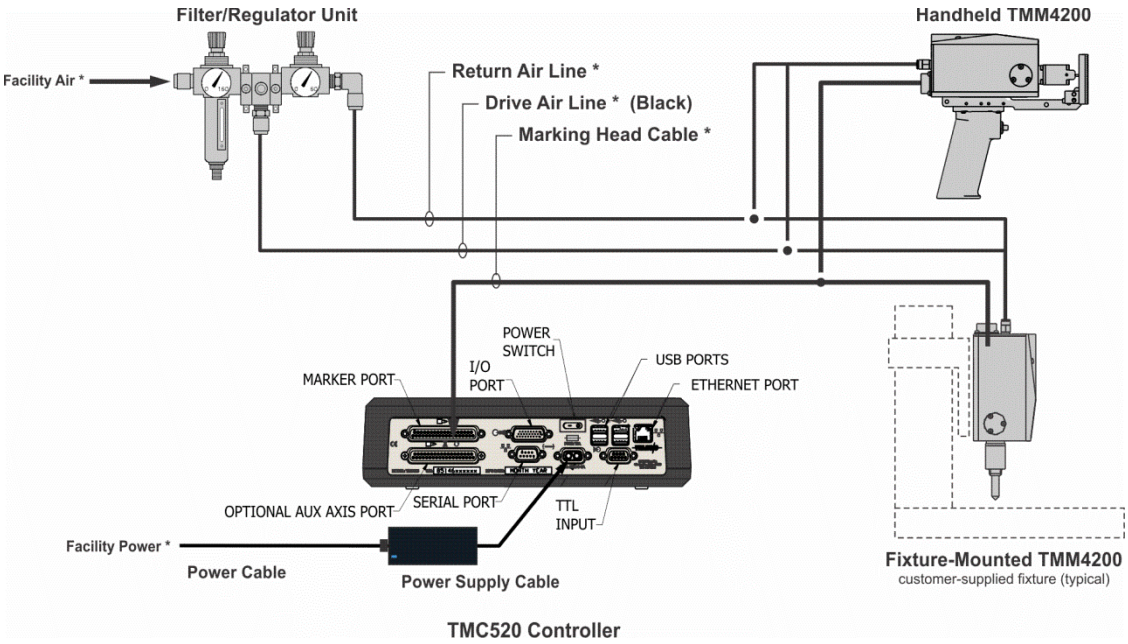


TMM4200/ TMC520 Marking System – General Arrangement Drawing

SYSTEM OVERVIEW

The Telesis® PINSTAMP® TMM4200/520 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 is compliant with UL, CSA, CE, and RoHS specifications.

TMM4200 Marking Head. The TMM4200 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.

A *shield plate* around the pin cartridge assembly helps prevent debris from entering the marking head cavity.

The TMM4200 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 (Fine mode) and .032 mm (Standard mode).

The TMM4200 uses a rack-and-pinion drive system to rapidly position the pin cartridge and to accommodate the dynamics of impacting and rebounding.

The floating pin design allows 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.

TMM4200 Configurations. TMM4200 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 fixture-mounted unit is available for mounting in a fixed location.
An optional debris shield around the pin cartridge assembly can be installed to help prevent objects from entering the marking head.

Pin Cartridges. The standard system uses non-lubricated, lightweight pin cartridges for the 25S-series and 150SA-series pins.

Cartridges for 25S pins are available in two configurations: four (4) pins spaced on 6 mm centers or on 12 mm centers.

The cartridge for 150SA pins contain two (2) pins spaced on 25 mm centers.

The cartridge configuration dictates the size of the marking window along the X-axis. Refer to the *TMM4200 Marking Head Dimensions* drawings for details.

Marking Pins. The TMM4200 uses 25S-series and 150SA-series marking pins available in various cone (tip) angles.

The 25S-series pins are made of powdered steel stainless steel with diamond tips or carbide.

The 150SA pins are made of powdered steel or tool steel with carbide tips.

Refer to the *TMM4200 Marking Head Dimensions* drawings for pin stroke (pin extension) dimensions.

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 cables lengths are available.

TMC520 Controller. The TMC520 controller runs the Merlin520 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.

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 pins; return air pushes them back into the cartridge. Standard air lines are 4 m (13.1 ft) and are made of 6 mm tubing.

SYSTEM OPTIONS

- Mounting Post with Hand Crank (19.3 inches [492 mm] travel)
- 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
- USB Mouse and Keyboard
- USB Barcode Scanner
- Barcode Scanner or Barcode Wand with Cable
- Foot Switch (Start Print) or Push Button Station (Start/Abort)
- Standoff Hanger Kit (handheld markers only)
- Standoff V-Block Kit (handheld markers only)

SYSTEM SETUP

Complete installation procedures are provided in the *TMM4200* and the *TMC520 Installation & Maintenance Manuals*. The following procedures are listed only to provide an 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

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).

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 (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.
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.

TMM4200 MARKING HEAD

Specifications

The TMM4200 marking head specifications are subject to change without prior notice.

Dimensions	refer to the appropriate *TMM4200 Marking Head Dimensions* drawing
Rating	NEMA® 2 (I.P. 41) with optional, protective debris shield installed
Weight	
Handheld	1.86 kg (4.08 lb), excluding cable
Fixture-mounted	1.58 kg (3.47 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	Refer to the TMM4200 Marking Head Dimensional drawing
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 TMM4200 can produce characters as small as 0.75 mm (0.03 in) high.

Text strings can be rotated 180° 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 the drive air pressure.

To optimize quality and speed, three 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
- *Continuous mode* prints with only one pin at a time tracing the character shape.

Pin Life

Pin life depends on the type of material being marked, how hard or abrasive it is, the marking density 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.

Marking Speeds

The system is capable of marking four (4) characters per second (two characters per pin per second) using a two-pin cartridge to print 3 mm (0.118 in)-high characters in the 5x7 font. Speeds will vary depending on the selected character size, style, and dot density. Specific times can be verified by a Telesis representative.

Marking Depth

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

Marking Noise

Sound 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.

Vibration Data

Vibration tests were performed under controlled conditions imitating typical operation.

Conditions such as rigidity of the work piece, material, and setting of the machine, vary in operational use and 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, 5mm (.20 in) characters HHHEEE000888 5x7 font, 3mm (.12 in) characters

Test results reflecting the worst-case scenarios under the given test conditions are listed in the following table:

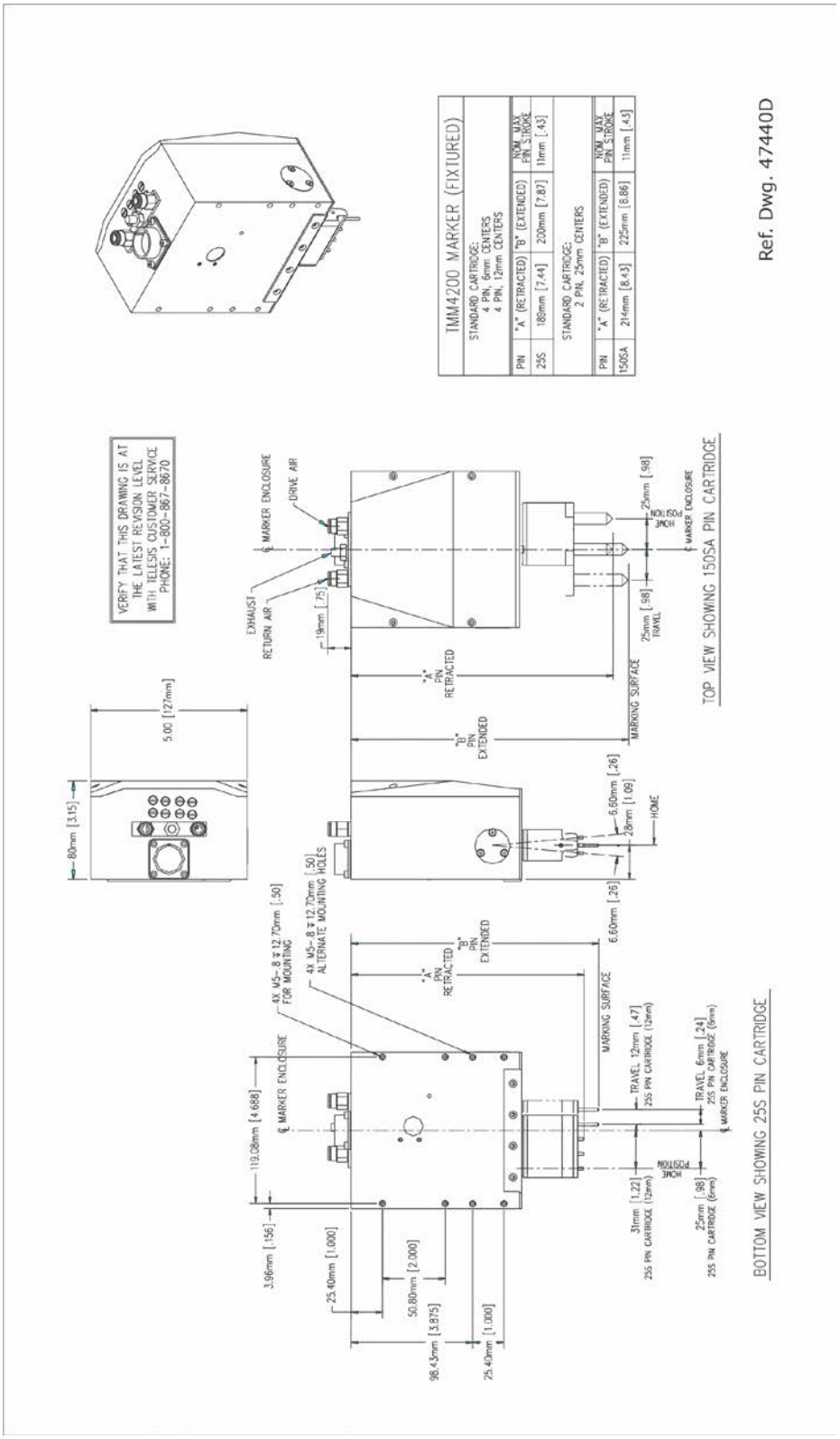
Steel Marking Surface			
Pin	**VM**	**$T_{(EAV)}$**	**$T_{(ELV)}$**
25C	0.4 m/s^2	more than 24 hr	more than 24 hr
150SA	0.8 m/s^2	more than 24 hr	more than 24 hr
Aluminum Marking Surface			
Pin	**VM**	**$T_{(EAV)}$**	**$T_{(ELV)}$**
25C	0.6 m/s^2	more than 24 hr	more than 24 hr
150SA	1.2 m/s^2	more than 24 hr	more than 24 hr

where:

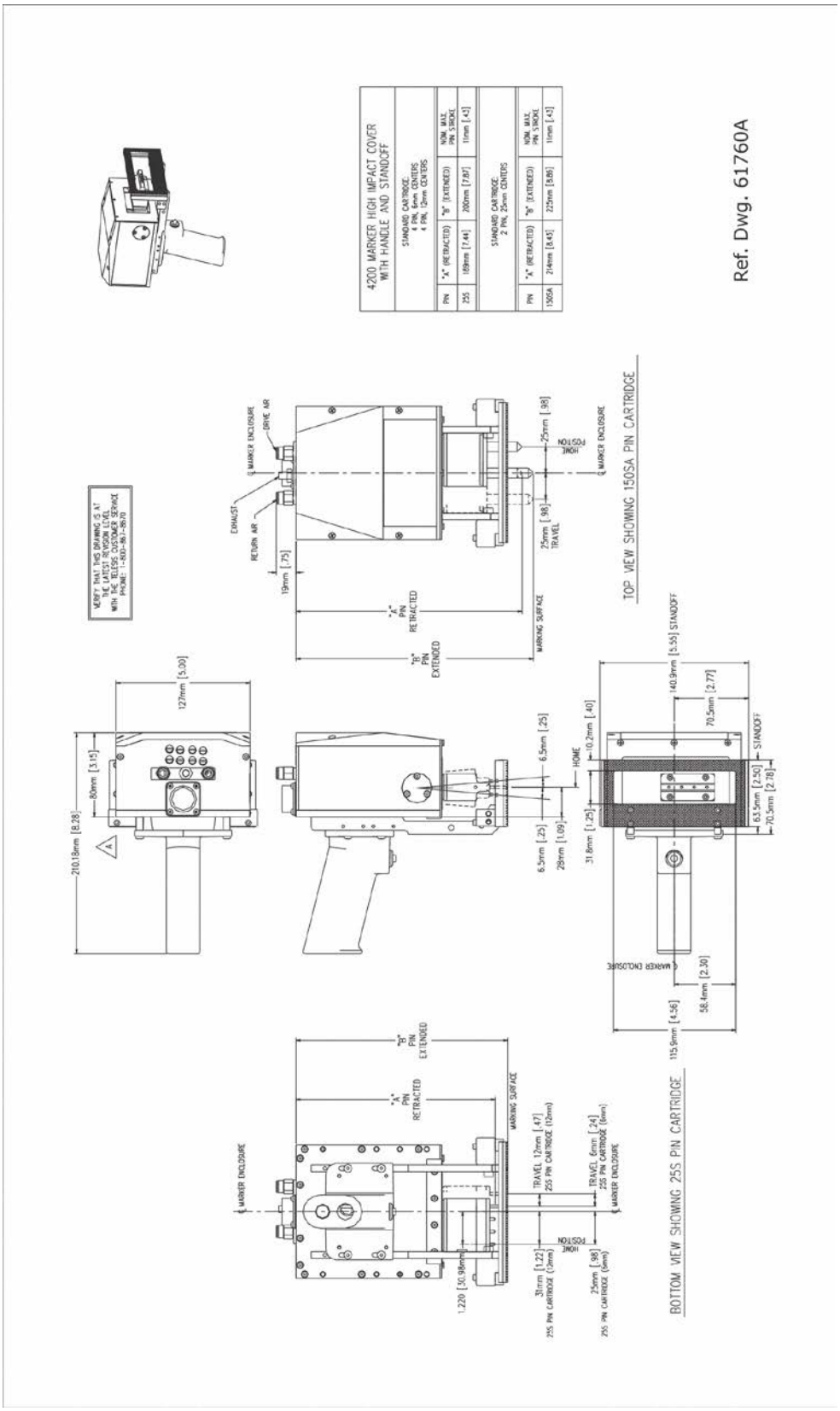
VM = hand/arm Vibration Magnitude.

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

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



TMM4200 Fixture Mounted Marking Head Dimensions



TMM4200 Handheld Marking Head Dimensions

TMC 520 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.

TMC 520 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)

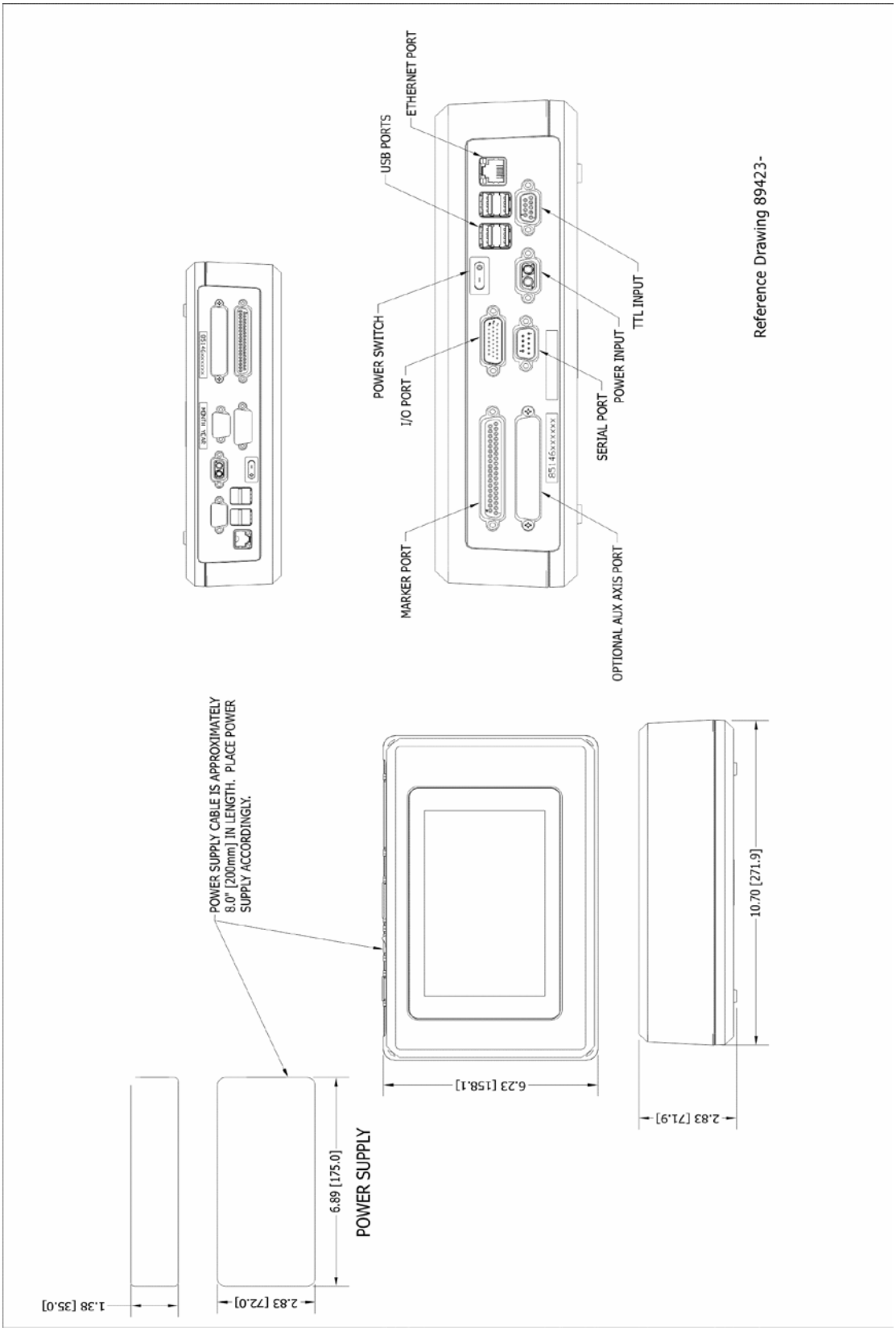
Environmental Considerations

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

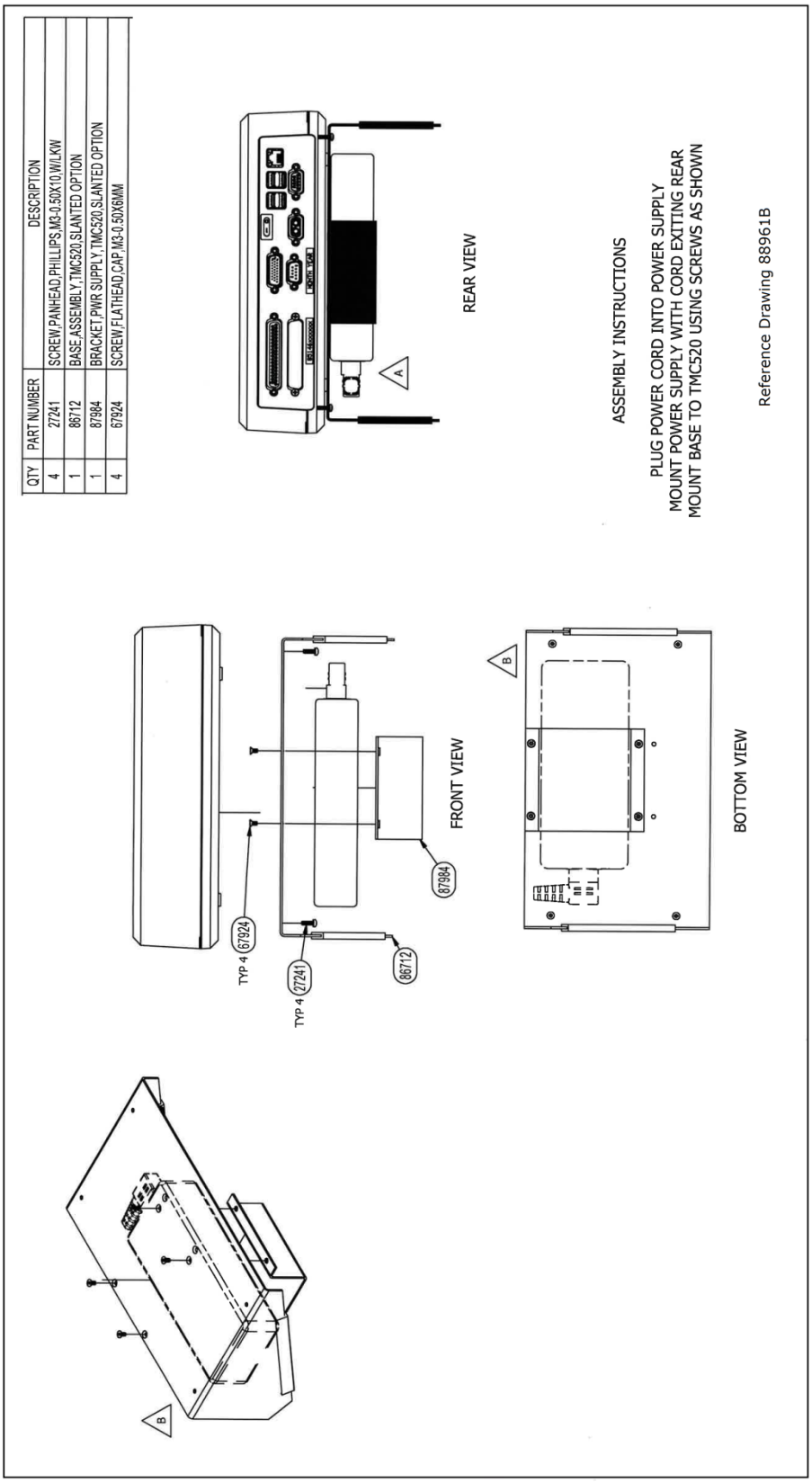
Contaminants. The non-vented TMC520 is rated (IP40). When used in environments where liquid contaminants are present, the controller **must** be located where it can be protected.

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

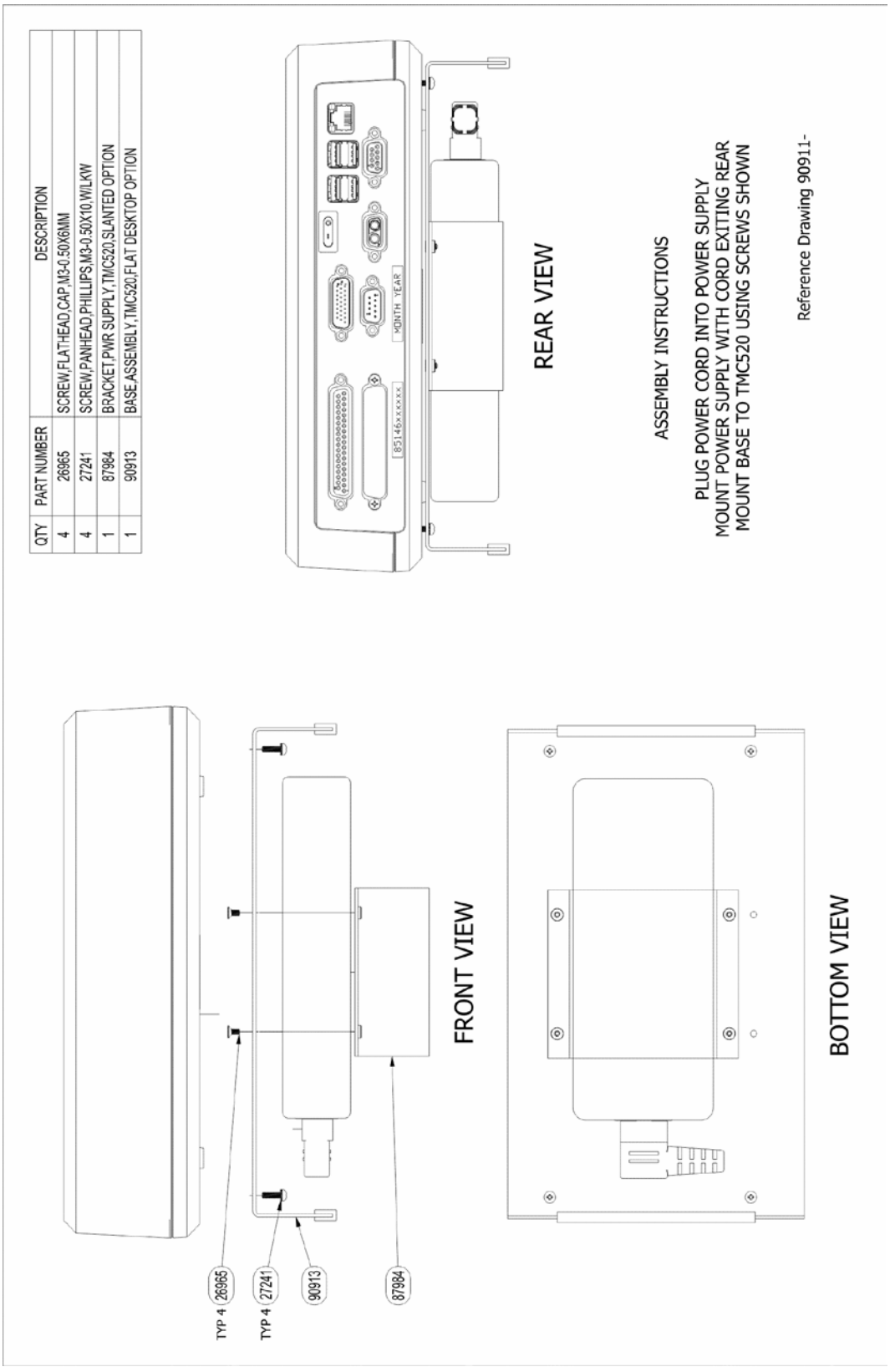
EMI Susceptibility. Although the system has been found to be in compliance with pertinent susceptibility standards, care should be taken when installing near welders and other extreme generators of electromagnetic interference (EMI). Particular care should be taken to ensure welder currents are not injected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



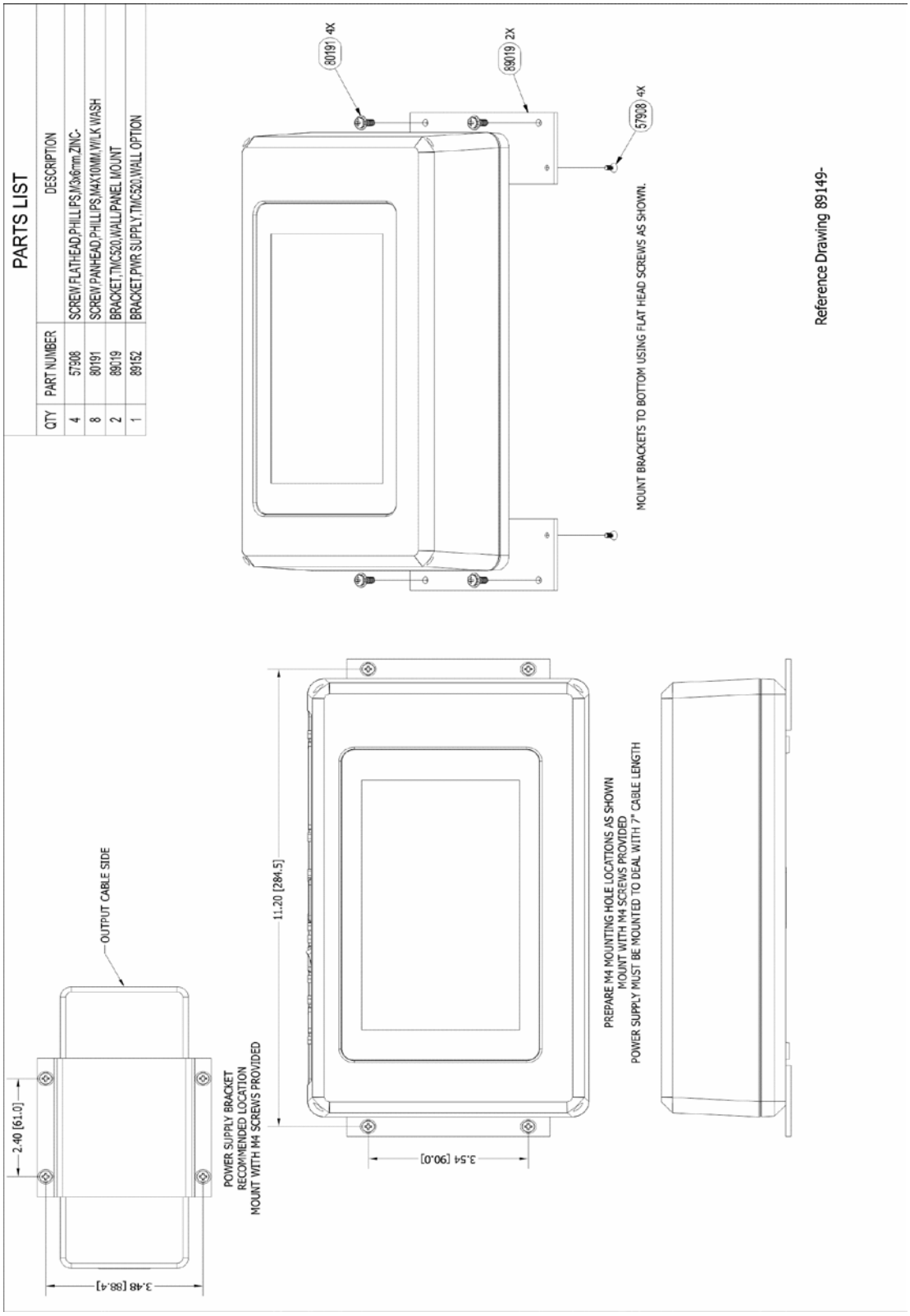
TMC 520 Controller Dimensions – Tabletop Configurations



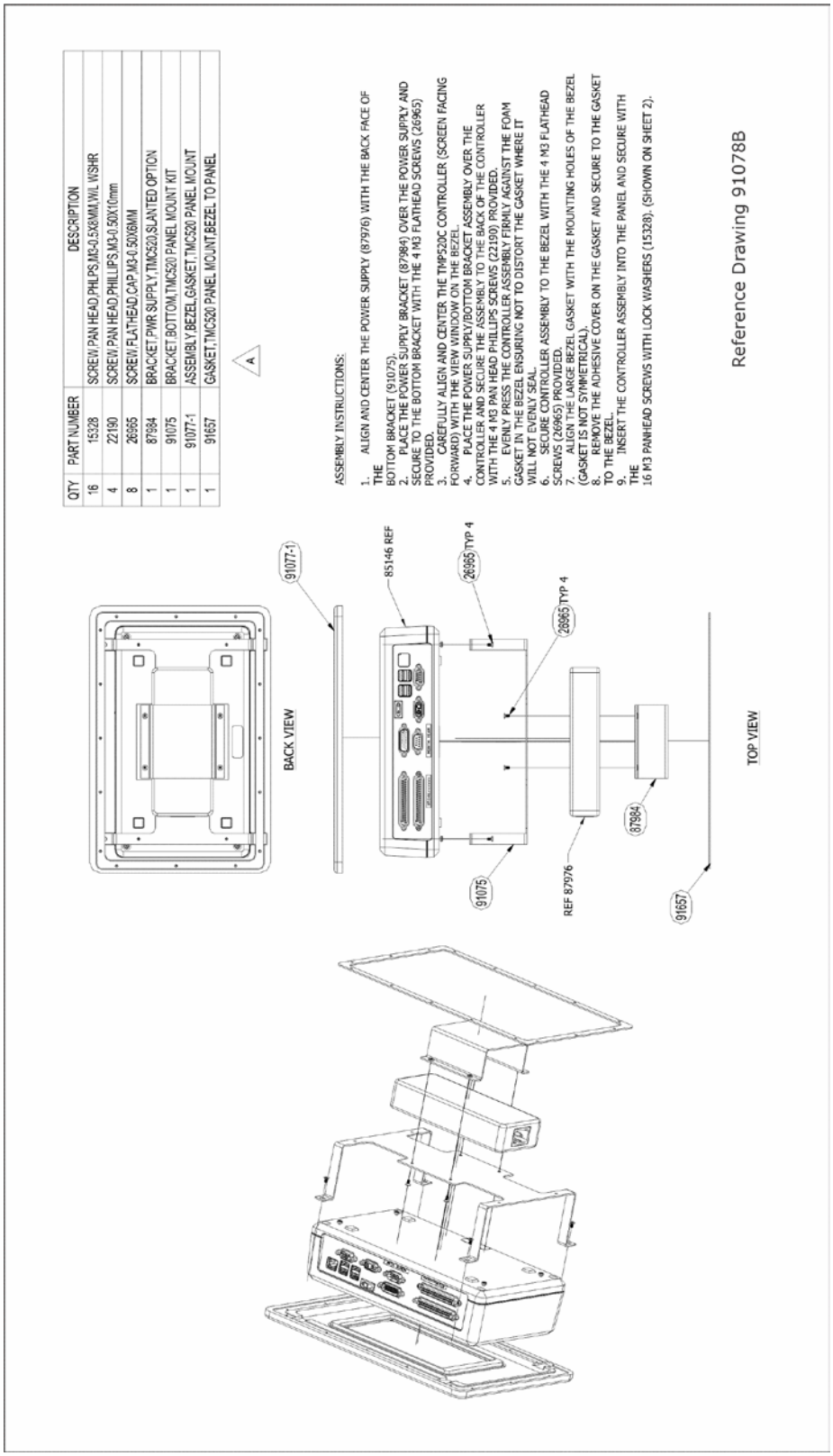
TMC520 Controller Dimensions – Optional Angle Table-Mounted Configuration



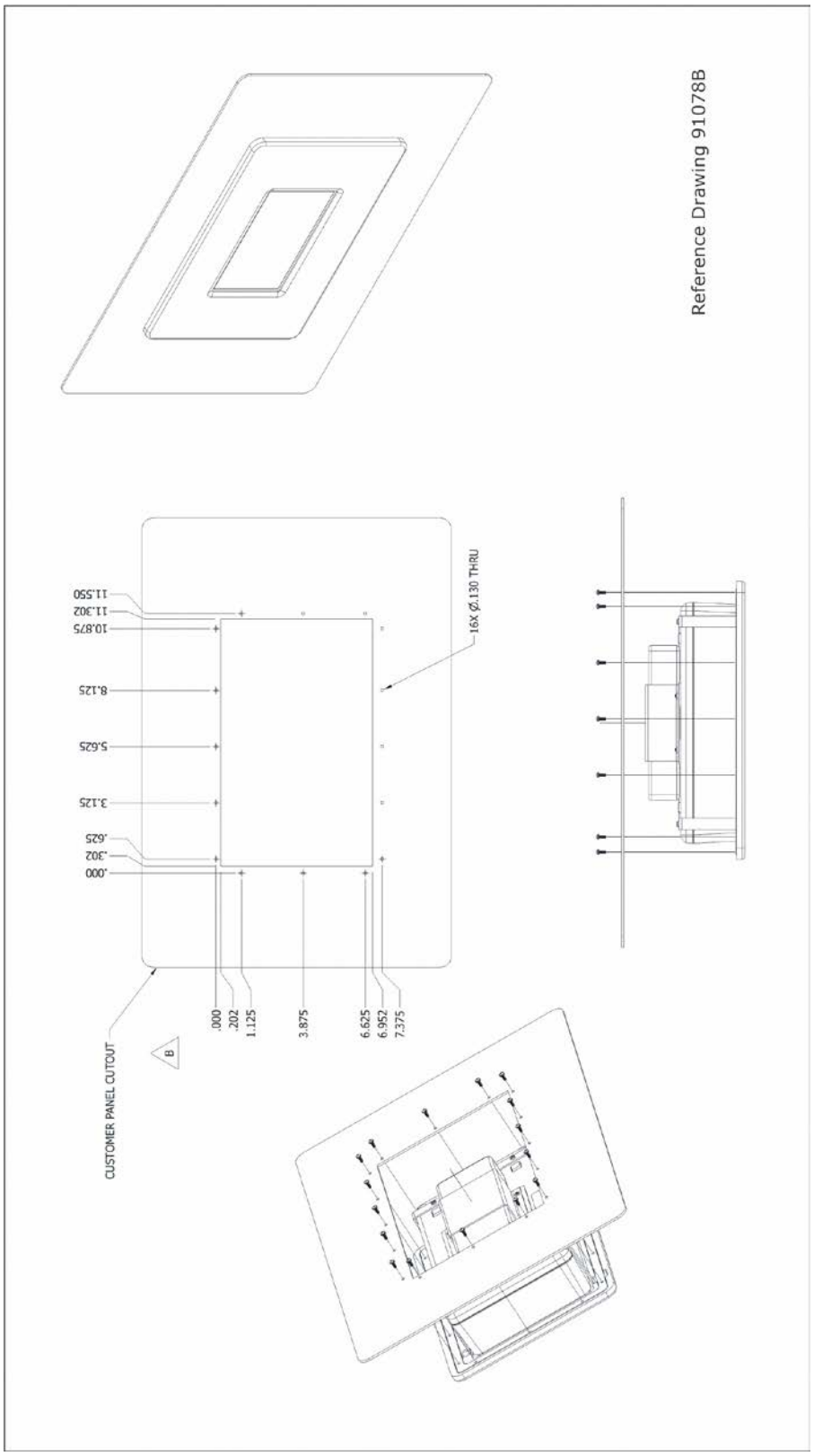
TMC520 Controller Dimensions – Optional Flat Table-Mounted Configuration



TMC520 Controller Dimensions – Optional Wall-Mounted Configuration



TMC520 Controller Dimensions – Panel-Mounted Configuration



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

TMC 520-Based System Software

The Telesis Merlin520 software package is a graphical user interface that makes pattern marking and pattern design quick and easy. The software comes pre-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 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 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.

Touch Screen User Interface

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

TMC 520 Controller with Touch Screen Monitor and Merlin 520 Software

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

* The system software allows the SEL_6 signal to be configured for remotely selecting patterns or for remotely placing the marker online. If used to place the marker online, pattern selection is reduced to a maximum of 63 patterns.

Output Signals. These 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 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.
- **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 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).

TRADEMARKS