

## SYSTEM OVERVIEW

The Telesis® TMP1700/520 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 CE, CSA, and UL specifications.

**TMP1700 Marking Head.** The TMP1700 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 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.

The TMP1700 marking head is an X/Y-traversing mechanism. Using two stepper motor drives, it accurately and rapidly positions the pin at coordinate-defined locations in marking window within .001 inch (.025 mm).

The TMP1700 accommodates the rigorous dynamics of impacting, rebounding, and rapid positioning of the marking pin through a system of rigid rails and ball bearing saddles, timing belts, and direct-drive, toothed pulleys.

The internal mechanism is protected from debris by an integral shield. Three stainless steel panels slide against one another, constrained by the cartridge and the high-impact ABS cover, to prevent debris from entering the marking head. A flexible, oil-resistant fabric boot is also available for applications requiring additional protection, especially against liquid sprays and mists.

**Marker Cable.** The marker cable is pre-wired to the marking head and connects the marker to the controller. The highly flexible cable is 4 m (13 feet) long. Optional extension cables are available for greater distances.

**Pin Cartridges.** The pin cartridges are machined from engineered plastic materials and offer long life with little maintenance. Clasps are used to attach the pin cartridge to the marking head for easy cleaning and pin replacement.

# TMP1700/520 Marking System

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**Marking Pins.** Marking pins for the TMP1700 include the 25L-, 25XL-, 150S, and the 150SA-series and the 10MP MicroPin™. Refer to the *TMP1700 Marking Head Dimensions* drawing for pin stroke (pin extension) dimensions. Refer to *Marking Depth* for pin cone angles and depths.

**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 12 feet (3.6 m) long and are made of 1/4-inch tubing.

**TMC520 Controller.** The TMC520 controller runs the Merlin520 PS software and provides the user interface for operating the marking system. The controller is a fan less design keeping contaminants from being circulated inside the controller. The controller features an integrated, 7-inch, high-resolution, capacitive touchscreen monitor in the top panel. The back panel of the controller provides the electrical interface for connecting to optional remote I/O sources. Refer to *TMC520 Controller Specifications* for details.

## SYSTEM OPTIONS

- Oil-Resistant Fabric Boot
- Marking Head Extension Cables
- Tool Post Assembly
- Auxiliary Axis Driver Board Kit
- Motorized Z-Axis Tool Post with Programmable Travel
- Motorized Theta-Axis with Programmable Rotary Drive Unit
- TMC520 Controller Angle-Mounting Bracket Kit
- TMC520 Controller Wall-Mounting Bracket Kit
- TMC520 Controller Panel-Mounting Bezel/Bracket Kit
- Barcode Scanner or Barcode Wand with Cable (RS-232 only)
- USB Barcode Scanner
- Foot Switch (Start Print) or Push Button Station (Start/Abort)
- Logo/Font Generator Software

## SYSTEM SETUP

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

1. Mount the marking head to the optional tool post assembly or other suitable fixture using two M6 bolts. **Mounting bolts must not extend more than 5/8 inch (15 mm) into the marking head.**
2. Mount the filter/regulator assembly within 12 feet (3.6 m) of the marker.
3. Connect the drive air and return air lines to the marking head.
4. Connect the supply air to the input port on the filter/regulator assembly.

### CAUTION

**Protect the TMC520 from potentially damaging conditions and contaminants. 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 feet).
6. Install the controller as a tabletop, wall-mounted, or panel-mounted unit.
7. Ensure the controller power switch is **OFF**.
8. Connect the marker cable to the controller.
9. Connect the power supply cable to the controller, the power cable to the power supply, and the power cable to the facility power.  
**Note:** Use only the Telesis-supplied external power supply. Use of any other power supply cable will void all warranties and will negatively affect the controller performance.
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.

## TMP1700 MARKING HEAD

### Specifications

The TMP1700 marking head specifications are subject to change without notice.

Dimensions.....	Refer to the <i>TMP1700 Marking Head Dimensions</i> drawing
Weight .....	6.4 lb (2.9 kg)
Operating Temperature....	32° to 122°F (0° to 50°C), non-condensing
Air Supply.....	Clean and dry, 40 to 120 psi (2.8 to 8.3 bar)
Air Consumption.....	.04 SCFM (idle) 0.6 SCFM (marking)
Marking Area .....	2.5 x 1.5 inches (63 x 38 mm)
Pin Types.....	10MP-, 25L-, 25XL-, 150S, or 150SA-series
Pin Material.....	Carbide (10MP-series MicroPin) Powdered metal or stainless steel with diamond tip or carbide (25L-, 25XL-series) Powdered metal or tool steel with carbide tip (150S-, 150SA-series)

### Marking Characteristics

The TMP1700 can produce characters as small as .030 inch (.76 mm), printed at any angle within the marking window. Printing resolutions range from 10 dots per inch to 200 dots per inch for an engraved look. The depth of mark can be adjusted over a significant range by adjusting the pin stroke and, the drive air pressure. In addition, the multi-strike option can be used to set the marker to strike each pin point a specified number of times.

### Marking Speeds

The system generally marks four characters per second (5 x 7 font, .125-inch [3 mm] characters). Speeds vary depending on the selected character size, style, and dot density. Specific times can be verified by a Telesis representative.

### 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 .005 inch (.127 mm), powdered steel pins average about 3 million impressions before needing sharpened; carbide pins average approximately 9 million impressions. If carbide pins are used, marking times increase by approximately 25% due to the increased weight of the pins.

### Marking Noise

When marking cold-rolled steel strips at 50% duty cycle, the noise level of the TMP1700 marking system has been measured at 74.6 dB, using the "time weighted average" approach (average sound exposure over an 8-hour period). It is expected that as the duty cycle rises, the time weighted average will also rise. Typical applications average 20-30% duty cycle where the sound pressure level would not exceed 70 dB (A).

Noise level tests were performed under controlled conditions imitating predicted normal operation. Conditions such as rigidity of the work piece, material, setting of the machine, and ambient noise might vary when in operational use and might alter the actual noise level.

Despite detailed guidance notes provided with each machine, these conditions would be out of the control of Telesis and must remain the responsibility of end users. End users should conduct their own tests to establish safe working levels of use.

# TMP1700/520 Marking System

## Marking Depth

Sample marking depths are listed in the following tables. Drive air was set at 80 psi (5.5 bar); return air was set at 20 psi (1.4 bar); pin stroke was set to the maximum allowable distance for each pin type to achieve the maximum depth of mark.

### NOTICE

**The recommended nominal drive air pressure is 80 psi (5.5 bar). Lower drive air pressure can be used, but marking depth would be decreased and cycle time would be increased.**

#### Depth – Type 25L & 25XL Powdered-Metal Pins

MATERIAL (HARDNESS)	22° CONE	30° CONE	45° CONE	60° CONE
Aluminum (Rb3)	.005 inch .127 mm	.007 inch .178 mm	.011 inch .279 mm	.016 inch .406 mm
Brass (Rb18)	.003 inch .076 mm	.005 inch .127 mm	.009 inch .229 mm	.012 inch .305 mm
Cold Rolled Steel (Rc18)	.003 inch .076 mm	.005 inch .127 mm	.008 inch .203 mm	.012 inch .305 mm

#### Depth – Type 25L & 25XL Carbide Pins

MATERIAL (HARDNESS)	22° CONE	30° CONE	45° CONE	60° CONE
Aluminum (Rb3)	.006 inch .152 mm	.007 inch .178 mm	.010 inch .254 mm	.011 inch .279 mm
Brass (Rb18)	.005 inch .127 mm	.007 inch .178 mm	.008 inch .203 mm	.009 inch .229 mm
Cold Rolled Steel (Rc18)	.004 inch .101 mm	.005 inch .127 mm	.007 inch .178 mm	.009 inch .229 mm

#### Depth – Type 150S Pins

MATERIAL (HARDNESS)	22° CONE	30° CONE	45° CONE	60° CONE
Aluminum (Rb3)	N/A	.008 inch .203 mm	.012 inch .305 mm	.018 inch .457 mm
Brass (Rb18)	N/A	.007 inch .178 mm	.010 inch .254 mm	.017 inch .432 mm
Cold Rolled Steel (Rc18)	N/A	.006 inch .152 mm	.008 inch .203 mm	.013 inch .330 mm

#### Depth – Type 150SA Pins

MATERIAL (HARDNESS)	22° CONE	30° CONE	45° CONE	60° CONE
Aluminum (Rb3)	N/A	.008 inch .203 mm	.012 inch .305 mm	N/A
Brass (Rb18)	N/A	.007 inch .178 mm	.010 inch .254 mm	N/A
Cold Rolled Steel (Rc18)	N/A	.006 inch .152 mm	.008 inch .203 mm	N/A

## Vibration Data

Vibration tests were performed under controlled conditions imitating, as closely as possible, typical normal operation.

Conditions such as rigidity of the work piece, material, setting of the machine, etc. may vary in actual operational use and would alter the actual vibration level. Despite detailed guidance instructions provided with each machine, such conditions are beyond the control of Telesis and must remain the responsibility of the end user. Accordingly, you should 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 inch)
Marking Base.....	20 mm (.79 inch) thick steel
Marking Surfaces .....	2 mm (.08 inch) thick steel plate 4 mm (.16 inch) thick aluminum plate
Marking Mode.....	Dot
Text Marked.....	TELESIS (11 x 16 font, 5 mm [.20-inch] characters) HHHEEE000888 (5 x 7 font, 3 mm [.12-inch] characters)

The worst-case scenarios under the given test conditions are listed in the following table.

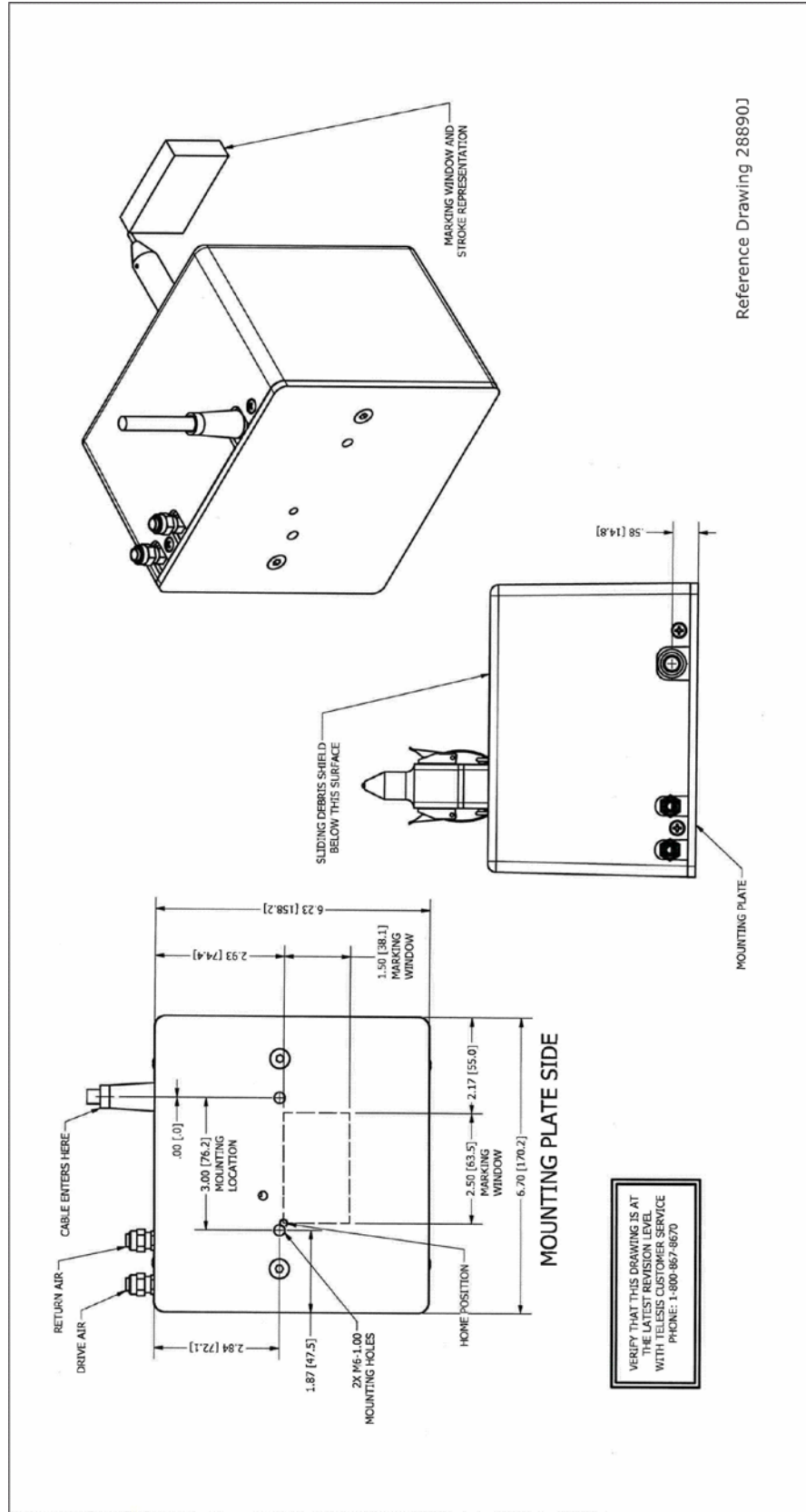
Steel Marking Surface			
Pin	VM	T <sub>(EAV)</sub>	T <sub>(ELV)</sub>
25C	0.4 m/s <sup>2</sup>	more than 24 hr	more than 24 hr
150SA	0.8 m/s <sup>2</sup>	more than 24 hr	more than 24 hr
Aluminum Marking Surface			
Pin	VM	T <sub>(EAV)</sub>	T <sub>(ELV)</sub>
25C	0.6 m/s <sup>2</sup>	more than 24 hr	more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

where:

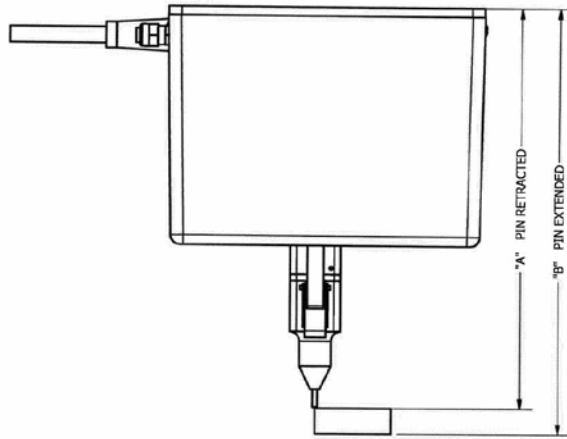
**VM** = hand/arm vibration magnitude.

**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.



TMP1700 Marking Head Dimensions



PIN	CARTRIDGE ASSEMBLY	TMP1700		
		"A"	"B"	NOM. MAX. PIN STROKE
25L	13868	7.51 [183.2]	8.11 [206.0]	.50 [12.7]
25XL	13868	7.92 [201.0]	8.42 [213.9]	.50 [12.7]
25L-X	14961	9.27 [235.5]	9.77 [248.2]	.50 [12.7]
25XL-X	14961	9.59 [243.3]	10.08 [256.0]	.50 [12.7]
150S	15569	8.17 [207.4]	8.42 [213.9]	.25 [6.4]
153SA	15569	8.17 [207.4]	8.92 [226.6]	.75 [19.1]
10MP	62615	7.17 [182.1]	7.31 [185.7]	.14 [3.6]

Reference Drawing 288903

TMP1700 Marking Head Dimensions (page 2)

## TMC520 CONTROLLER

The TMC520 controller can be installed as a tabletop, wall-mounted, or panel-mounted unit. All configurations provide features and connectivity for external communications. Differences occur only in the mounting configuration.

### TMC520 Specifications

The TMC520 controller specifications are subject to change without notice.

Compliance.....	CE, CSA, and UL
Configurations.....	Tabletop, wall-mounted, panel-mounted
Rating.....	(I.P. 40) tabletop, wall-mounted, panel-mounted
Dimensions.....	Refer to the appropriate <i>TMC520 Controller Dimensions</i> drawing
Weight .....	2.70 lb (1.22 kg) controller only
Operating Temperature ...	32° to 113°F (0° to 45°C)
Operating Humidity.....	10% to 80% non-condensing
Cooling.....	N/A
Power Requirements .....	95 to 250 VAC, 2 amps, 50-60 Hz, single phase
Communications.....	TTL, Discrete I/O, RS232, TCP/IP, and USB (data backup and transfer)
Input Signals .....	Twelve (12) total, optically isolated 9 dedicated, 1 selectable 3 programmable 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 .....	Seven (7) total, optically isolated 4 dedicated, 3 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

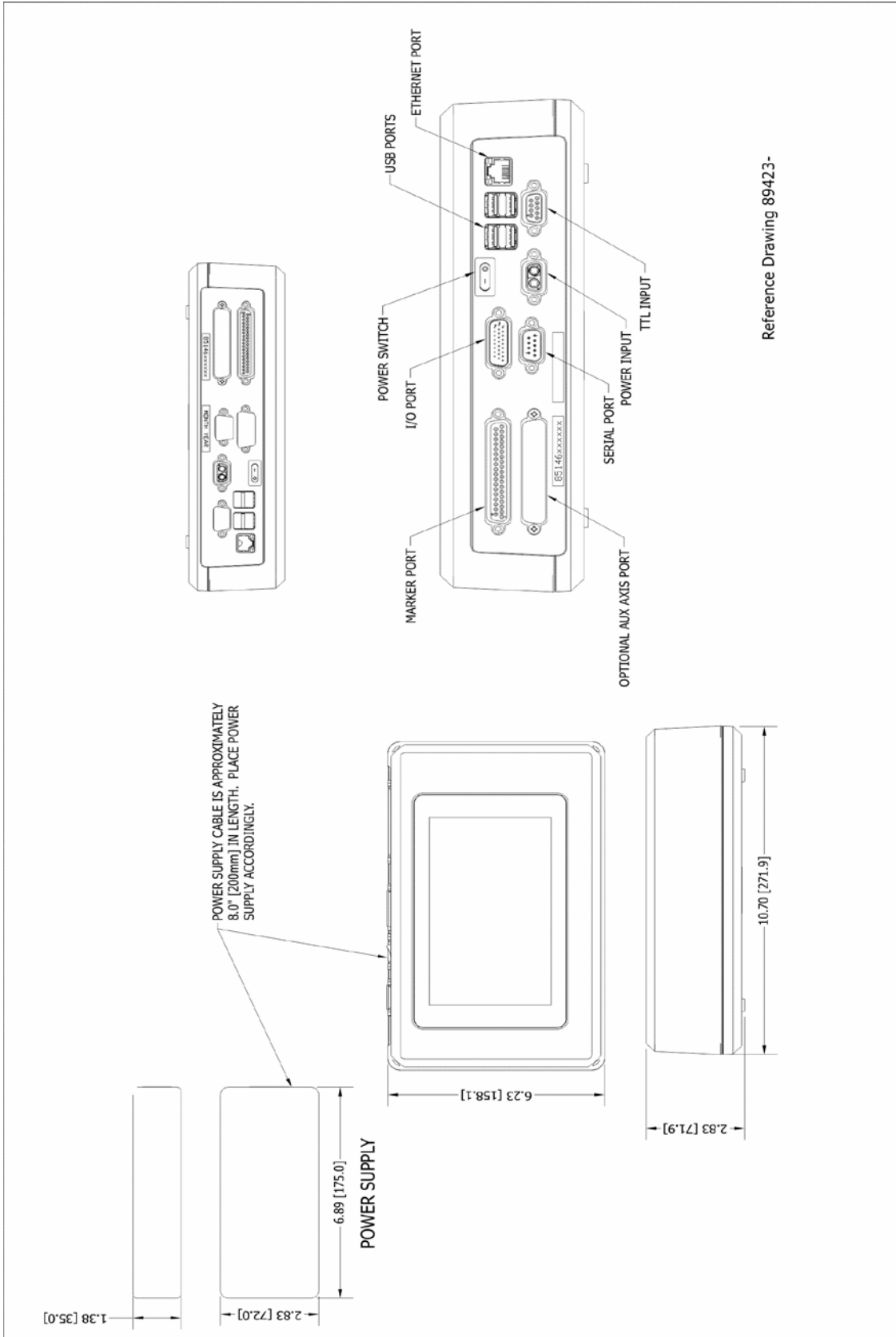
The following environmental considerations must be taken into account when installing the TMC520 controller.

**Contaminants.** The non-vented TMC520 is rated (IP40). When used in environments where liquid contaminants are present, the controller **must** be located in a place it can be protected.

**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.

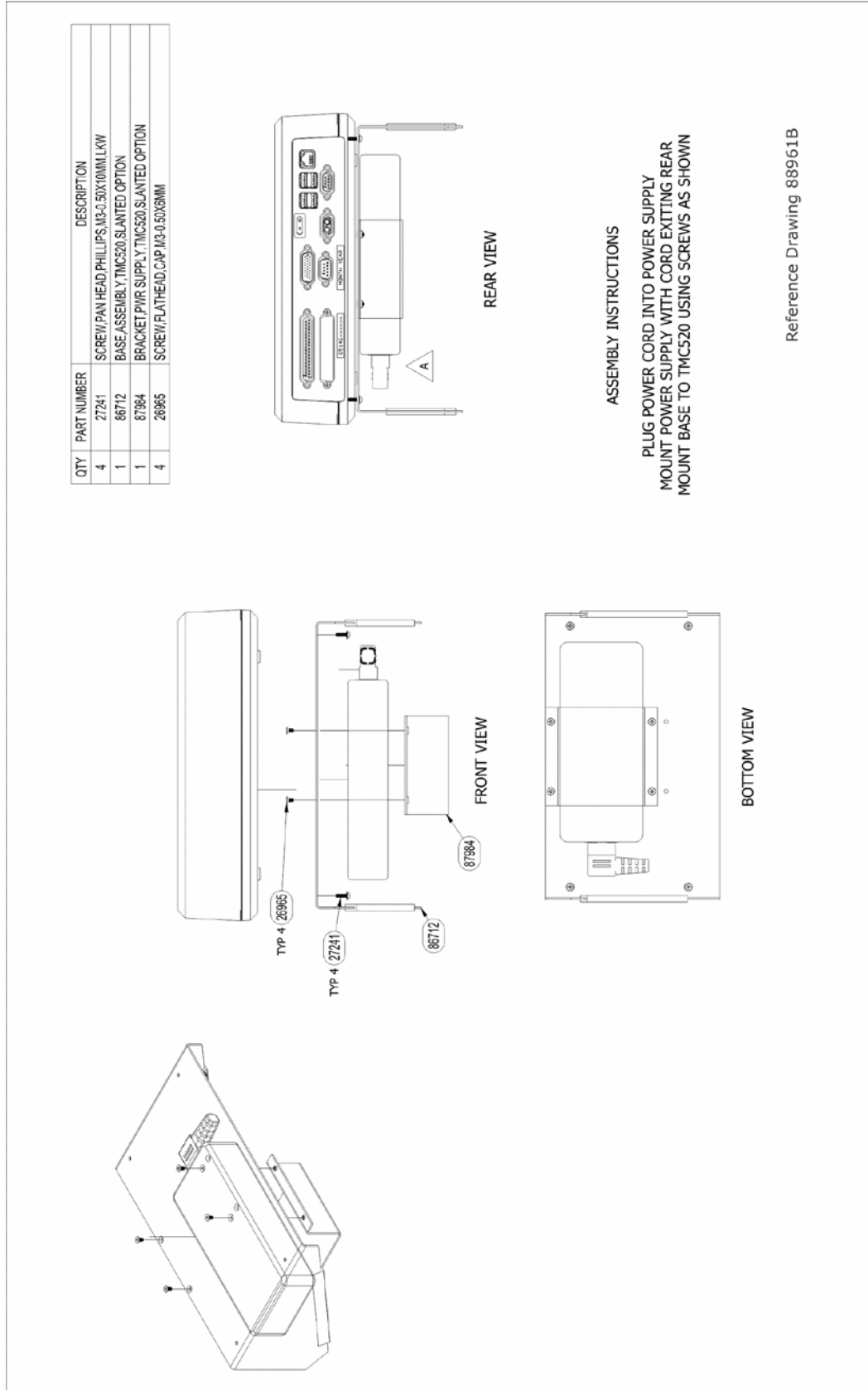




Reference Drawing 89423-

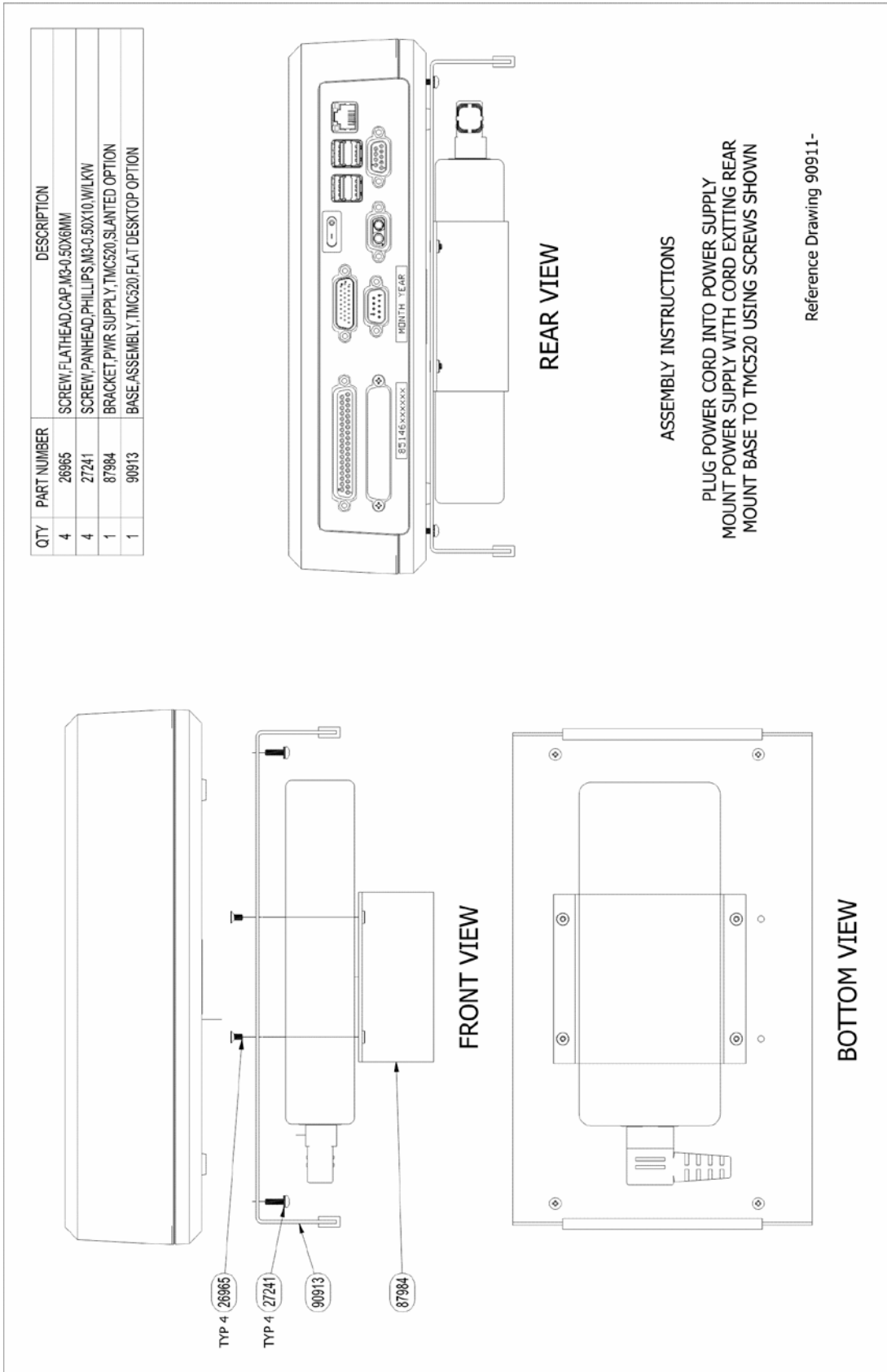
**TMC520 Controller Dimensions – Tabletop Configuration**



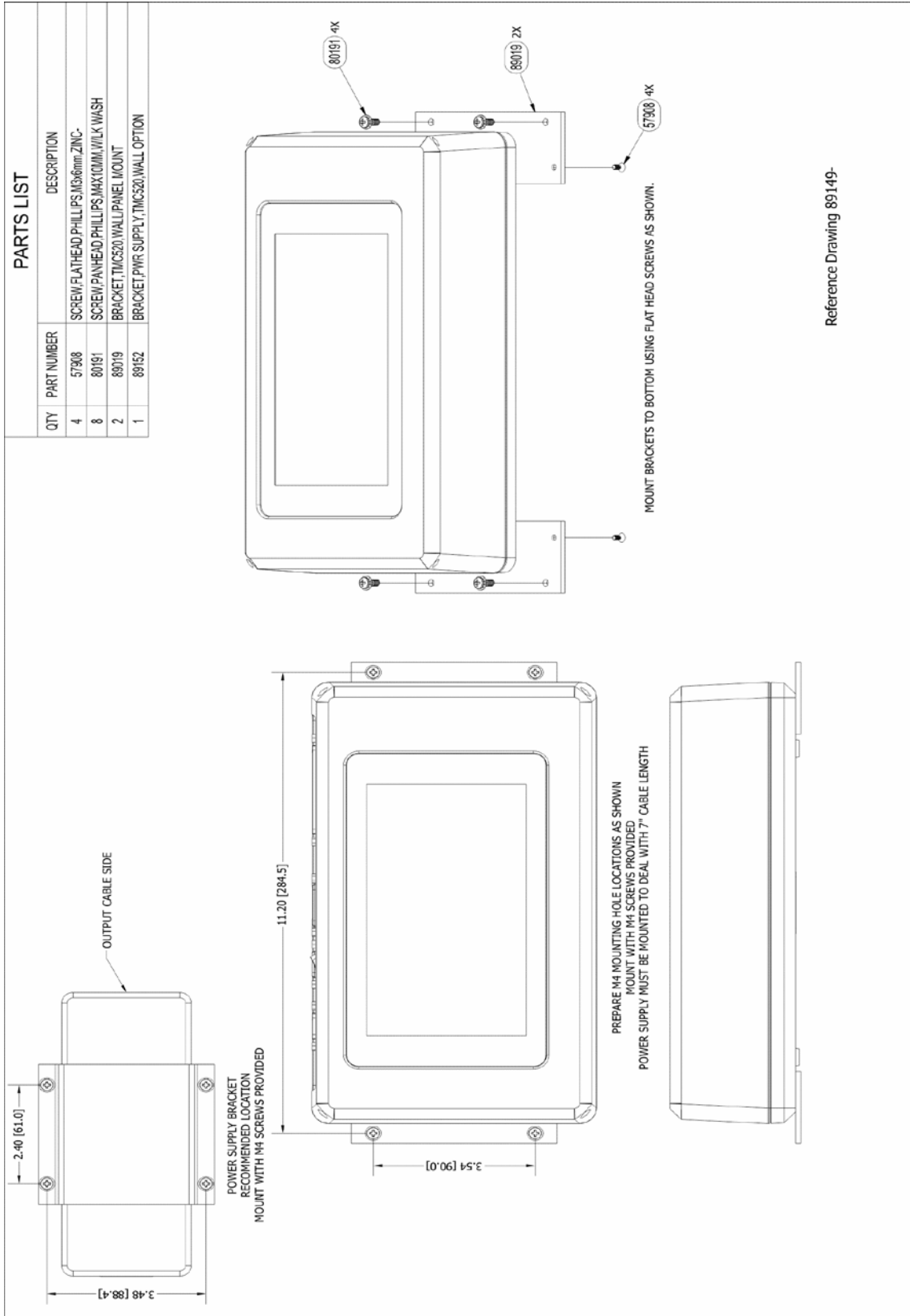


**TMC520 Controller Dimensions – Optional Angle Table-Mounted Configuration**

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**TMC520 Controller Dimensions – Optional Flat Table-Mounted Configuration**



Reference Drawing 89149-

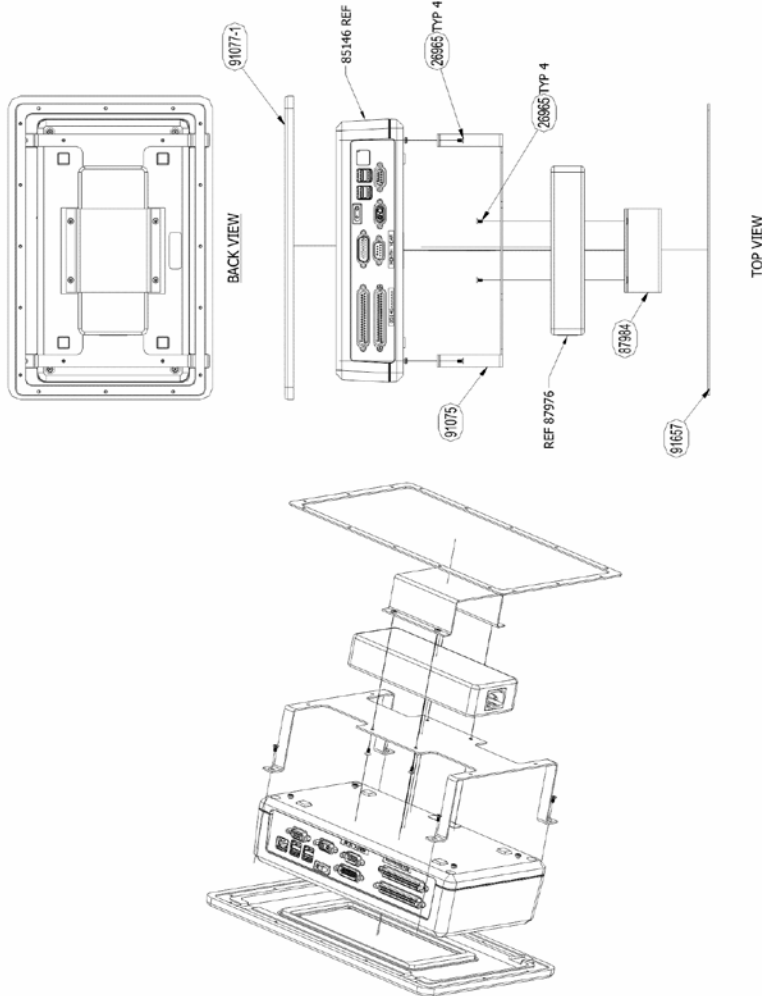
TMC520 Controller Dimensions – Optional Wall-Mounted Configuration

QTY	PART NUMBER	DESCRIPTION
16	15328	SCREW PAN HEAD, PHILIPS, M3.0X8MM, VIL, WSHR
4	22190	SCREW PAN HEAD, PHILIPS, M3.0X10MM
8	26965	SCREW FLATHEAD, CAP, M3.0-50X09/MM
1	87984	BRACKET PWR SUPPLY, TMC520, SLANTED OPTION
1	91075	BRACKET BOTTOM, TMC520, PANEL MOUNT KIT
1	91077-1	ASSEMBLY BEZEL, GASKET, TMC520, PANEL MOUNT
1	91657	GASKET, TMC520, PANEL MOUNT, BEZEL TO PANEL



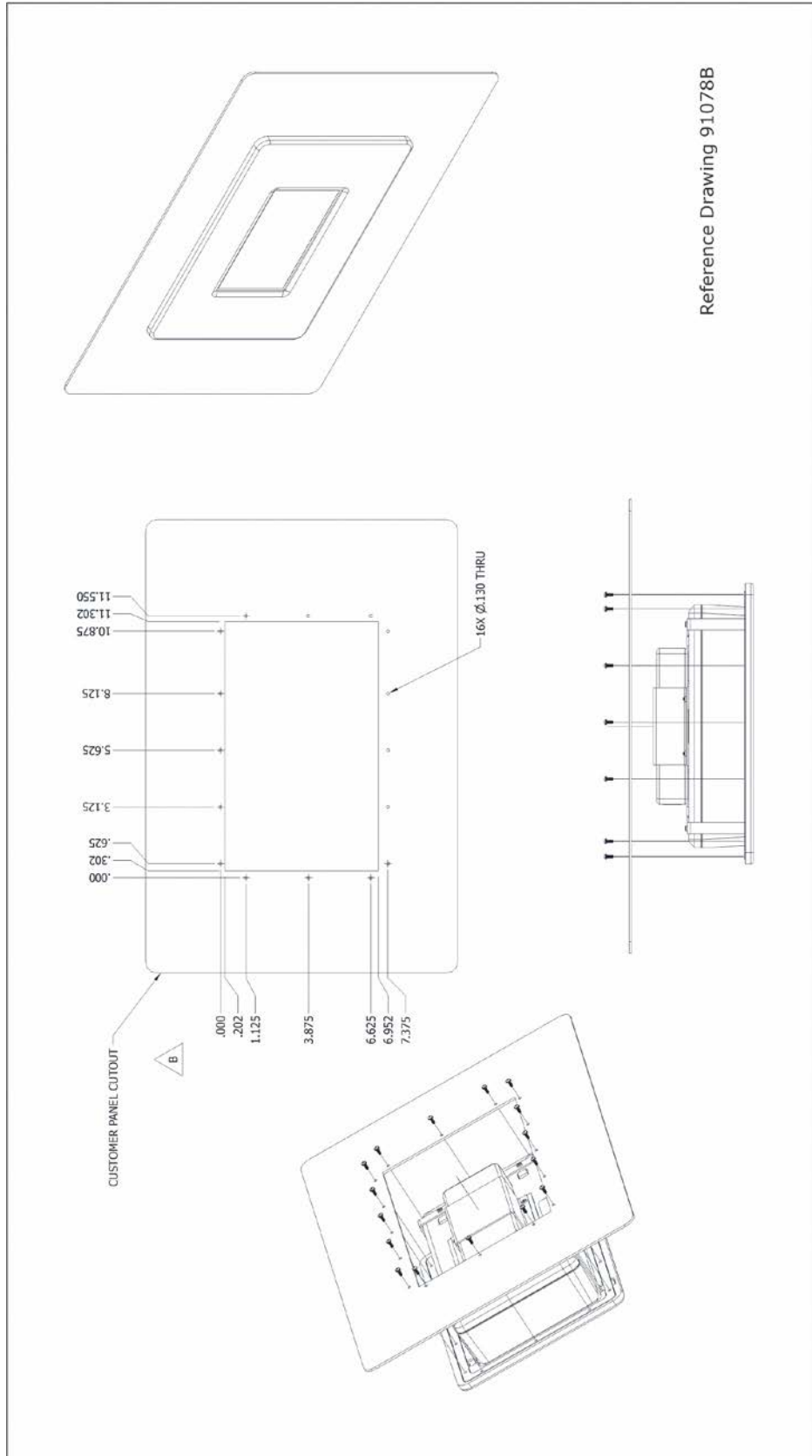
**ASSEMBLY INSTRUCTIONS:**

1. ALIGN AND CENTER THE POWER SUPPLY (87976) WITH THE BACK FACE OF THE BOTTOM BRACKET (91075).
2. PLACE THE POWER SUPPLY BRACKET (87984) OVER THE POWER SUPPLY AND SECURE TO THE BOTTOM BRACKET WITH THE 4 M3 FLATHEAD SCREWS (26965) PROVIDED.
3. CAREFULLY ALIGN AND CENTER THE TMP520C CONTROLLER (SCREEN FACING FORWARD) WITH THE VIEW WINDOW ON THE BEZEL.
4. PLACE THE SCREW TYPE/BEZEL BRACKET ASSEMBLY OVER THE CONTROLLER. THIS SECURES THE BRACKET TO THE BACK OF THE CONTROLLER WITH THE 4 M3 PAN HEAD PHILIPS SCREWS (22190) PROVIDED.
5. EVENLY PRESS THE CONTROLLER ASSEMBLY FIRMLY AGAINST THE FOAM GASKET IN THE BEZEL ENSURING NOT TO DISTORT THE GASKET WHERE IT WILL NOT EVENLY SEAL.
6. SECURE CONTROLLER ASSEMBLY TO THE BEZEL WITH THE 4 M3 FLATHEAD SCREWS (26965) PROVIDED.
7. ALIGN THE LARGE BEZEL GASKET WITH THE MOUNTING HOLES OF THE BEZEL (GASKET IS NOT SYMMETRICAL).
8. REMOVE THE ADHESIVE COVER ON THE GASKET AND SECURE TO THE GASKET WITH THE 16 M3 PANHEAD SCREWS WITH LOCK WASHERS (15328). (SHOWN ON SHEET 2).
9. INSERT THE CONTROLLER ASSEMBLY INTO THE PANEL AND SECURE WITH THE 16 M3 PANHEAD SCREWS WITH LOCK WASHERS (15328). (SHOWN ON SHEET 2).



Reference Drawing 91078B

**TMC520 Controller Dimensions – Optional Panel-Mounted Configuration**



TMC520 Controller Dimensions – Optional Panel-Mounted Configuration (page 2)

## TMC520-Based System Software

The Telesis Merlin520 PS software package comes pre-installed in the TMC520 controller. It is a graphical user interface that makes pattern marking and pattern design quick and easy.

The WYSIWYG (what-you-see-is-what-you-get) interface provides a to-scale image of the pattern as it is created.

The Merlin520 PS software includes tools to create and edit a library of pattern files for marking. Each pattern contains one or more fields; each field defines a single object.

Printable objects may be created to define text strings, arc-text strings, geometric shapes, graphics, and machine-readable data matrix symbols. Edit functions for adjustment to object size, location, or orientation.

Printable text fields may include alphanumeric characters, symbols, and special message flags. Message flags automatically insert data into the text string which may include serial numbers, times, dates and user-defined codes.

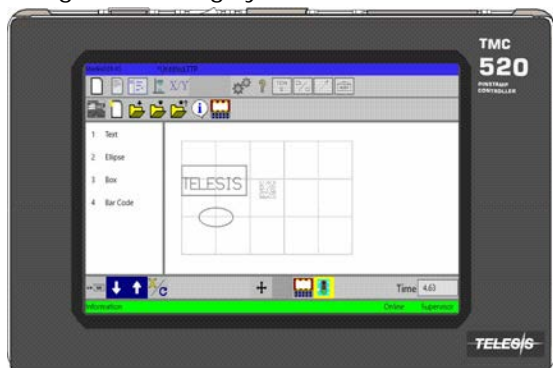
Multiple fields may be grouped and saved as a block to form a logo. Existing DXF files can also be imported for marking.

Non-printable fields can be created to clearly display a graphical representation of the part being marked.

Commands may be defined to perform specific tasks during the marking cycle (e.g., Pause, Go to, Input, or Output).

## Touchscreen User Interface

The top panel of the controller contains an integrated, 7-inch, high resolution, touchscreen monitor. The monitor displays the Merlin520 PS software and provides the user interface for operating the marking system.



## Back Interface Panel

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

**Serial Interface.** The Comm 1 port allows a 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.

**Ethernet Interface.** The Ethernet port may be used to connect a host computer 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.

**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..

**USB Interface.** The four USB ports allow you to connect a memory stick/flash drives for pattern storage/retrieval and software updates. It can also be used for keyboards and USB mouse, including wireless USB mouse and keyboard options.

**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 and rotational drive units.

## Discrete I/O Controls

The TMC520 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.** These 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 to remotely select patterns or to remotely place 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)
SPARE_1, 2, 3.....	Three (3) spares for custom applications
ONLINE .....	System status is online

## **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 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.

**TCP/IP Interface.** The Ethernet (TCP/IP) interface is most often used with host computers communicating over a local area network (LAN).

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 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 (e.g., "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.

**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.



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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 has the ability to initiate communications. If the host does not receive a response within three seconds, it should re-transmit 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 TMC520 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 currently loaded pattern with data supplied in the host message. See [DATA] for details.

**E** ..... Message Type E allows the host to take the machine offline. It also provides the option to display an error message with the provided data string.

**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 polls the system for the machine status. The machine status is returned to the host in an eight-character hexadecimal mask.

**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.

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

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

**I** ..... Message Type I polls the system for the I/O status

**[##]** ..... 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 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.

**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).

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