

SYSTEM OVERVIEW

The Telesis® SC5000/420 TeleScribe® Marking System permanently inscribes messages into materials such as steel, aluminum, and plastic.

Marking is accomplished by a hardened pin that is pneumatically pressed into the surface being marked. As the marking head moves the pin cartridge through the X/Y axes, the tip of the extended pin displaces the material being marked to form continuous-line characters.

The system software controls pin extension and retraction to mark the message. The shape, size, and location of the inscribed characters are determined by the user through the system software.

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

Marking Head. The SC5000 marking head includes the mechanical motion components to position the marking pin at precise X/Y positions and the pneumatic components to extend the pin from and return the pin to the pin cartridge.

The marking head is an X- and Y-traversing mechanism. Using two stepper motor drives, it accurately and rapidly positions the pin at coordinate-defined locations in the marking window within .001 inch (.025 mm). The SC5000 accommodates the rigorous 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 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.

Marker Cable. The marker cable connects the marking head to the controller. The head cable is a highly flexible cable. The standard cable length is 13 feet (4 m). Optional cable extensions are available for greater distances.

Pin Cartridges. Lightweight pin cartridges are provided for the marking pins. The machined cartridges, piloted to resist shear loads, offer long life with little maintenance. The cartridge is attached to the marking head with four bolts to allow for easy removal, cleaning, and pin replacement.

Marking Pins. Marking pins for the SC5000 are available in various cone angles, radius tips, and piston diameters. An optional diamond-tip pin is also available. Refer to the *SC5000 Marking Head Dimensions* drawing for maximum pin extension, or *pin stroke*.

Filter/Regulator Unit. The filter/regulator unit includes two regulators with pressure gauges to control the drive air and return air. The unit contains a filter to help remove contaminants from the supply air. Two air lines connect the regulated air to the marking head. Drive air extends and holds the impact pin while scribing; return air pushes it back into the cartridge. The standard drive/return air lines are 12 feet (3.6 m) and are made of 1/4-inch tubing.

Controller. The TMC470 controller provides a text-only operator interface and allows full operational control of the SC5000 marking head. It contains an integrated keyboard with an LCD display. The back panel provides the electrical interface for connecting to optional remote I/O sources. Refer to *TMC470 Controller Specifications* for details.

SYSTEM OPTIONS

- Drawn Sheet Metal Cover (fixtured applications)
- Welded Steel Plate Cover (custom applications)
- Marking Head Extension Cables
- Marking Head Mounting Post
- TMC470 Controller Wall-Mounting Bracket Kit
- TMC470 Controller Panel-Mounting Bezel/Bracket Kit
- TMC470N NEMA® Enclosure
- Barcode Scanner or Barcode Wand with Cable
- Foot Switch (Start Print) or Push Button Station (Start/Abort)
- Backup Utility Software
- Upgrade Utility Software
- Logo/Font Generator Software

SYSTEM SETUP

The optional drawn sheet metal cover allows for fixture-mounting. When designing the fixture, allow for three-axis adjustment to aid in horizontal, vertical, and lateral alignment of the marking head.

The optional welded steel plate cover allows for custom applications that include handles and clamping mechanisms suspended from a cable balancer.

1. Mount the marking head to a suitable, rigid structure. Refer to the mounting drawing for dimensions and hole locations.

CAUTION

Mounting bolts must not extend more than 5/8 inch (15 mm) into the marking head.

2. Use the provided brackets to mount the filter/regulator assembly within 12 feet (3.6 m) of the marking head.
3. Connect the Drive air line and the Return air line to the Drive and Return fittings, respectively, on 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 the vents in the bottom of the case. Ensure the marking system is electrically isolated from any devices that might generate extreme electromagnetic interference (EMI).

5. Locate the controller as close as practical to the marking head. Standard marking head cable length is 13 feet (4 m).
6. Install the controller as a tabletop, wall-mounted, panel-mounted, or enclosure-mounted unit.
7. Ensure the controller power switch is **OFF**.
8. Connect the marker cable to the marking head and 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 marking depth.

Specifications

The SC5000 marking head specifications are subject to change without notice.

Dimensions.....	refer to the appropriate <i>SC5000 Marking Head Dimensions</i> drawing Note: The overall dimensions of the marking head might be reduced for custom applications.
Weight	35 lb (15.9 kg) with optional sheet metal cover
Operating Temperature.....	32° to 122°F (0° to 50°C), non-condensing
Air Supply.....	Clean and dry, 60 to 120 psig (4.2 to 8.3 bar)
Air Consumption	
Idle	0.04 SCFM
Marking	0.6 SCFM
Marking Area	7.5 x 2.5 inches (190 x 63 mm)
Pin Material.....	Tungsten Carbide (optional diamond tip)

Marking Characteristics

The SC5000 can produce characters as small as .06 in. (1.5 mm), printed at any angle within the 7.5 x 2.5 inches (190 x 63 mm) X/Y marking window. Character strings can be marked at any angle (0° to 359° rotation) in 1° increments. The system can also mark arcs and arc text.

Marking Speeds

Marking speeds vary widely, depending on character size. For example, .125-inch (3 mm) characters can be marked at a maximum of 1.7 characters per second. Smaller characters might be marked faster; larger characters might require longer marking times. Specific marking 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.

Marking Noise

The SC5000 provides virtually silent marking with a maximum noise level of approximately 72 dBA.

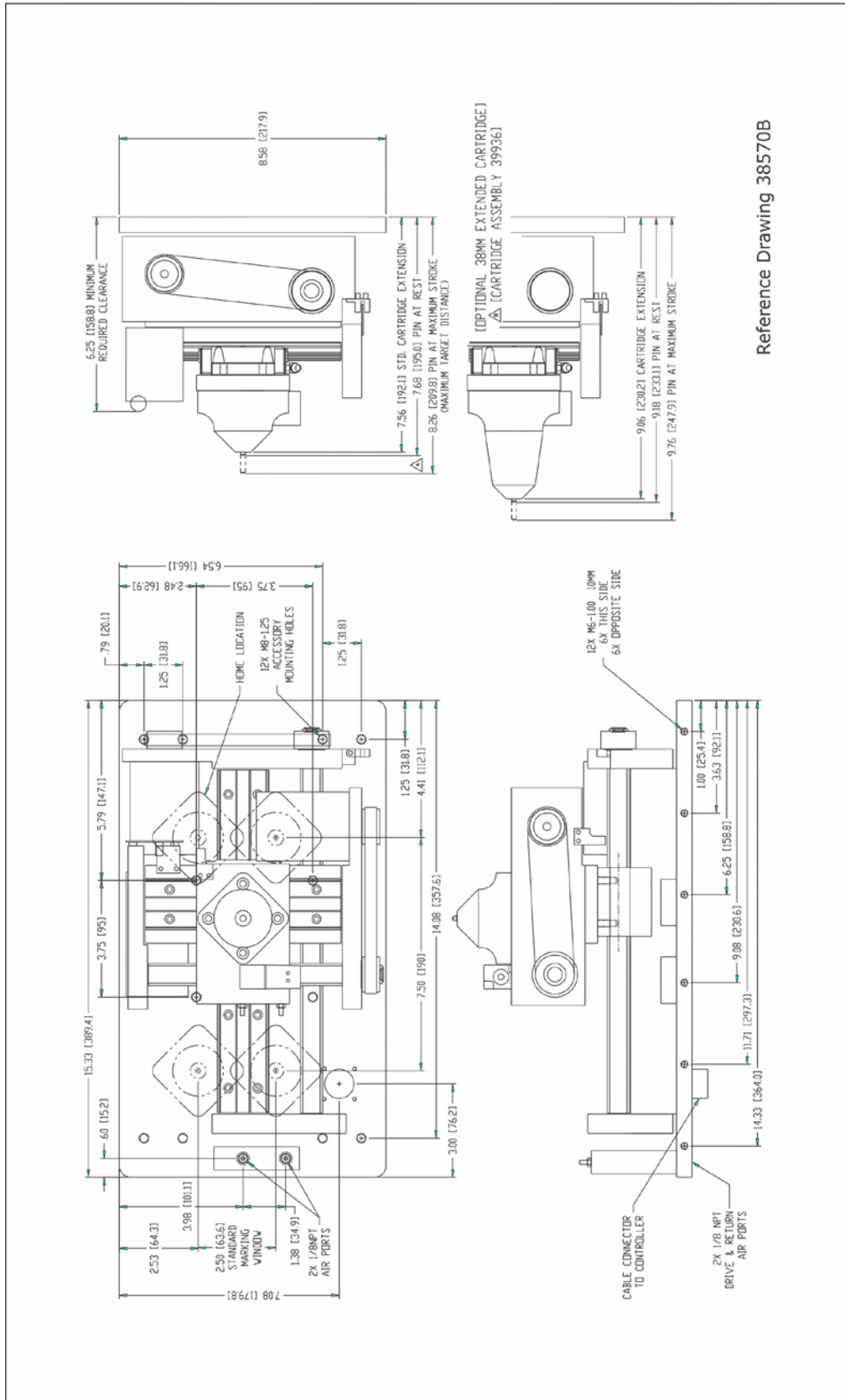
Marking Depth

The depth of mark can be adjusted by changing the drive air pressure. Maximum marking depths vary widely, depending on the material being marked, the thickness of the material, the marking pin selection, and the air pressure setting.

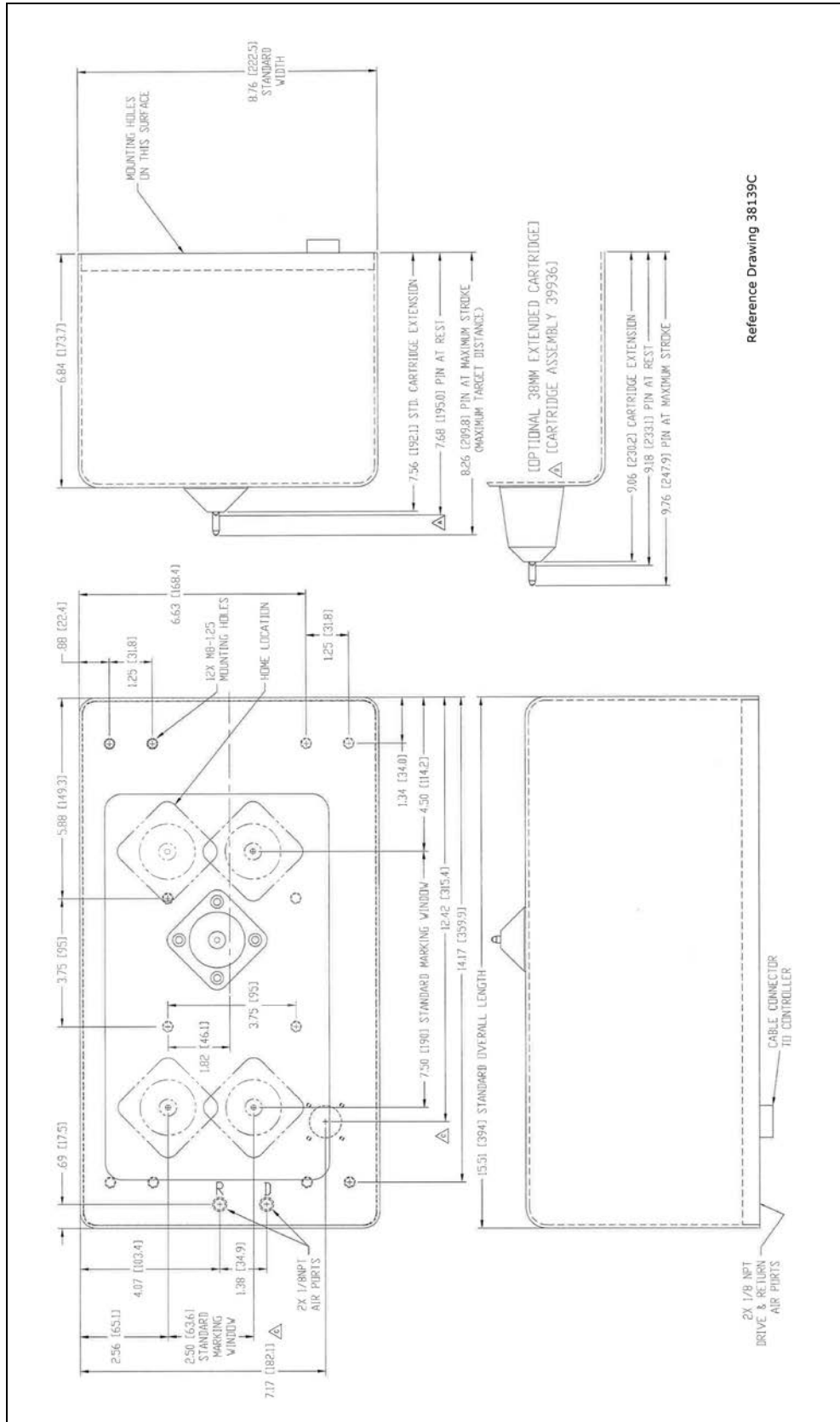
In cold-rolled steel with a thickness of .030 inch (.75 mm) or more, marking depths up to .006 inch (.15 mm) can be achieved.

In aluminum with a thickness of .040 inch (1 mm) or more, marking depths up to .010 inch (.25 mm) can be achieved. In thinner materials, the maximum marking depth can increase significantly. Specific marking depths can be verified by a Telesis representative.

SC5000/470 Marking System



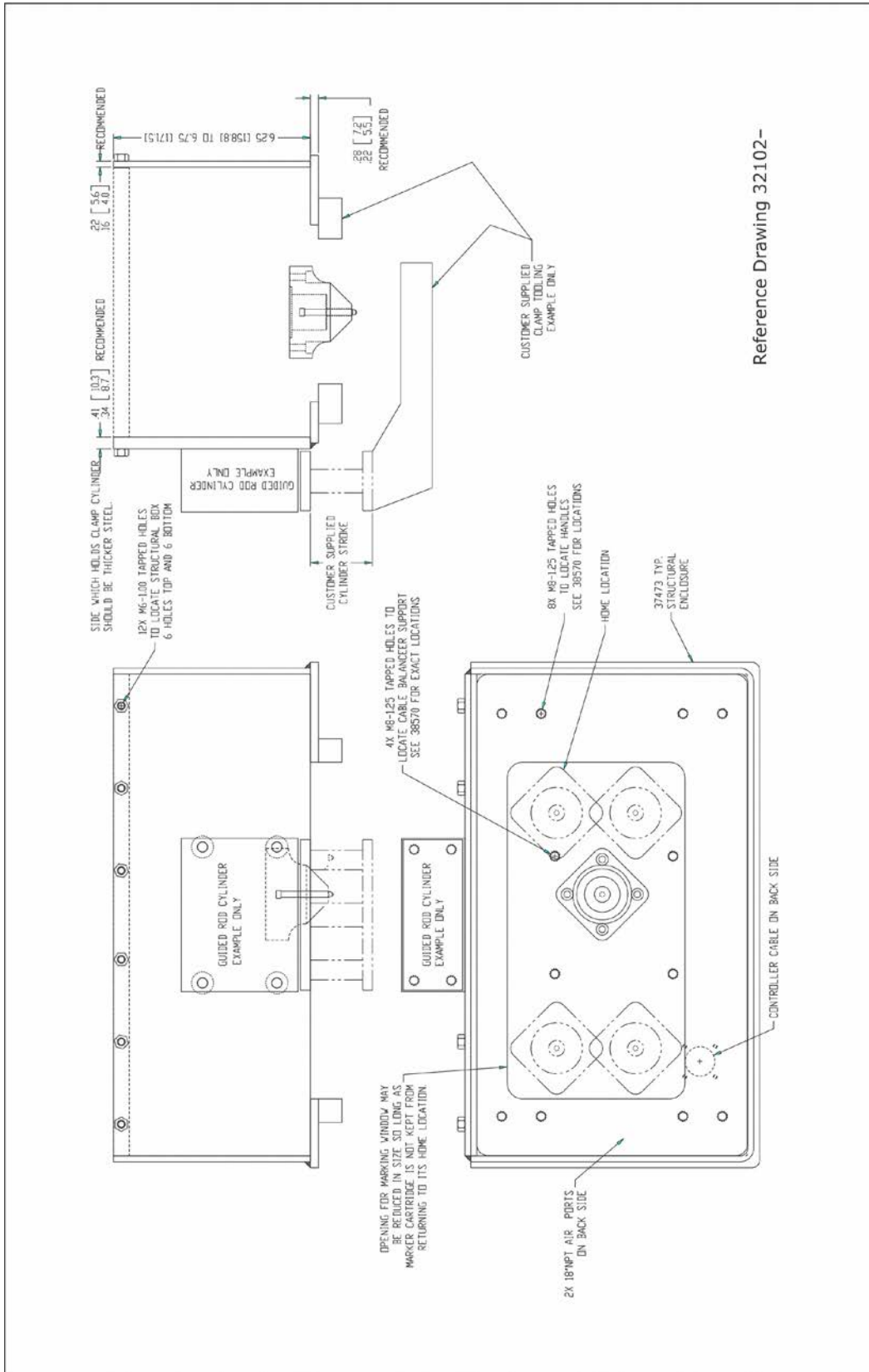
SC5000 Marking Head Dimensions (No Cover)



Reference Drawing 381.39C

SC5000 Marking Head Dimensions (Drawn Sheet Metal Cover)

SC5000/470 Marking System



SC5000 Marking Head Dimensions (Welded Steel Plate Cover)

TMC470 Controller

The TMC470 controller can be installed as a tabletop, wall-mounted, panel-mounted, or enclosure-mounted unit. All configurations provide features and connectivity for external communications. Differences occur only in the mounting configuration.

TMC470 Specifications

The TMC470 controller specifications are subject to change without notice.

Table with specifications for TMC470 Controller including Compliance (CE, RoHS), Configurations (Tabletop, wall-mounted, panel-mounted, enclosure-mounted), Rating (NEMA 1, NEMA 12), Dimensions, Weight (3.69 lb to 28.1 lb), Operating Temperature (32° to 122°F), Operating Humidity (10% to 80%), Cooling (Internal fan), Power Requirements (95 to 250 VAC), Communications (TTL, RS232, RS485, TCP/IP, USB), Input Signals (12 total), and Output Signals (6 total).

Environmental Considerations

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

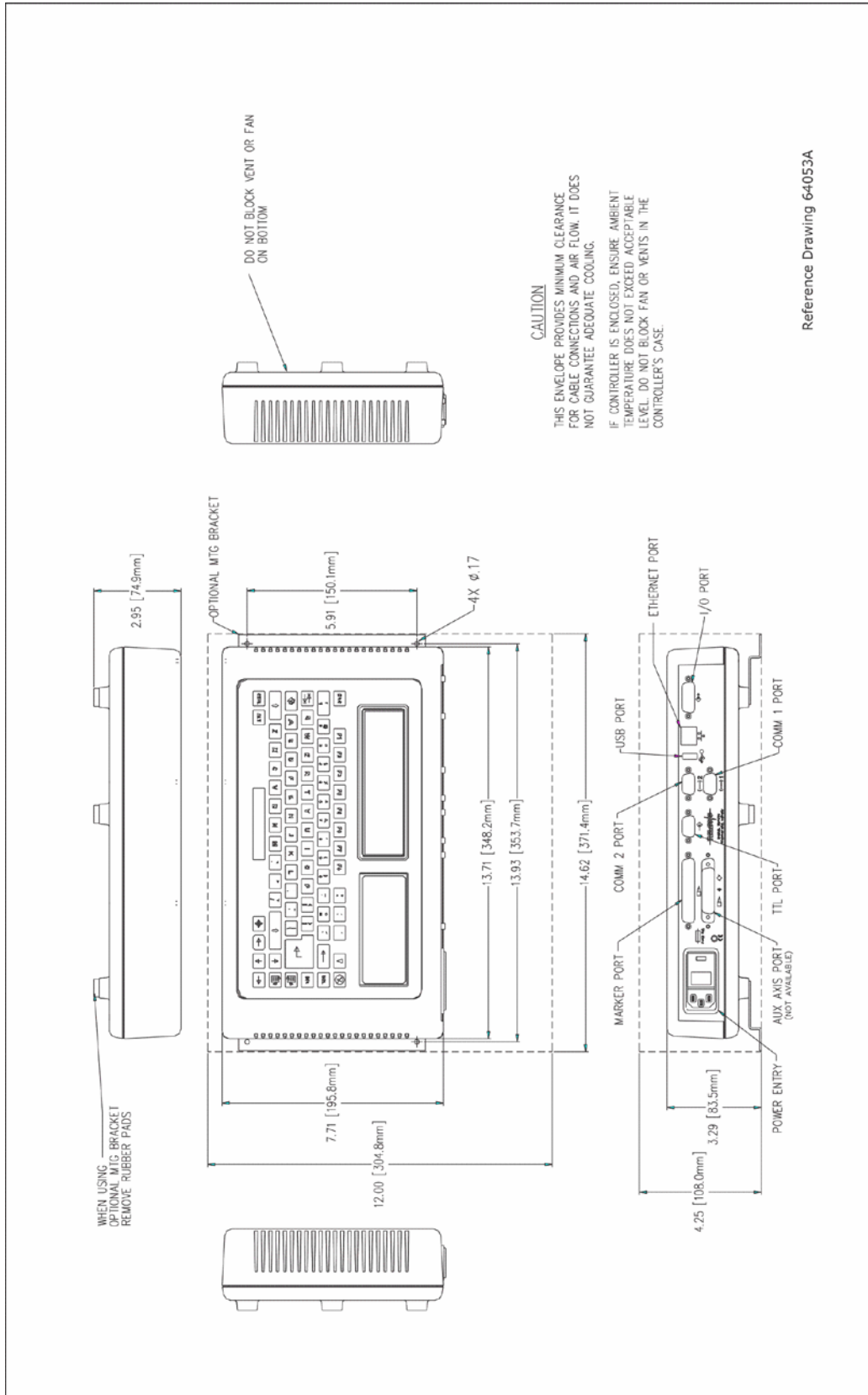
Contaminants. The vented TMC470 is rated NEMA 1 (I. P. 30) and contains a thermostatically controlled, variable-speed fan. In environments where solid or liquid contaminants are present, contaminants can be drawn into the TMC470 controller and cause the controller to fail. For that reason, in these types of environments, the controller must be located in a sealed industrial enclosure.

To facilitate such installations, Telesis offers an optional panel mounting kit for use with an appropriate customer-supplied panel or enclosure. Telesis also offers an optional TMC470N NEMA 12 (I. P. 65) enclosure in which the controller can be mounted.

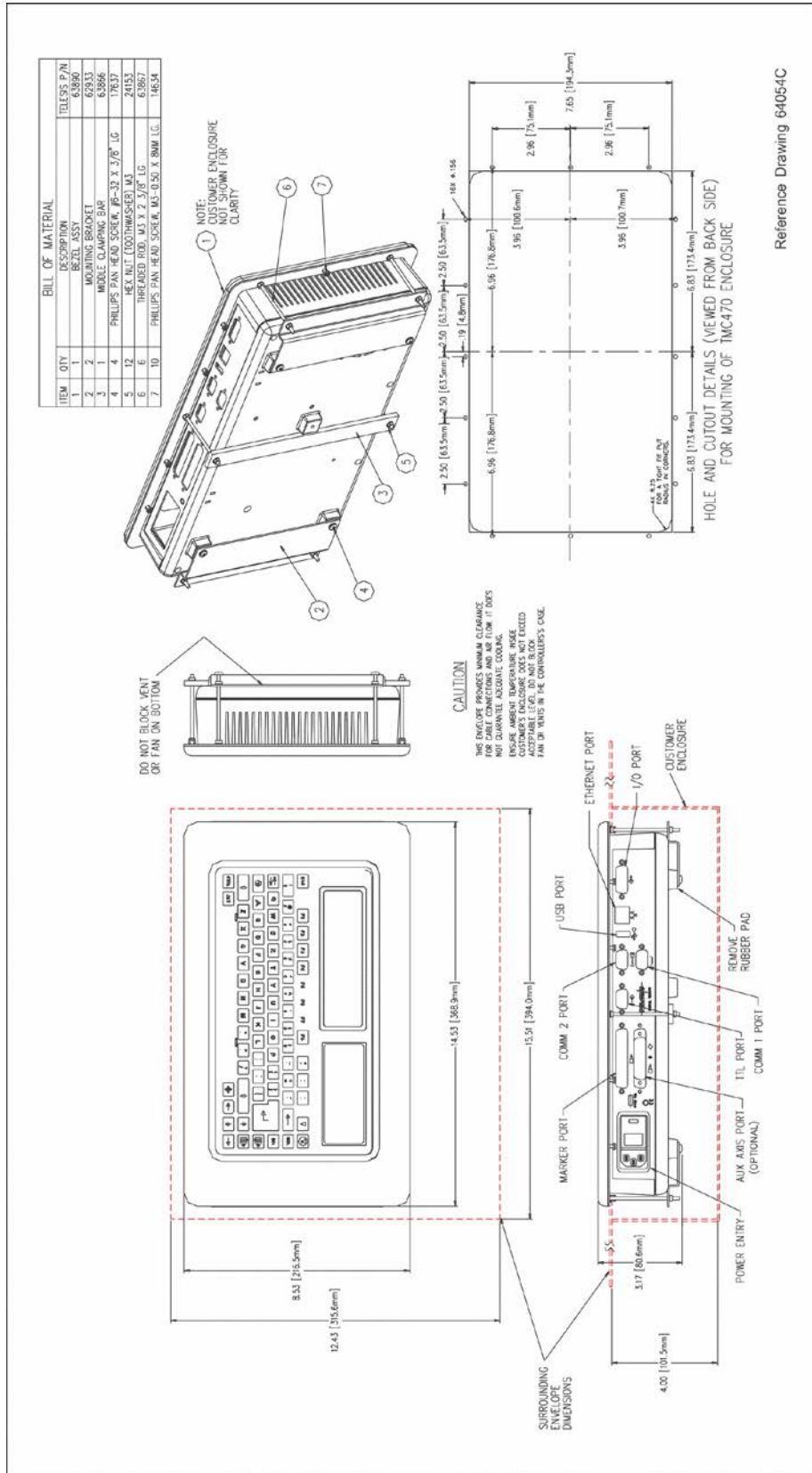
EMI Susceptibility. Although the system complies with pertinent susceptibility standards, care should be taken when installing near welders and other extreme generators of electromagnetic interference (EMI).

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.

SC5000/470 Marking System



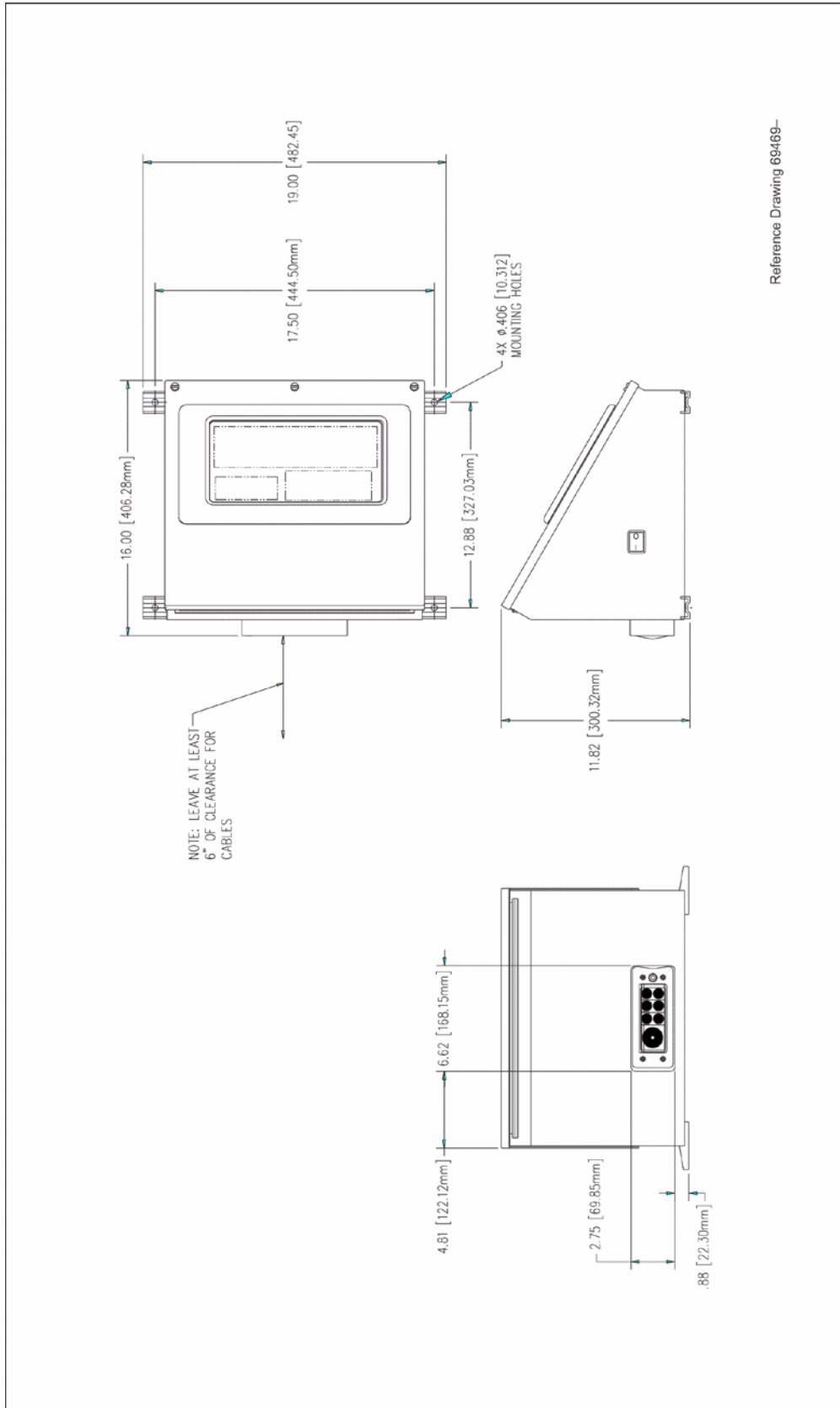
TMC470 Controller Dimensions – Tabletop & Wall-Mounted Configurations



Reference Drawing 64054C

TMC470 Controller Dimensions – Panel-Mounted Configuration

SC5000/470 Marking System



Reference Drawing 69469-

TMC470 Controller Dimensions – Enclosure-Mounted Configuration

TMC470-Based System Software

The system software provides the user interface for the operator to control the marker and is permanently installed in the controller.

The software also provides a library for storing, loading, and editing user-defined patterns. *Patterns* are files stored in the controller's memory.

Depending on the size of the pattern files, the controller can store up to 200 patterns. Each pattern contains one or more fields; each field defines a single object.

Printable objects can be created to define text strings, arc-text strings, geometric shapes, and graphics.

Non-printable objects can be defined for specific commands (for example, Pause, Go to, Input, or Output) to the marker.

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

Serial Interface. The Comm 1 and Comm 2 ports allow connection to remote serial devices such as a host computer or a 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.

TTL Interface. The TTL port allows the system to connect with a simple contact closure circuit such as a remote push button station or foot pedal switch. These types of devices can remotely control Start Print and Stop Print operations.

TCP/IP Interface. The Ethernet port typically connects to a PC over a local area network (LAN). It allows you to define the controller as a client or a server socket using Telesis Extended Protocol. See *Host Communications* for details.

USB Interface. The USB port allows you to connect a memory stick/flash drive for pattern storage or retrieval and for software upgrades.

Discrete I/O Controls

The TMC470 is configured only for 12 VDC to 24 VDC I/O and is provided to connect a PLC or other DC I/O source. The optically isolated I/O port allows you to remotely select and load patterns, start printing, stop printing, place the marker online, and monitor the system output signals. Cable connectors and connector pins are supplied with the controller for constructing appropriate interface cables.

Input Signals. 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 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)
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 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 barcode 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 barcode 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 the ASCII Start of Text "STX").

Terminating Character identifies the end of the transmitted string (usually "13" for the ASCII carriage return character).

Character Position counts from the starting character and ignores all characters preceding it.

Character Length accepts variable-length messages (if set to 0) or messages of a pre-specified, fixed number of characters.

Ignore Character identifies the character to ignore when sent from the host (usually "10" for the ASCII line feed character).

Message Type allows message-type recognition, which defines how the marking system uses data it receives from the host.

- 1** Message type 1 overwrites the first line of the first text field with data extracted from the host
- P** Message type P loads a specific pattern identified by data extracted from the 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 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 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 Extended Protocol message format as sent from the host to the TMC470 controller is described below.

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.
 - P** Message Type P specifies the pattern name to be loaded for printing. See [DATA].
 - Q** Message Type Q updates a specific query buffer with data supplied in the host message. See [DATA].
 - 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].
 - 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 requests the marker return the status of standard output and input signals. The system returns a hexadecimal code for the 6 output signals and 12 input signals in the following format:

OO ; III

where:

- bit 1 READY 0x01
- bit 2 DONE 0x02
- bit 3 PAUSED 0x04
- bit 4 NO_FAULT 0x08
- bit 5 SPARE_1 0x10
- bit 6 SPARE_2 0x20
- bit 1 START 0x001
- bit 2 STOP 0x002
- bit 3 SEL_0 0x004
- bit 4 SEL_1 0x008
- bit 5 SEL_2 0x010
- bit 6 SEL_3 0x020
- bit 7 SEL_6 * 0x040
- bit 8 SEL_4 0x080
- bit 9 SEL_5 0x100
- bit 10 SPARE_1 0x200
- bit 11 SPARE_2 0x400
- bit 12 SPARE_3 0x800

* Input SEL_6 can be configured to place the machine online (default) or to remotely select a pattern.

[##] Optional two-digit ASCII number that specifies the Station ID of the controller when used in multi-drop network applications. The Station ID may range from 00-31. Note "00" is reserved for applications where only one controller is used. In such applications, this field can be eliminated and "00" is assumed.

STX ASCII Start of Text Character (002H).

[DATA] Optional character string that may be required for certain message types (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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