. 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 vents in bottom of case. Ensure the marking system is electrically isolated from any devices that may generate extreme electromagnetic interference (EMI).

6. Locate the controller as close as practical to the marking head. The standard marker cable length is 4 m (13 ft).
7. Install the controller as a tabletop, wall-mounted, panel-mounted, or enclosure-mounted unit.
8. Ensure the controller power switch is **OFF**.
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. Start the marking system software.
13. Adjust the pin stroke, drive air, and return air for impact depth.

## TMM5400 MARKING HEAD

### Specifications

The TMM5400 marking head specifications are subject to change without notice.

Dimensions (H x W x D) ....	140 x 127 x 104 mm [no cartridge] 194 x 127 x 104 mm [with cartridge]
Weight .....	2.73 kg (6.01 lb), without pins, cartridge, or tooling
Operating Temp. ....	0° to 50°C (32° to 122° F), non-condensing
Humidity .....	10% to 80%
Air Supply.....	Clean and dry, 2.8 to 8.3 bar (40 to 120 psi)
Air Consumption.....	0.15 L/sec (0.32 SCFM), idle 0.28 L/sec (0.60 SCFM), marking
X-Axis Travel .....	36 mm
Y-Axis Travel.....	13 mm
Marking Area .....	see <i>TMM5400 Detail Drawing</i>
Maximum Pin Stroke.....	10.0 mm
Number of Impact Pins.....	8 (spaced 6 mm on centers) or 8 (spaced 12 mm on centers)
Number of Rows of Pins ...	1
Pin Types.....	25S-series with various cone (tip) angles
Pin Material.....	Powdered Metal or Carbide or Stainless Steel with Diamond Tip

### Marking Characteristics

The TMM5400 can produce characters as small as .13 mm. Text strings can be rotated 180° to print inverted. Characters can be printed with resolutions from 5 dots/cm to 75 dots/cm for an engraved look.

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

To optimize quality and speed, the following marking modes are available:

- *Raster mode* prints side-to-side, indexing downward one row at a time.
- *Matrix mode* prints up and down, indexing one column at a time.
- *Continuous mode* prints with only one pin at a time and traces the character shape.

### Marking Speeds

The system is capable of marking 16 characters per second (two characters per pin per second) using 5x7 font, 3 mm characters. Speeds vary depending on the selected character size, style, and dot density. Specific times can be verified by a Telesis representative.

### Marking Noise

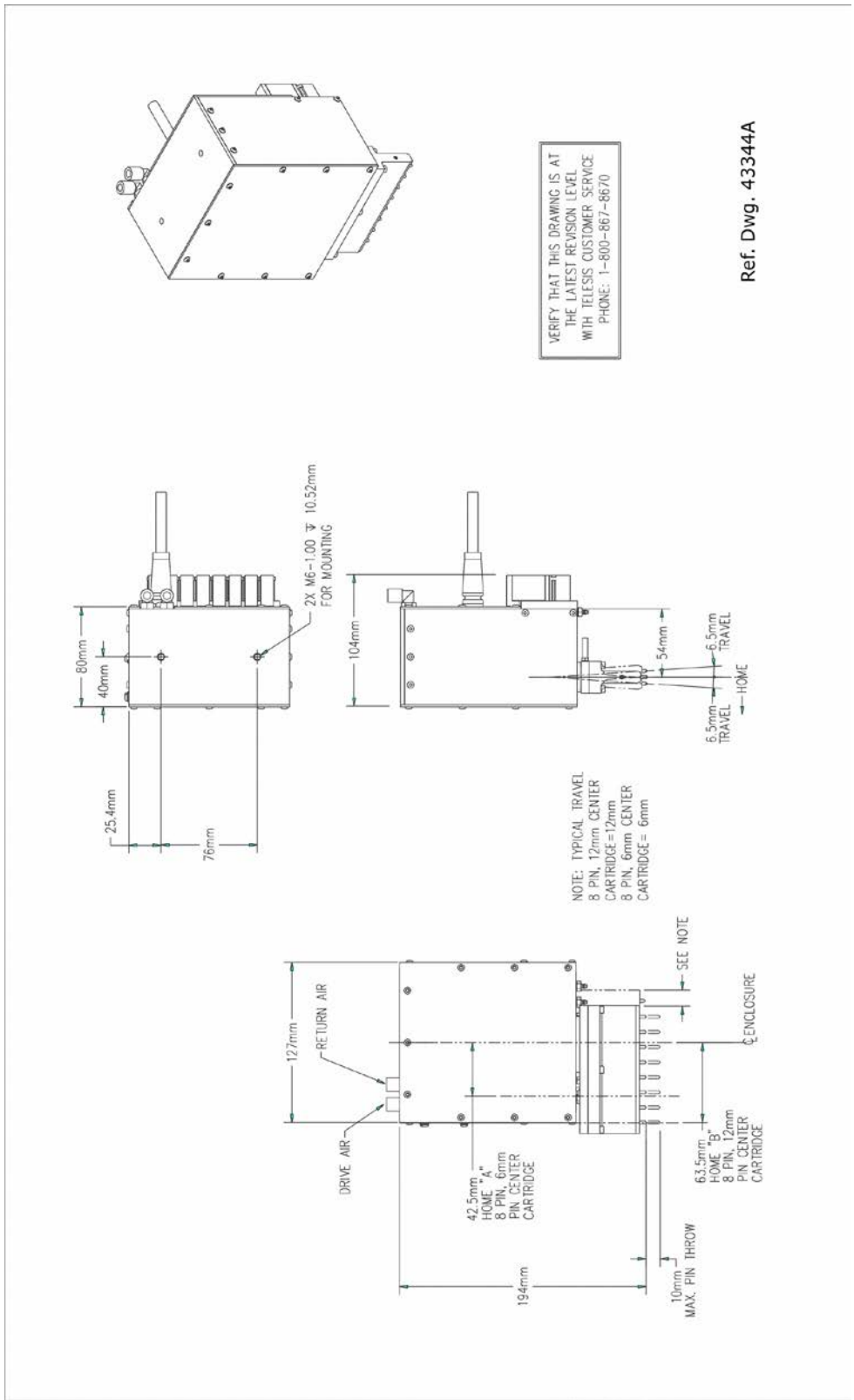
Although every attempt is made to reduce noise, the material being marked significantly influences the noise level. For example, marking a solid lead block produces less noise than marking a thin-walled steel pipe.

### 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, powdered steel pins average about 3 million impressions before needing sharpened.

# TMM5400/470 Marking Systems



VERIFY THAT THIS DRAWING IS AT THE LATEST REVISION LEVEL WITH TELESCIS CUSTOMER SERVICE PHONE: 1-800-867-8670

Ref. Dwg. 43344A

TMM5400 Detail Drawing

**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-mounted, panel-mounted, or enclosure-mounted
Rating .....	NEMA 1 (I.P. 30), tabletop or wall-mounted NEMA 12 (I.P. 65), panel-mounted using customer-supplied panel NEMA 12 (I.P. 65), using Telesis-supplied TMC470N enclosure
Dimensions.....	refer to TMC470 Mounting Drawings
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
Op. Temperature .....	32° to 122° F (0° to 50°C)
Op. Humidity .....	10% to 80% non-condensing
Cooling.....	Internal, thermostat-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 and data 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 @ 24VDC (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)
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**Environmental Considerations**

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

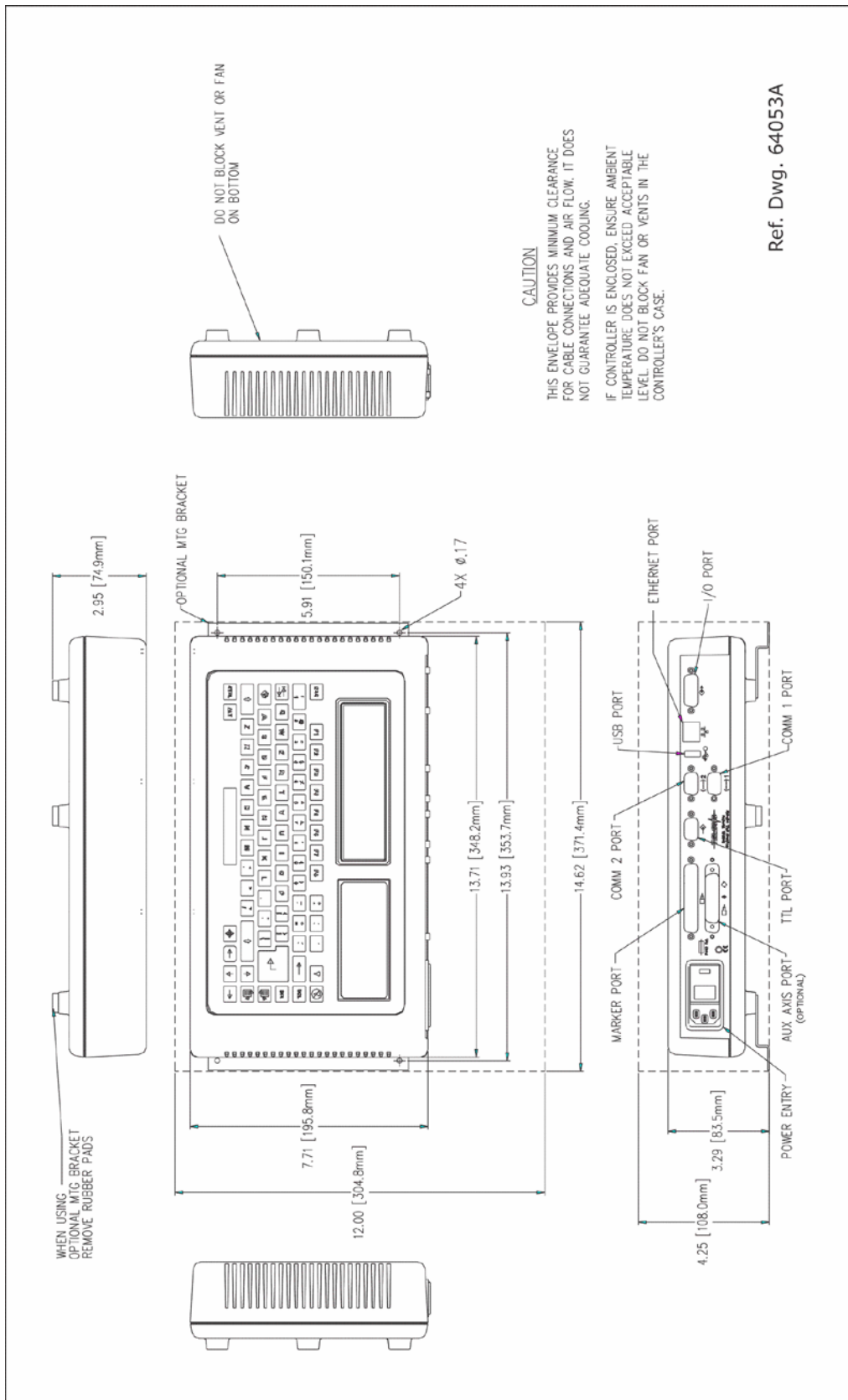
**Contaminants.** The vented TMC470 is rated NEMA 1 (IP30) and contains a thermostatically controlled, variable-speed fan.

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.

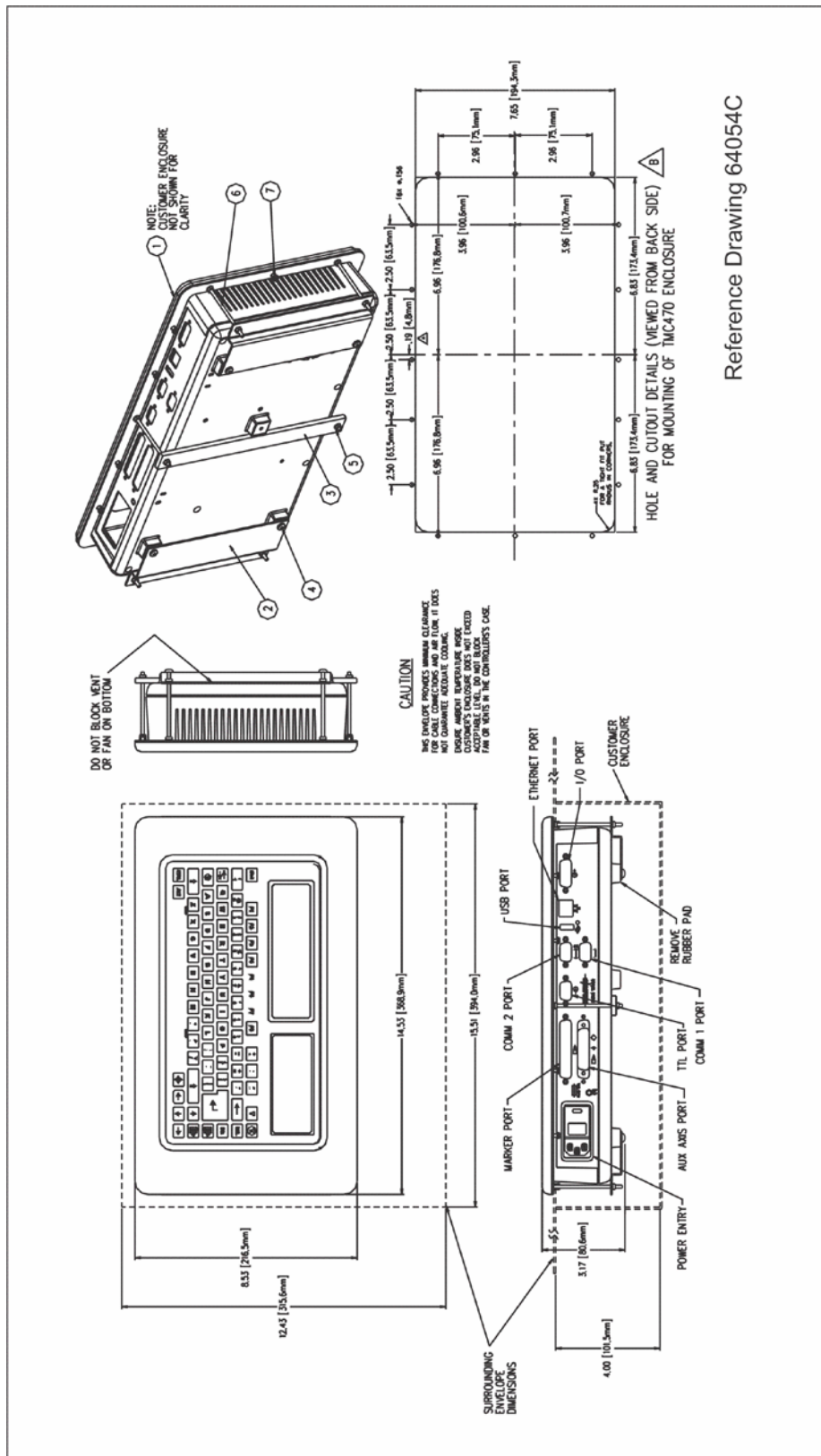
**EMI Susceptibility.** Although the system has been found to be in compliance with pertinent susceptibility standards, care should be taken when installing near welders and other extreme generators of electromagnetic interference (EMI). Particular care should be taken to ensure welder currents are not 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 that could become part of a welder current path.

# TMM5400/470 Marking Systems

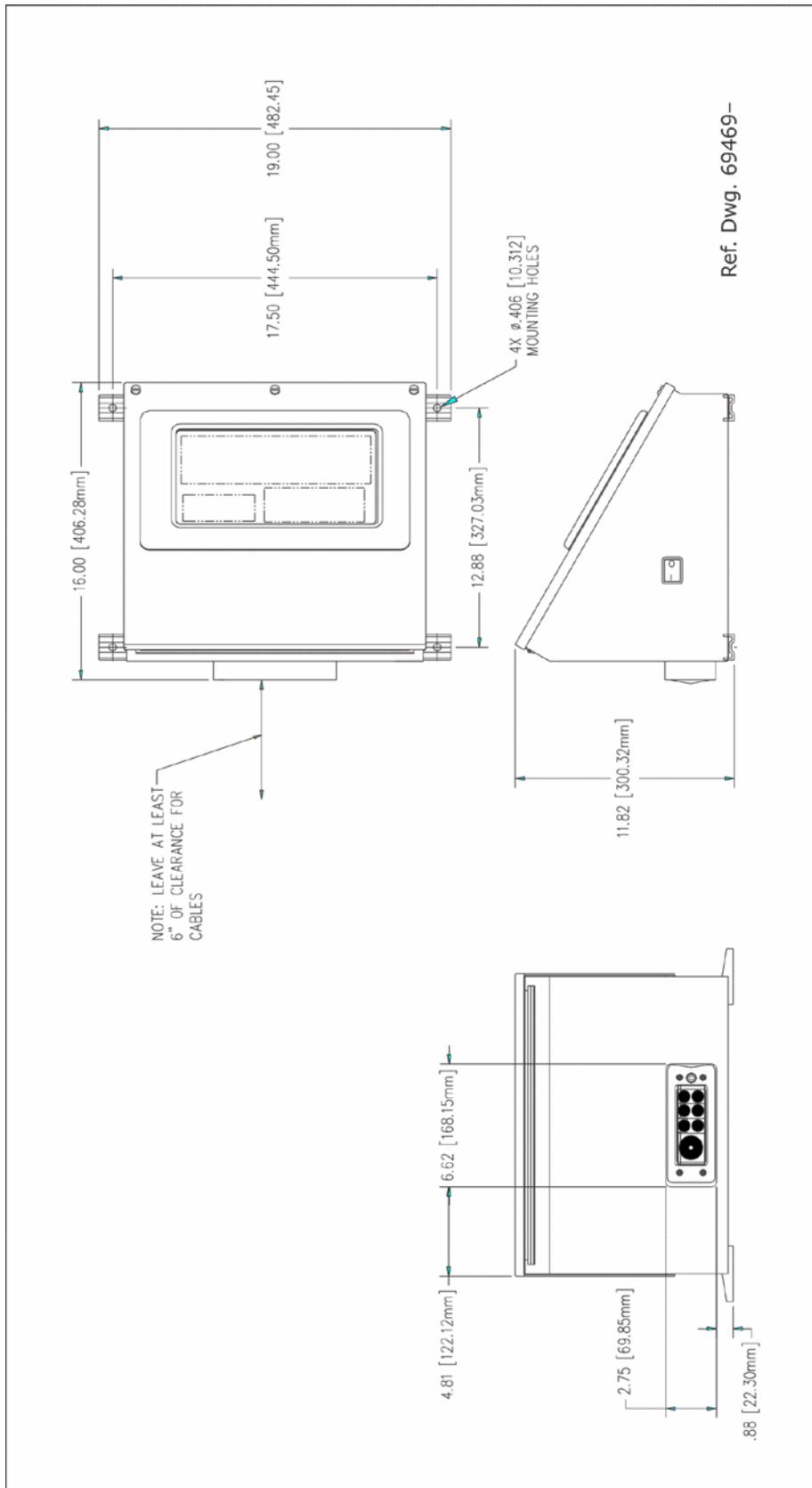


Ref. Dwg. 64053A

TMC470 Controller Dimensions – Table and Wall-Mounted Configurations



TMC470 Controller Dimensions – Panel-Mounted Configuration



**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.

## Discrete I/O Controls

The TMC470 is configured only for 12 VDC to 24 VDC I/O 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 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 below:

- 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 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 the 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 the 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** Message Type 1 overwrites a specific field in the currently loaded pattern with data supplied in the host message. See [DATA] for details.
- C** Message Type C clears the error from the screen.
- G** Message Type G initiates a print cycle to mark the currently loaded pattern.
- I** Message Type 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:

**OO ; III**

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

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

- O** Message Type O resets the marker and places it online.
- P** Message Type P specifies the pattern name to be loaded for printing. See [DATA] for details.

- Q** Message Type Q updates a specific query buffer with data supplied in the host message. See [DATA] for details.
- S** Message Type S requests the error status.
- V** Message Type 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 may range from 00-31. Note "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 (e.g., 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**

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