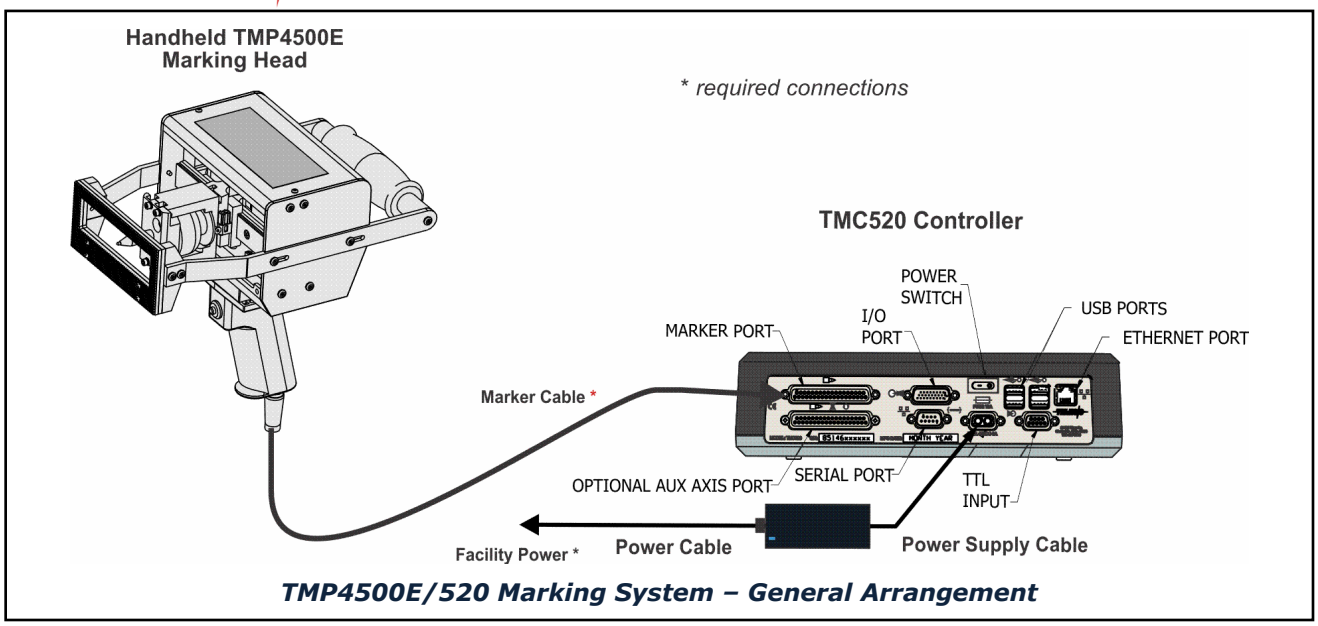


TMP4500E/520 Marking System – General Arrangement

SYSTEM OVERVIEW

The Telesis® TMP4500E marking system permanently marks messages into materials such as steel, aluminum, and plastic.

A hardened pin is accelerated to indent dot matrix characters into the item being marked at depths up to .45 mm (.018 inch) in mild steel.

Character shape, size, density, and location are determined by the user through the marking system software.

Marking Head. The marking head is an electromechanical marker. A metal-formed cover houses the internal mechanical components that position the pin cartridge. An electric solenoid fires the marking pin, and an internal spring returns the pin to its idle position within the cartridge. The marking head moves the pin cartridge through X- and Y-axis rectilinear motions to reach the correct position for each dot of the characters to be marked. The system software controls pin extension to mark the message.

The marker uses two stepper-motor drives to position the pin at coordinate-defined locations in the marking window within .006 mm (.00024 inch). The marker accommodates the rigorous dynamics of impacting, rebounding, and rapid positioning of the marking pin through a linear rail/ball bearing saddle assembly, ceramic-coated guide shaft/linear bushing assemblies, and drive motors with concentric, linear drive screws.

The lightweight and portable TMP4500E is designed for remote operation. The handheld marker incorporates a pistol grip handle with a Start Print push-button switch. A rear-mounted handle provides additional stability during marking. It can be used in virtually any orientation.

The integral standoff with its padded front surface is held against the marking surface while marking. The standoff can be adjusted forward and aft to change the pin stroke.

A tapped hole in the top of the marking head (beneath the label) allows for installation of an eyebolt. The eyebolt allows the marker to be suspended from a mechanical-assist device such as a cable or cable balancer.

Pin Cartridge. The pin cartridge is machined from engineered plastic materials and offers long life with little maintenance. Screws attach the pin cartridge to the marking head for easy removal, cleaning, and pin replacement. The cartridge/solenoid assembly can be configured for Long- or Short-Throw operation. *Long-Throw* configuration allows for deeper marks, while *Short-Throw* configuration allows for faster marking.

Marking Pins. The marking pins are made of carbide and are available in 30° and 45° cone angles.

Marker Cable. The marker cable connects the marker to the controller. The cable is 4 m (13 feet) and is pre-wired to the marking head.

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 that keeps 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

- Tool Stand (for fixed-mounting applications)
- TMC520 Controller Angle-Mounting Bracket Kit
- TMC520 Controller Wall-Mounting Bracket Kit
- TMC520 Controller Panel-Mounting Bezel/Bracket Kit
- USB Mouse and Keyboard
- USB Barcode Scanner
- Barcode Scanner or Barcode Wand with Cable
- Logo/Font Generator Software

SYSTEM SETUP

The marking head is designed to be used as a handheld marker. It can also be suspended from a cable balancer or mounted on a Telesis tool stand.

The following procedures provide only a general overview of the installation process. For complete installation instructions, refer to the *TMP4500E Installation & Maintenance Manual* and the *TMC520 Controller Installation & Maintenance Manual*.

C A U T I O N

Protect the TMC520 from potentially damaging conditions and contaminants. Ensure the marking system is electrically isolated from any devices that may generate extreme electromagnetic interference (EMI).

1. Locate the controller as close as practical to the marking head. Standard marker cable length is 4 m (13 feet).
2. Install the controller as a tabletop, wall-mounted, or panel-mounted unit.
3. Ensure the controller power switch is **OFF**.
4. Connect the marker cable to the controller.
5. Connect the power supply cable to the controller, the power cable to the power supply (if not already connected), and then 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.
6. Position the controller power switch to ON.
7. Start the marking system software.
8. Adjust the pin stroke, drive air, and return air for impact depth.

TMP4500E MARKING HEAD

Specifications

The TMP4500E marking head specifications are subject to change without notice.

Dimensions	See *TMP4500E Handheld Marking Head Dimensions*
Rating	NEMA® 1 (I. P. 30)
Weight	3.82 kg (8.4 lb), marker & cable 3.00 kg (6.6 lb), marker only
Noise	81.4 dB (maximum) 73.1 dB (LEQ) See *Marking Noise*
Vibration	Does not exceed 2.5 m/s2 See *Vibration Data*
Marking Area (W x H)	100 x 25 mm (4.0 x 1.0 inches)
Number of Impact Pins	1
Pin Types	30° or 45° cone angle
Pin Type	Carbide with 30° or 45° cone angle
Pin Stroke (maximum)	
Long Throw	8.26 mm (.325 inch)
Short Throw	4.45 mm (.175 inch)
Operating Temperature	0° to 50°C (32° to 122°F), non-condensing
Humidity	10% to 80%

Marking Characteristics

The TMP4500E can produce character sizes from 1.5 to 25 mm (.060 to 1.0-inch) increments. Characters can be rotated 359° in 1° increments with a printing resolution range from 4 dots/cm (10 dots/inch) to 31 dots/cm (80 dots/inch) for an engraved look. The depth of mark can be adjusted by adjusting the pin stroke and the Depth parameter in the marking system software.

Marking Speeds

The system can mark 3.175 mm (.125-inch) characters in the 5 x 7 font at a rate of 2 characters per second at a depth of .45 mm (.018 inch) in mild steel.

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 is based on several factors: the type of material being marked, how hard or abrasive it is, dot density, duty cycle, required marking depth, etc. On typical metals with a hardness of Rockwell Rb60 (aluminum and similar metals), marking at a depth of .127 mm (0.005 inch) and 5x7 font, the 25 series powdered metal pins average at least 10 million impressions before needing sharpened. Carbide pins average two to three times as long as powdered metal pins. These numbers can vary substantially, based on the application.

Vibration Data

Total hand-arm vibration does not exceed 2.5 m/s^2.

Vibration tests were performed under controlled conditions imitating typical operation.

Conditions such as rigidity of the work piece, material, and machine settings 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 must remain the responsibility of end users. End users should conduct their own tests to establish safe working levels of use.

The vibration tests were conducted using the following parameters:

Pin Stroke	8 mm (.31 inch) Long Throw
Marking Base	20 mm (.79-inch) thick steel
Marking Surfaces	3 mm (.125-inch) thick steel plate
Marking Mode	Dot
Text Marked	QWERTYUI12345678 5 x 7 font, 3 mm (.12-inch) characters

The worst-case scenarios under the given test conditions are listed in the following tables:

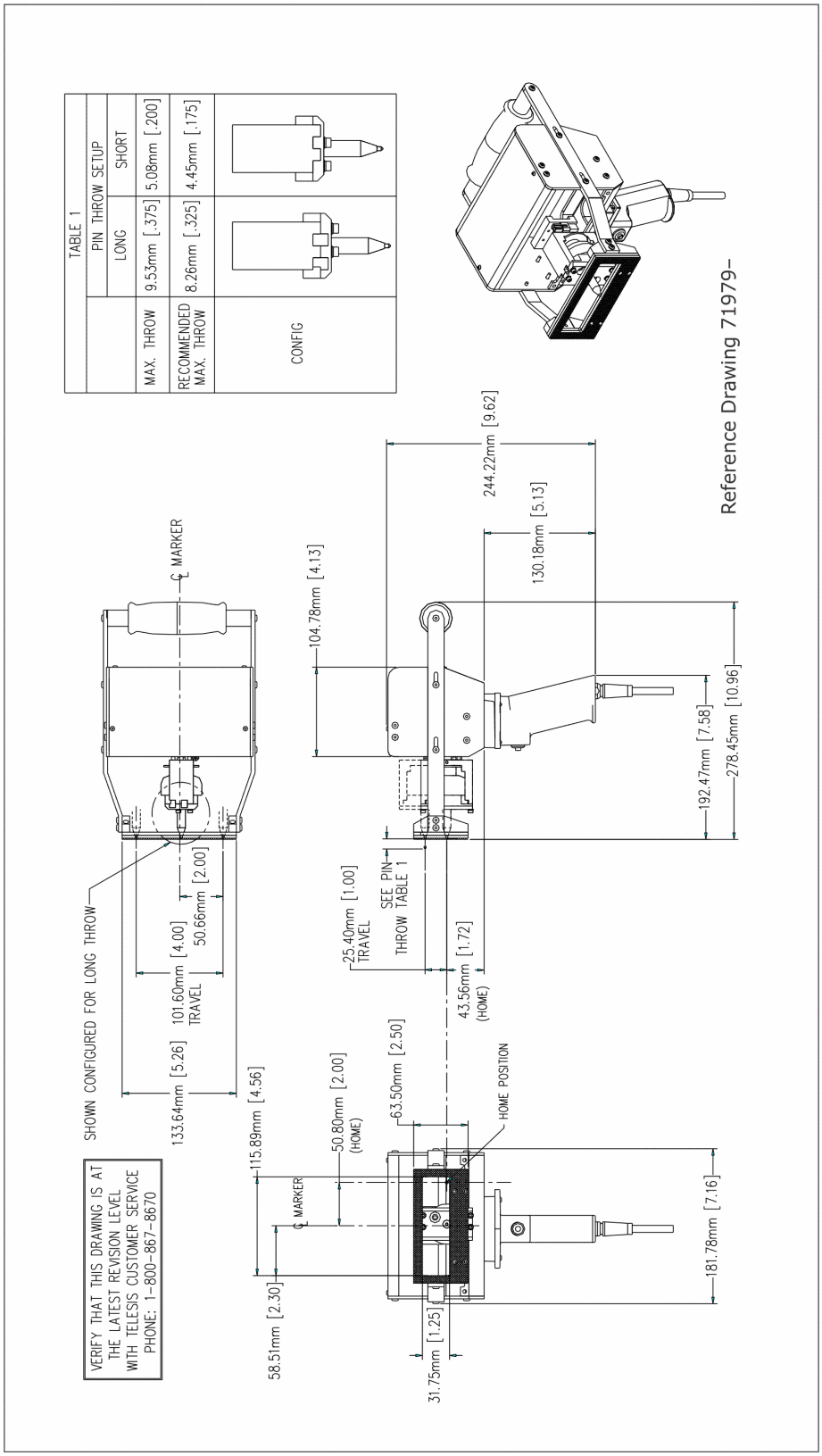
Pistol Grip Handle		
VM	**$T_{(EAV)}$**	**$T_{(ELV)}$**
0.933 m/s^2	more than 24 hr	more than 24 hr

Padded (rear-mounted) Handle		
VM	**$T_{(EAV)}$**	**$T_{(ELV)}$**
0.87 m/s^2	more than 24 hr	more than 24 hr

VM = hand/arm Vibration Magnitude.

$T_{(EAV)}$ = time to reach the Exposure Action Value based on continuous marking.

$T_{(ELV)}$ = time to reach the Exposure Limit Value based on continuous marking.



TMP4500E Handheld Marking Head Dimensions

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, UL
Configurations	Tabletop, wall-mounted, panel-mounted
Rating	(I. P. 40) tabletop, wall-mounted, panel-mounted
Dimensions	refer to the appropriate *TMC520 Controller Dimensions* 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, RS-232, 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)

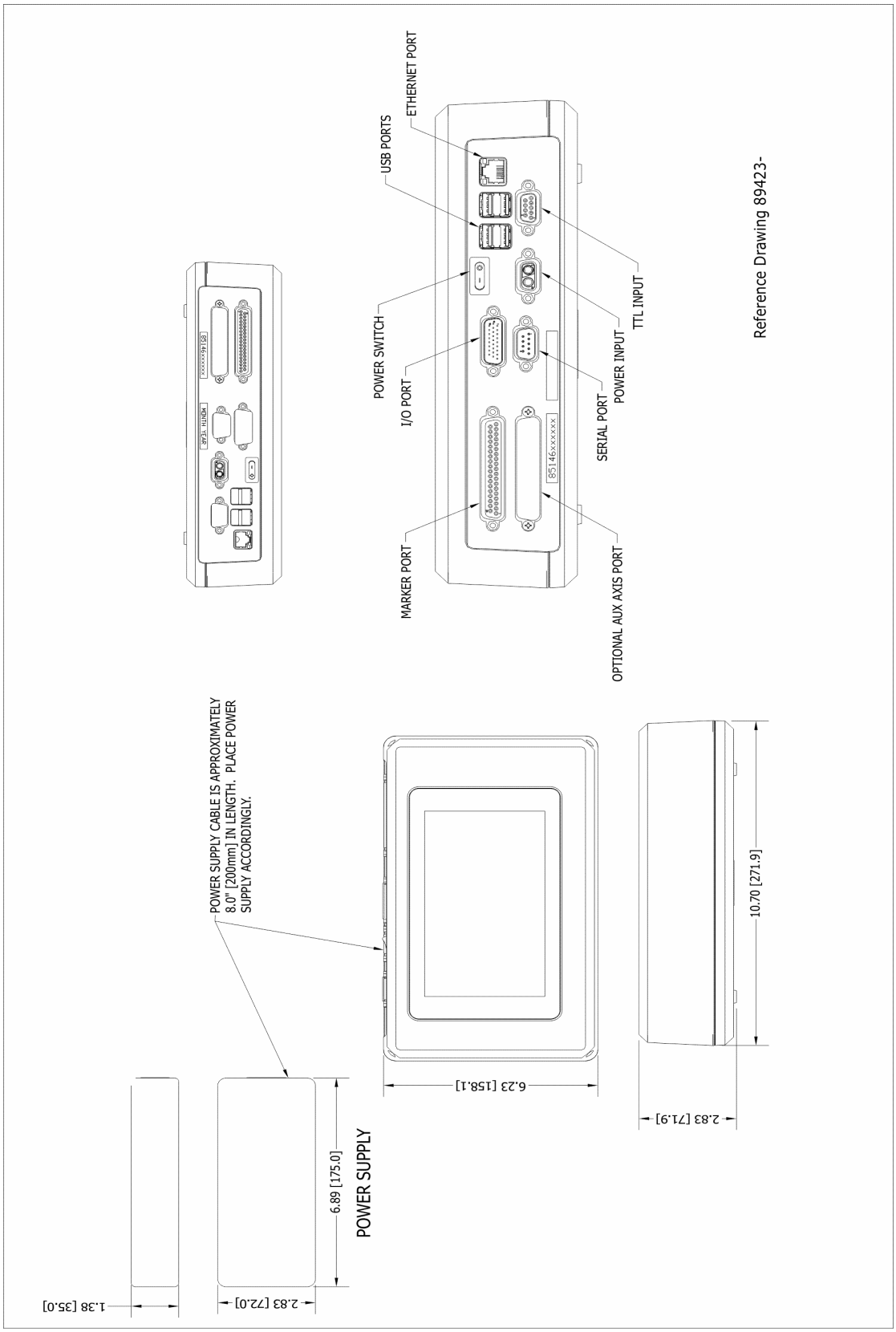
Environmental Considerations

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

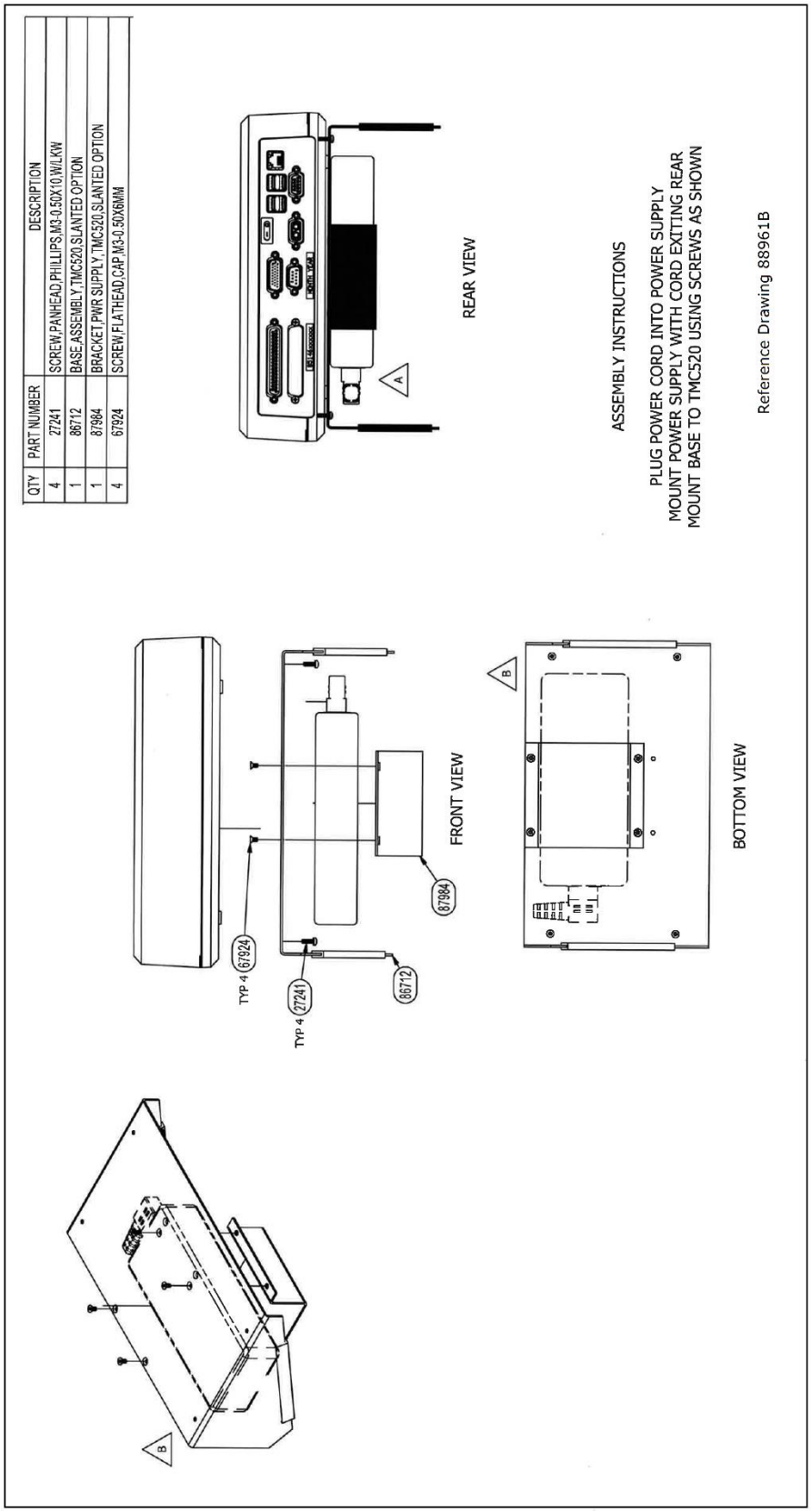
Contaminants. The non-vented TMC520 is rated (I. P. 40). When used in environments where liquid contaminants are present, the controller **must** be located where it can be protected.

To facilitate such installations, Telesis offers an optional panel-mounting kit for use with an appropriate customer-supplied panel or enclosure.

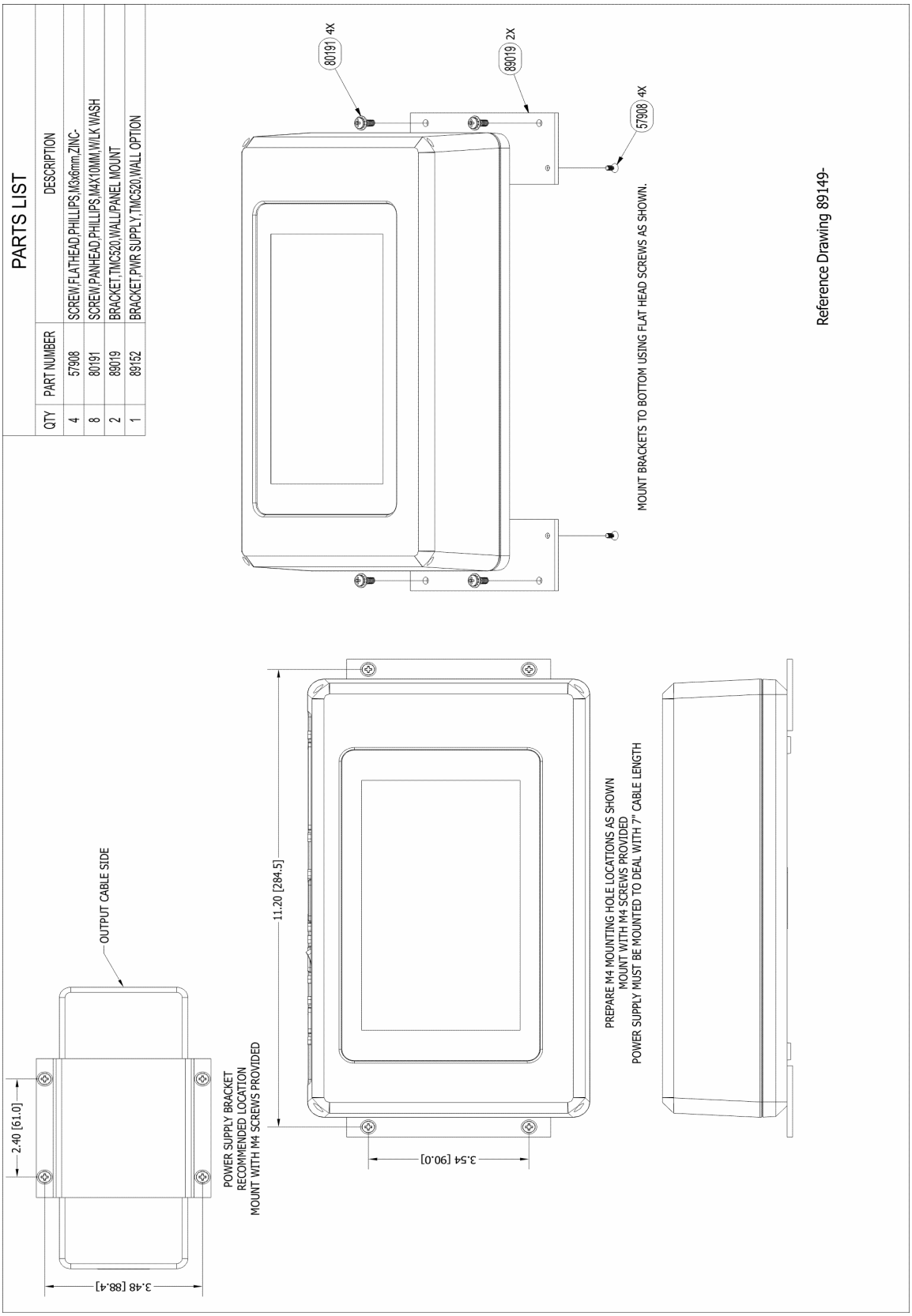
EMI Susceptibility. Although the system has been found to be in compliance with pertinent susceptibility standards, care should be taken when installing near welders and other extreme generators of electromagnetic interference (EMI). Particular care should be taken to ensure welder currents are not injected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



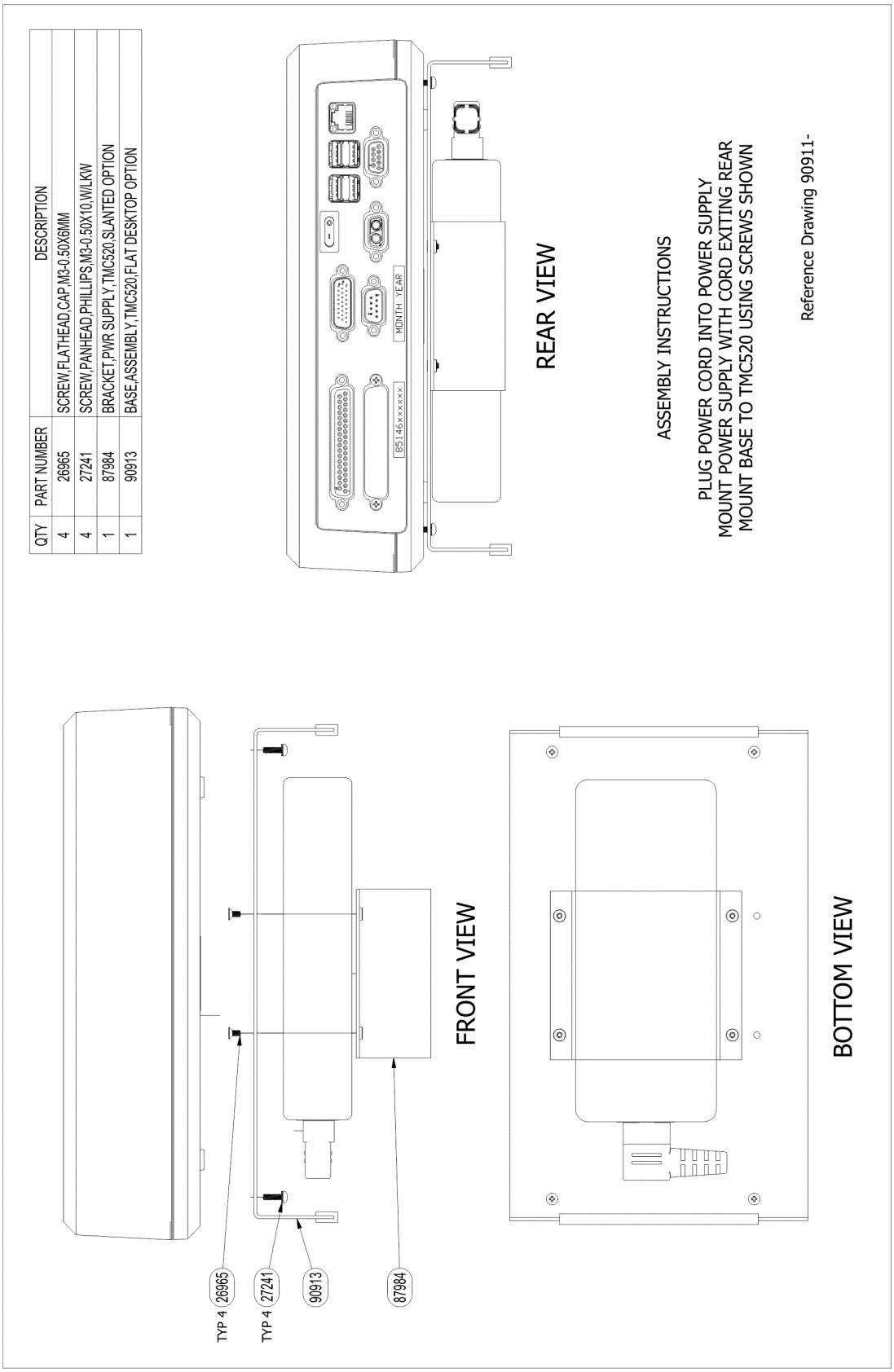
TMC520 Controller Dimensions – Tabletop Configuration



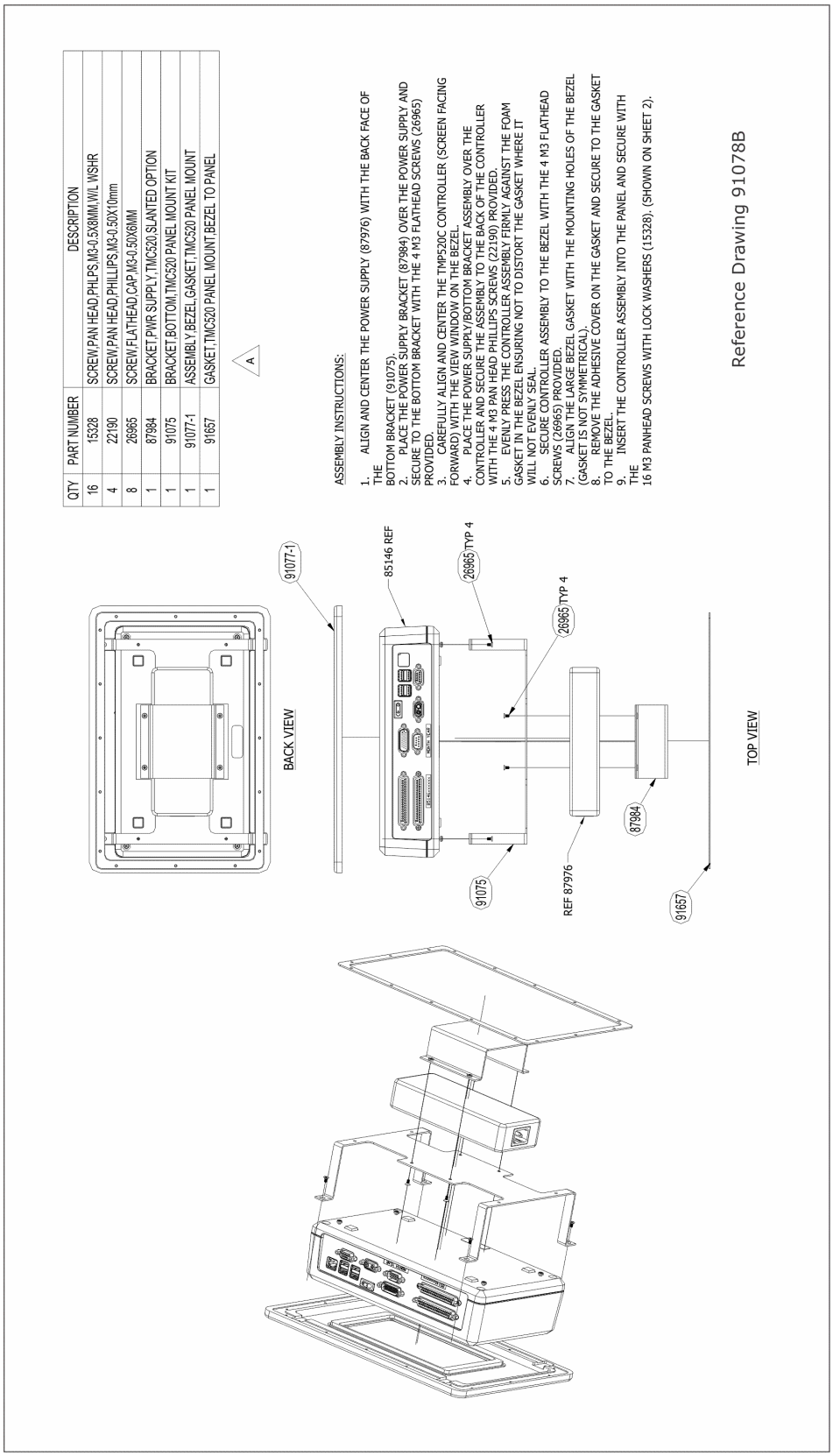
TMC520 Controller Dimensions – Angle Table-Mounted Configuration



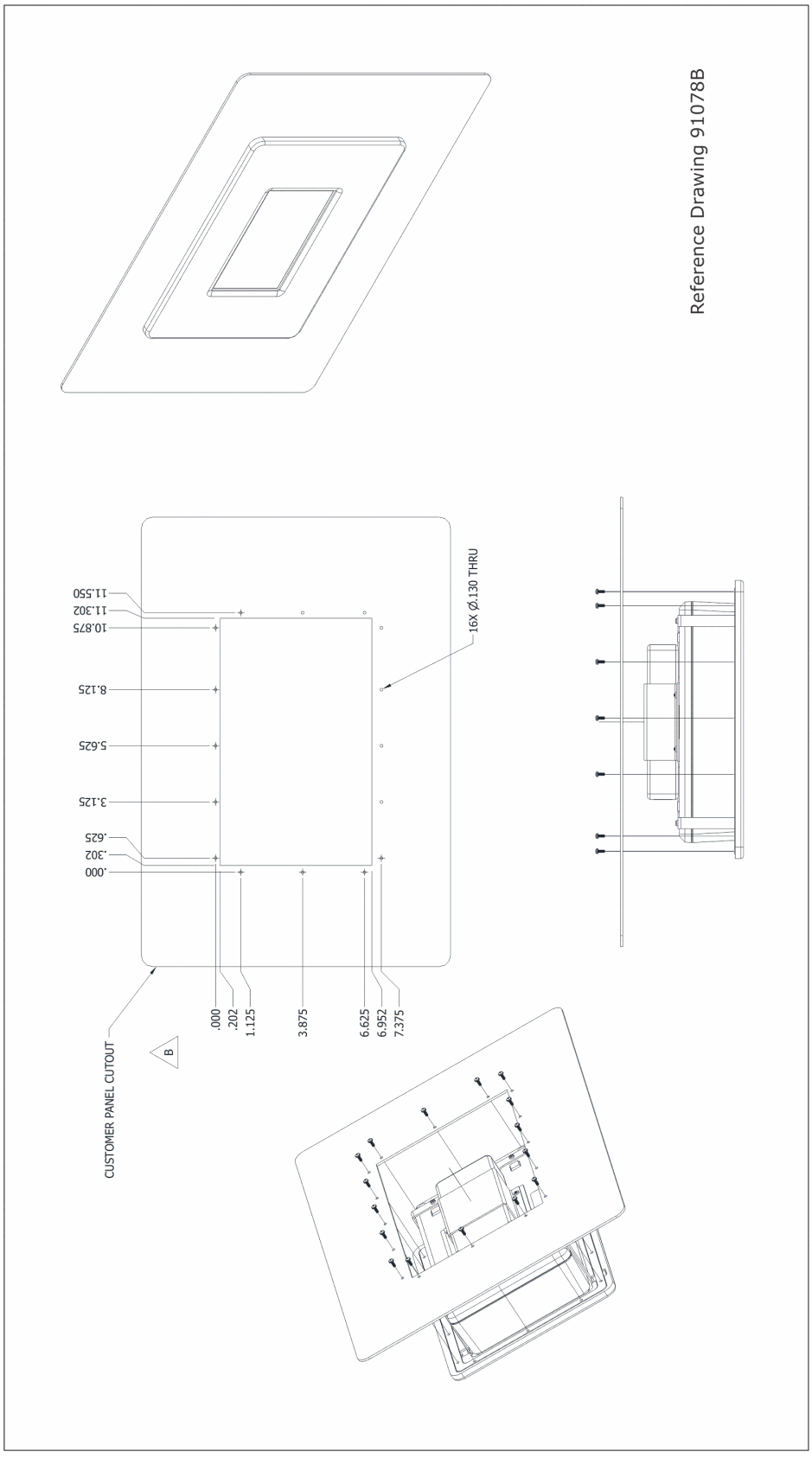
TMC520 Controller Dimensions –Wall-Mounted Configuration



TMC520 Controller Dimensions –Flat Table-Mounted Configuration



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 is a graphical user interface that makes pattern marking and pattern design quick and easy. The software comes installed in the TMC520 controller.

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

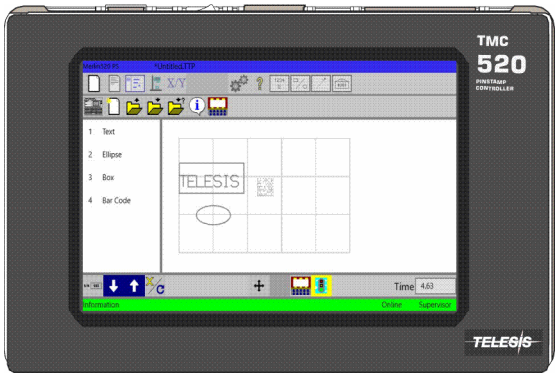
Existing DXF files can also be imported for marking.

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

Commands can be defined to perform specific tasks (for example, Pause, Go to, Input, or Output) during the marking cycle.

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 ports for connecting the marker, host computers, logic controllers, optional accessories, and remote I/O devices.

Serial Interface. The Comm 1 port allows a connection to a remote serial device, such as a host computer or a barcode 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 drive for pattern storage and retrieval and software updates. It can also be used for a USB barcode scanner, keyboard, and mouse, including wireless keyboard and mouse options.

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

Discrete I/O Controls

The TMC520 is configured for 12 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 and loads up to 127* pattern files
SPARE_1, 2, 3.....	Three (3) spares for custom applications

*The SEL_6 signal can 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. 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)
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 host computers, terminals, barcode scanners, and other remote devices. 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 and dynamic addressing.

Programmable Protocol. Use this protocol where very simple one-way communications are required (such as with barcode 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 (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 the 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 to indicate 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 Types 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 has the ability to 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 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 the 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 of displaying an error message box with the provided data string.
- **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.
- **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 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.

[##] 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).

TRADEMARKS