

### SYSTEM OVERVIEW

The Telesis® Pinstamp® TMP4210/470 is a high-speed, single-pin marking system that 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 pneumatic pin extension and retraction to mark the message.

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

The TMP4210 marking head is an X/Y-traversing mechanism. Using two stepper motor drives, it positions the pin cartridge at coordinate-defined locations in the marking window within .008 mm (in Fine mode) and .032 mm (in Standard mode).

The TMP4210 uses a rack-and-pinion drive system to rapidly 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.

### SYSTEM CONFIGURATION

TMP4210 configurations include a handheld version and a fixture-mounted version. The handheld marker is available for portable operation. It incorporates a pistol grip handle with a push button trigger switch and an integral standoff to position the marker against the marking surface.

The handheld marker can be fitted with a v-block standoff or a hanger attachment. The v-block standoff provides additional stability when marking on round or curved surfaces. The hanger allows the marker to be suspended from a cable balancer. The fixture-mounted unit is available for mounting in a stationary location.

**Pin Cartridges.** The standard system uses non-lubricated, lightweight pin cartridges. The cartridge can be mounted with the pin oriented toward the left side of the mark or reversed with the pin oriented closer to the marker centerline. This optional offset configuration shifts the marking window 25 mm (1.0 in) to the left along the X-axis. The variable configuration allows for flexibility in your marking applications.

**Marking Pins.** The TMP4210 uses 25S-series and 150SA-series marking pins available in various cone (tip) angles. Refer to the appropriate *TMP4210 Marking Head Dimensions* drawing for pin stroke (pin extension) dimensions.

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**Marker Cable.** The marker cable connects the marking head to the controller. The highly flexible cable is 4 m (13.1 ft) and attaches to the back of the marker with a quick disconnect connector. Optional extension cables lengths are available.

**TMC470 Controller.** The controller provides the electrical interface and software control of the TMP4210 marking head. See *TMC470 Controller Specifications* for details.

**Filter/Regulator Unit.** The filter/regulator unit includes two regulators with pressure gauges to control 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. Standard air lines are 4 m (13.1 ft) long and are made of 6 mm tubing.

## SYSTEM OPTIONS

- Backup Utility Software
- Bar Code Scanner
- Bar Code Wand
- Logo/Font Generator Software
- Marking Head Extension Cables
- Standoff Hanger Kit (handheld markers only)
- Standoff V-Block Kit (handheld markers only)
- TMC470 Controller Panel-Mounting Bezel/Bracket Kit
- TMC470 Controller Wall-Mounting Bracket Kit
- TMC470N NEMA® Enclosure
- Tool Post Quick-Disconnect Adapter (handheld markers only)
- Upgrade Utility Software

## SYSTEM SETUP

Complete installation procedures are provided in the *TMP4210* and the *TMC470 Installation/Maintenance Manuals*. The following procedures are listed only for reference to provide a general overview of the installation process.

1. **FIXTURE-MOUNTED MARKERS ONLY.** When designing a fixture, allow for 3-axis adjustment to aid in horizontal, vertical, and lateral alignment of the marking head. Mount the marking head to a suitable fixture using four M5-0.80 bolts. Mounting bolts must not extend more than 10 mm (0.375 in) into the marking head.
2. Mount the filter/regulator assembly, using the brackets provided, within 4 m (13.1 ft) of the marking head.
3. Connect the drive air and return air lines to the connectors on the back of 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 vents in the bottom of the case. Ensure the marking system is electrically isolated from devices that may generate extreme electromagnetic interference (EMI).

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

## TMP4210 MARKING HEAD

### Specifications

The TMP4210 marking head specifications are subject to change without prior notice.

Dimensions .....	refer to the appropriate <i>TMP4210 Marking Head Dimensions</i> drawing
Rating .....	NEMA <sup>®</sup> 2 (I.P. 41) with optional, protective debris shield installed
Weight	
Handheld .....	1.91 kg (4.18 lb), excluding cable
Fixture-Mounted.....	1.63 kg (3.58 lb), excluding cable, handle, standoff, and tooling
Operating Temp.....	0° to 50°C (32° to 122° F), non-condensing
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
Marking Area .....	51 x 13 mm (2.0 x .50 in)
Pin Types .....	25S-series 150SA-series
Pin Material	
25S-series .....	Powdered Metal or Stainless Steel with Diamond Tip or Carbide
150SA-series .....	Powdered Metal or Tool Steel with Carbide Tip

### Marking Characteristics

The TMP4210 can produce characters as small as 0.75 mm (0.03 in). Text strings can be rotated 180 degrees to print inverted. Characters can be printed with resolutions from 4 to 79 dots/cm (10 to 200 dots/in) for an engraved look. The depth of mark can be adjusted over a significant range by adjusting the pin stroke and by adjusting the drive air pressure.

### Marking Speeds

The system can mark 3 mm (0.118 in) characters in the 5x7 font at a rate of 3.5 characters per second. Speeds vary depending on the 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 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 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 (0.005 in), powdered metal pins average about 3 million impressions before needing sharpened. Carbide pins average about 9 million impressions.

### Vibration Data

Vibration tests were performed under controlled conditions imitating normal operation.

Conditions such as rigidity of the work piece, material, and setting of the machine might vary in operational use and might alter the vibration level. Despite detailed guidance instructions provided with each machine, such conditions are beyond the control of Telesis and are the responsibility of the end user. Conduct your own tests to establish safe working levels of use.

The vibration tests were conducted using the following parameters:

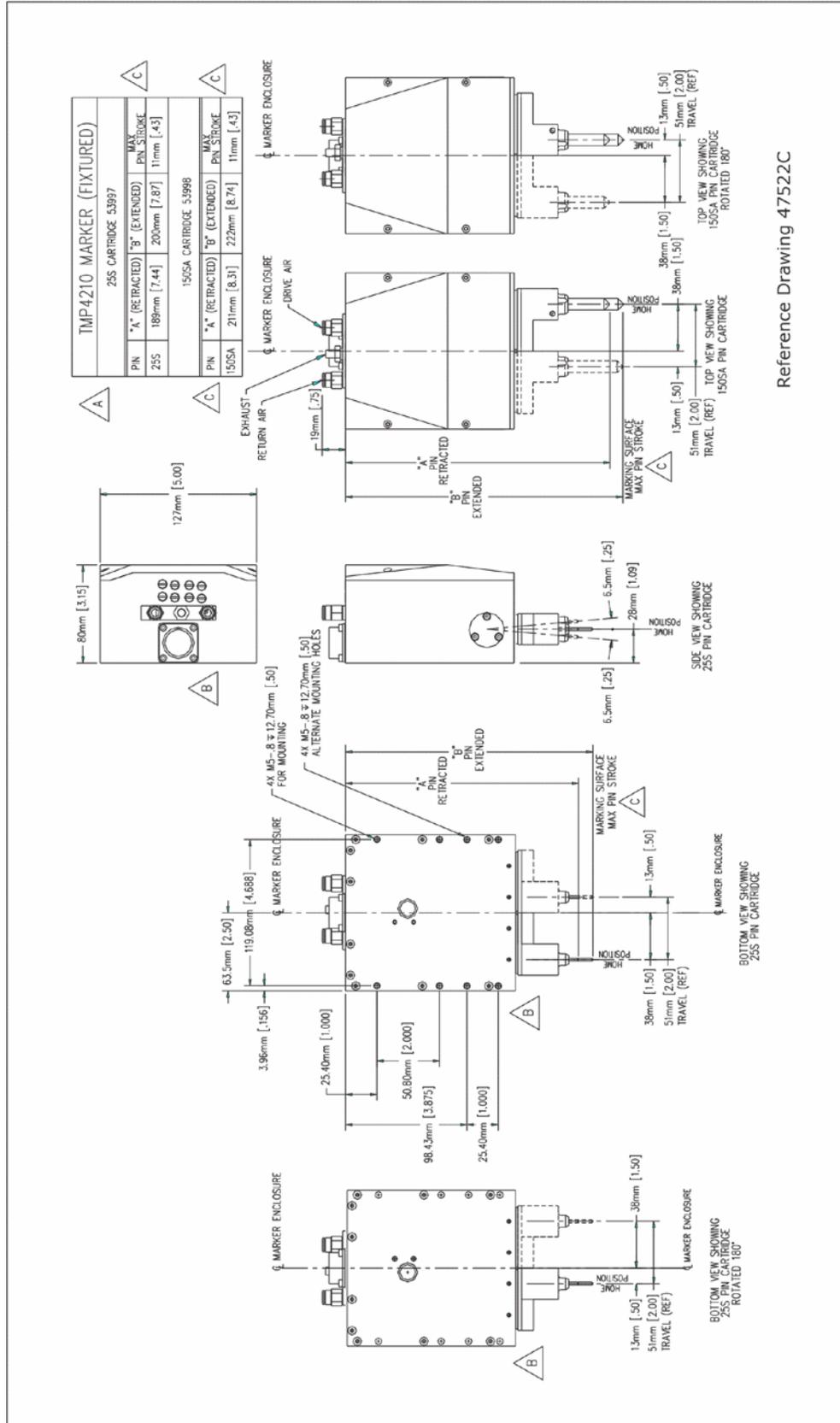
Drive Air Pressure.....	4.08 bar (60 psi)
Return Air Pressure.....	1.36 bar (20 psi)
Pin Stroke .....	8 mm (.31 in)
Marking Base .....	20 mm (.79 in) thick steel
Marking Surfaces.....	2 mm (.08 in) thick steel plate 4 mm (.16 in) thick aluminum plate
Marking Mode .....	Dot
Text Marked .....	TELESIS 11x16 font, 5 mm (.20 in) characters  HHHEEE000888 5x7 font, 3 mm (.12 in) characters

The following test results reflect the worst-case scenarios under the given test conditions.

Steel Marking Surface			
Pin	VM	T <sub>(EAV)</sub>	T <sub>(ELV)</sub>
25C	0.4 m/s <sup>2</sup>	more than 24 hr	more than 24 hr
150SA	0.8 m/s <sup>2</sup>	more than 24 hr	more than 24 hr
Aluminum Marking Surface			
Pin	VM	T <sub>(EAV)</sub>	T <sub>(ELV)</sub>
25C	0.6 m/s <sup>2</sup>	more than 24 hr	more than 24 hr
150SA	1.2 m/s <sup>2</sup>	more than 24 hr	more than 24 hr

- VM = hand/arm Vibration Magnitude.
- T<sub>(EAV)</sub> = time to reach the Exposure Action Value based on continuous marking.
- T<sub>(ELV)</sub> = time to reach the Exposure Limit Value based on continuous marking.





Reference Drawing 47522C

TMP4210 Fixture-Mounted Marking Head Dimensions

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## 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 prior 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 the appropriate <i>TMC470 Controller Dimensions</i> drawing
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
p. 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 @ 12 VDC; 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)
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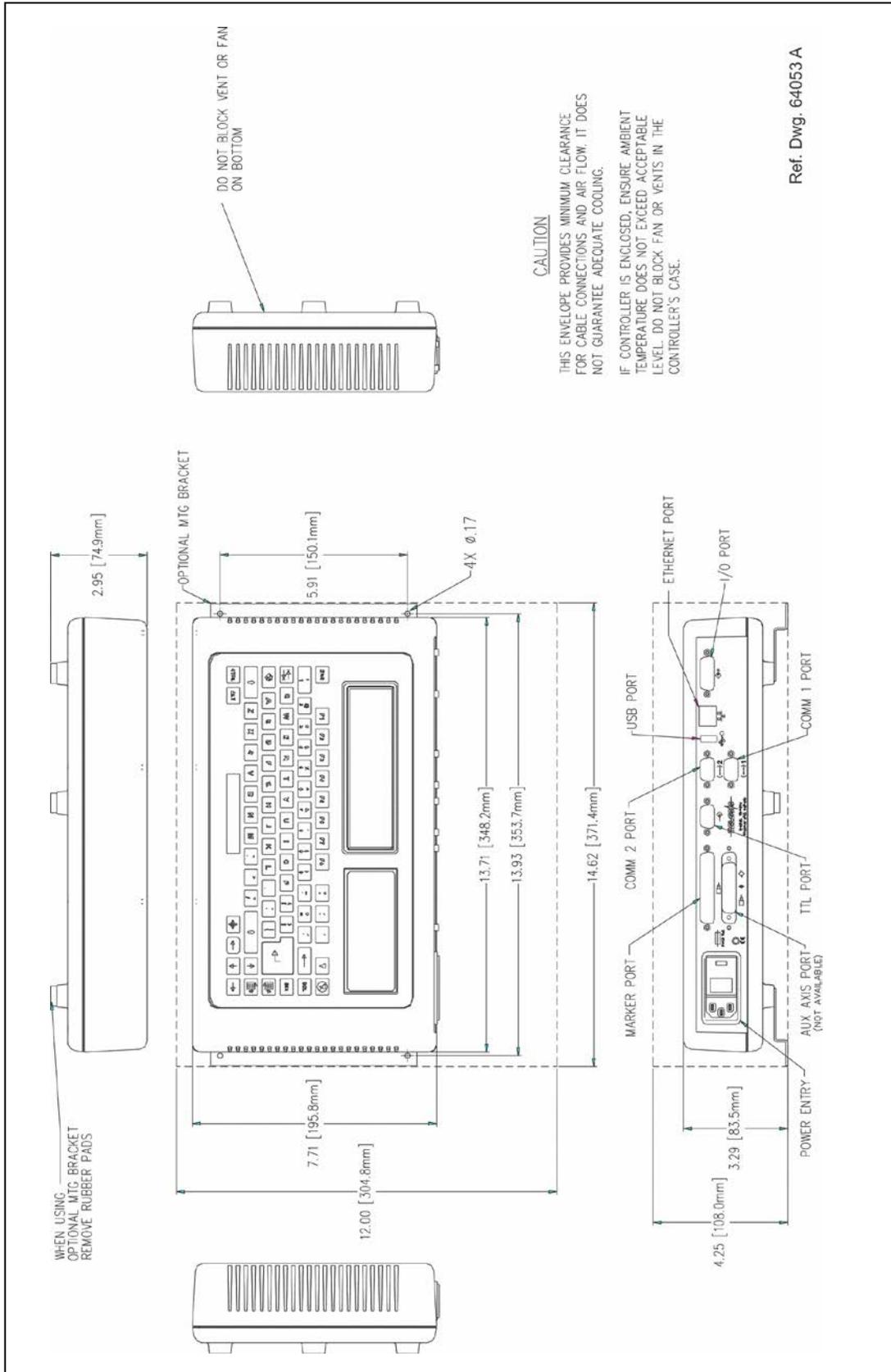
### Environmental Considerations

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

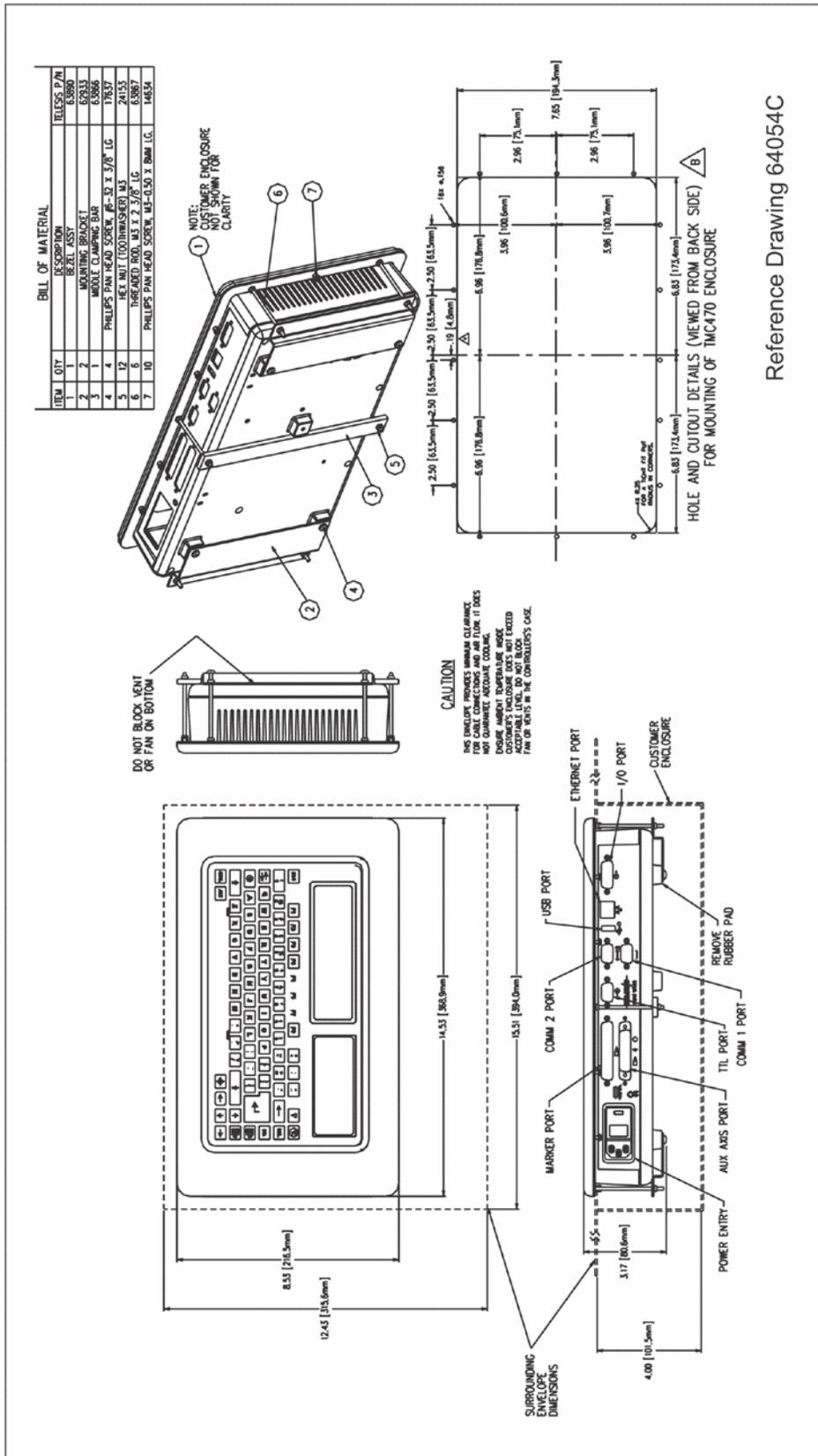
**Contaminants.** The vented TMC470 is rated NEMA® 1 (IP30) and contains a thermostatically controlled, variable-speed fan. In environments where solid or liquid contaminants are present, these contaminants can be drawn into the TMC470 controller and can cause the controller to fail. Therefore, in these 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.

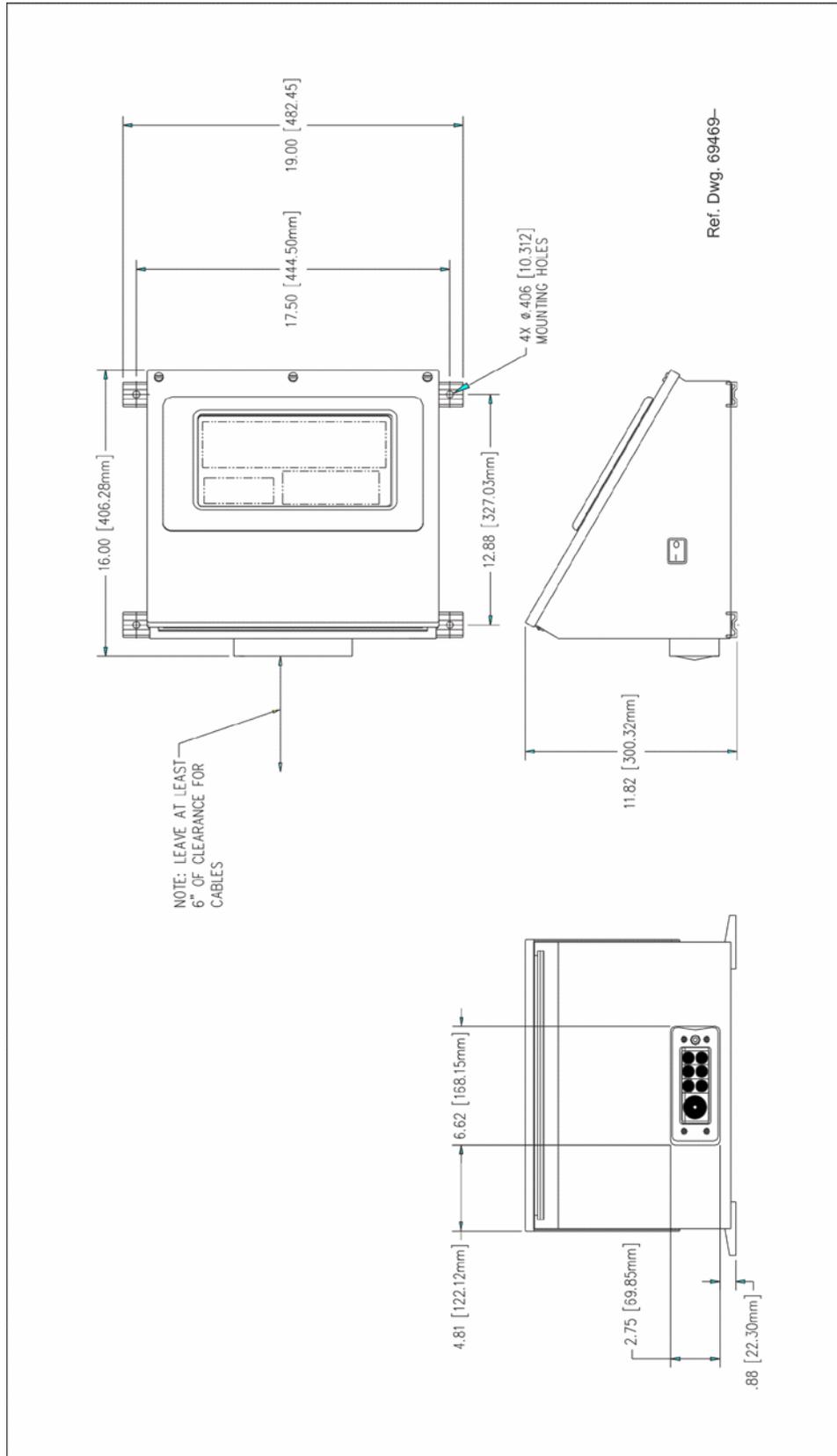


TMC470 Controller Dimensions – Tabletop and Wall-Mounted Configurations



Reference Drawing 64054C

TMC470 Controller Dimensions – Panel-Mounted Configuration



TMC470 Controller Dimensions – Enclosure-Mounted Configuration

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## **TMC470-Based System Software**

The system software is permanently installed in the controller. It provides the user interface for the operator to control the marker. 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 may be defined to 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 you to connect 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 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.** These input signals provide the following controls:

INPUT COMM.....	For all inputs (+ or – supply)
START PRINT .....	Begins the print cycle
STOP .....	Stops the print cycle
SEL_0 thru _6 * .....	Allows for the remote selection and loading of 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.** These output signals indicate the following states:

OUTPUT COMM.....	For all outputs (+ or – supply)
DONE .....	Print cycle is complete
READY .....	System ready for message or for start print command
PAUSED .....	System 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 and receive 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 two protocol choices: 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 following describes the serial data character format on all transmissions to and from the TMC470 Controller.

- 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 ASCII carriage return character).

**Character Position** counted from the starting character ignoring 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 ASCII line feed character)).

**Message Type** allows message-type recognition which defines how the marking system will use 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 that host will provide message type, field number (if applicable), line number (if applicable), and data; delegates message type selection to the host on message-by-message basis. The host message must use the format:

**Tnn<string>**

where:

**T** = 1, P, Q, or V to indicate message type

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

### **Notes:**

Not used with Message Type P.

**<string>** = For Message Type P, indicates the pattern name to be loaded.

For Message Types 1, Q, or V, indicates the data to be inserted into the field or the query text buffer.

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**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.

**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 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

\*SEL\_6 can be configured to place the machine online (default) or for remote pattern selection.

**G** initiates a print cycle to mark the currently loaded 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 status of the marking system.

**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 that "00" is reserved for applications where only one controller is used. In such applications, this field may be eliminated and "00" will be assumed.

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

**[DATA]** ..... Optional character string that might 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 Types 1, Q, or V, indicates the data to be inserted into the field or the query text buffer, as applicable.

**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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