

Overview

The DPP2000 is a fully programmable, data plate (tag) printer that automatically extracts data plates from a magazine and positions them before a fixed stylus to print user-defined messages. Printing is accomplished by pneumatically accelerating an impact pin to imprint dots that form characters or shapes in malleable materials such as steel, aluminum, or plastic. Character shapes and locations are determined by the internal software, easily programmed by the user to define X/Y coordinates on the two-dimensional mechanical platform. The DPP2000 can print various fonts and character sizes in .001 in. (.025 mm) increments from .030 to 2.00 in. (.762 to 50.8 mm).

System Components

DPP2000 Printer Assembly - Within its enclosure, the printer includes an X and Y traversing mechanism to extract and position the data plate and the pneumatic components necessary to drive the impact pin at the designated X/Y position. Using two stepper motor drives, it accurately and rapidly positions the data plate at coordinate-defined locations in the printing window (within .002 in.). The printer accommodates the rigorous dynamics of impacting, rebounding, and rapid positioning of the data plate through a system of pulleys, belts, and anti-friction bearings.

An adjustable magazine can hold up to 250 data plates ranging in size from .75-in. high x 1.25-in. long to 4.0-in. high x 5.0-in. long (19.05 x 31.75 mm to 101.6 x 127 mm) and ranging in thickness from .020 to .070 in. (0.51 to 1.78 mm). The magazine is removable to simplify adjustment and exchange. No tools are required to remove or adjust the magazine.

Pin cartridges are available for the 25XL-series or the 150S-series impact pins. Formed of a self-lubricating plastic material, the pin cartridge offers long life with little maintenance. Clasps are used to attach the pin cartridge to the cartridge base for easy pin replacement.

Two pin types are available for the printer: the 25XL-series and 150S-series. The 25XL-series pin is used for high speed printing of up to four characters per second, providing depths to .008 in. (0.20 mm). The 150S-series pin is used for speeds of up to three characters per second and depths to .012 in. (.25 mm). Impact pins may be made from carbide steel or powdered metal.

TMC400 Controller - An integrated keyboard/controller with a four line LCD display. It provides the electrical interface and software control of the printer. The rear panel of the controller provides an interface for external connections, including remote I/O signals and serial communications.

Filter-Regulator Assembly - This unit provides filtered/regulated air to the printer. It includes two filters, three air lines, and three regulators with pressure gauges to control the Drive air, Return air, and the lift cylinder/gripper mechanisms. The standard air tubing is ¼-in. (6.35 mm) Polyflo™, provided in 10-ft. (3 m) lengths. (Note: Drive air drives the impact pin from the cartridge; Return air pushes it back in.)

DPP2000/400 Options

The following options are available for use with the DPP2000.

- Backup Utility Software
- Bar Code Scanner with Cable
- Bar Code Wand with Cable
- Magazine Assembly
- Re-stacker Unit (first in / first out)

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DPP2000/400 System General Setup

- The printer is a tabletop device that may be located on any flat, sturdy surface.
- Mount the filter-regulator assembly using the brackets provided. The filter-regulator assembly should be located within 10 ft. (3 m) of the printer; optionally on the side or rear panel of the printer.
- Locate the controller as close as practical to the marking head. The standard head cable length is 12 ft. (3.6m).
Note: The TMC400 is not a sealed unit. Protect it from potentially damaging conditions; do not block vents in its case.
- Connect the respective air lines to the CYL (cylinder), DRV (drive), and RTN (return) ports on the rear panel of the printer.
- Connect clean, dry supply to the input port on the filter-regulator assembly.
- Adjust pin stroke and/or the Drive and Return air regulators, as needed, for proper pin impact depth:
45 to 80 psi (3 to 5 bars) for Drive Air;
15 to 30 psi (1 to 2 bars) for Return Air;
65 to 120 psi (4 to 8 bars) for Cylinder Air.
- Turn the TMC400 controller on using the off/on switch located on the rear of the TMC400 controller.

DPP2000 Specifications

Weight	75 lb. (34 Kg)
Printer (HxWxD)	19.0 x 23.0 x 13.0 in. (483 x 584 x 330 mm)
Data Plate (HxW)	4.0 x 5.0 in. (101.6 x 127 mm) max. overall
	3.85 x 5.0 in. (97.8 x 127 mm) max. printable area
Pin Type	25XL-series or 150S-series
Pin Material	Powdered Metal or Tungsten Carbide
Air Supply	60 to 120 psig (4.2 to 8.3 bars) clean and dry
Air Consumption	0.04 SCFM (at idle) 0.80 SCFM (while printing)
Air Pressure at Inlet	dependent on printing force 60 to 120 psi (4.2 to 8.3 bars) permitted 80 psi (5.5 bars) minimum recommended
Operating Temp.	32° to 105° F (0° to 40° C), non-condensing

Printer Characteristics

Printing - Printing is accomplished by indenting dots into the data plate using a pneumatically accelerated and returned piston/pin. Characters and shapes can be rotated in 90° increments and printed at resolutions from 10 to 200 dots per inch for an engraved look. The text may also be printed as a mirrored image to produce an embossed message. The depth of mark can be adjusted over a significant range by adjusting the pin stroke distance and, to a lesser extent, by adjusting the Drive air pressure. On thin, soft plate materials, use minimal pin stroke and air pressures to prevent distortion of the plate while marking.

Pin Life - Pin life depends largely on the type of material being printed, how hard or abrasive it is and the depth required. On typical metals with a hardness of Rockwell 20C, at a depth of .005 in. (.127 mm), the 25-series, powdered metal pins average about three million impressions before requiring sharpening, while carbide pins average approximately nine million impressions. If carbide pins are used, printing times will increase by approximately 25% due to the increased weight of the pin.

Marking Depth - The following tables provide sample marking depths using different materials marked with various pin types and cone (tip) angles. Drive air was set at 80 psi (5.52 bars) and Return air was set at 20 psi (1.38 bars). The pin stroke was set to the maximum allowable distance for each pin type to achieve the maximum depth of mark (i.e., 0.5-in. (12.7 mm) for 25-series pins and 0.25 (6.4 mm) for 150S-series pins).

Marking Depths Using Type 25 Powdered-Metal Pin

MATERIAL (HARDNESS)	22° CONE	30° CONE	45° CONE	60° CONE
Aluminum (Rb2)	0.0040 in 0.1016 mm	0.0045 in 0.1143 mm	0.0080 in 0.2032 mm	0.0110 in 0.2794 mm
Brass (Rb22)	0.0025 in 0.0635 mm	0.0030 in 0.0762 mm	0.0055 in 0.1397 mm	0.0080 in 0.2032 mm
Cast Iron (Rb47)	0.0025 in 0.0635 mm	0.0030 in 0.0762 mm	0.0055 in 0.1397 mm	0.0080 in 0.2032 mm
Cold Rolled Steel (Rb53)	0.0025 in 0.0635 mm	0.0030 in 0.0762 mm	0.0055 in 0.1397 mm	0.0080 in 0.2032 mm

Marking Depths Using Type 25 Carbide Pin

MATERIAL (HARDNESS)	22° CONE	30° CONE	45° CONE	60° CONE
Aluminum (Rb2)	0.0040 in 0.1016 mm	0.0050 in 0.1270 mm	0.0080 in 0.2032 mm	0.0065 in 0.1651 mm
Brass (Rb22)	0.0025 in 0.0635 mm	0.0035 in 0.0889 mm	0.0060 in 0.1524 mm	0.0040 in 0.1016 mm
Cast Iron (Rb47)	0.0025 in 0.0635 mm	0.0035 in 0.0889 mm	0.0060 in 0.1524 mm	0.0040 in 0.1016 mm
Cold Rolled Steel (Rb53)	0.0025 in 0.0635 mm	0.0035 in 0.0889 mm	0.0060 in 0.1524 mm	0.0040 in 0.1016 mm

Marking Depths Using Type 150S Pin

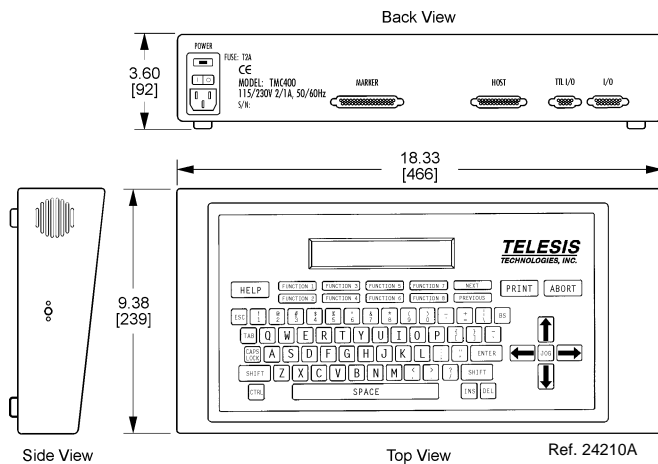
MATERIAL (HARDNESS)	30° CONE	45° CONE	45° CONE *	60° CONE
Aluminum (Rb2)	0.0110 in 0.2794 mm	0.0150 in 0.3810 mm	0.0170 in 0.4318 mm	0.0220 in 0.5588 mm
Brass (Rb22)	0.0080 in 0.2032 mm	0.0120 in 0.3048 mm	0.0135 in 0.3429 mm	0.0160 in 0.4064 mm
Cast Iron (Rb47)	0.0060 in 0.1524 mm	0.0100 in 0.2540 mm	0.0115 in 0.2921 mm	0.0115 in 0.3937 mm
Cold Rolled Steel (Rb53)	0.0060 in 0.1524 mm	0.0100 in 0.2540 mm	0.0110 in 0.2794 mm	0.0150 in 0.3810 mm

* Denotes Carbide Pin (all other 150S-Powdered Metal)

Noise - In addition to being housed in an enclosure, all DPP2000s are equipped with mufflers on the solenoid exhausts to reduce noise. Although every attempt is made to reduce noise, the material being printed influences the noise level significantly. For example, printing a thick, soft aluminum plate produces less noise than printing a thin, steel plate.

TMC400 Controller

The TMC400 includes an integrated keyboard with a four-line LCD display, a printer connector, an input/output connector and a serial interface. The I/O connector is used for START PRINT, ABORT, READY and DONE signals to/from a PLC or other DC I/O signals. The serial interface connector is used for RS232/485 communications with serial devices such as a host computer or bar code scanner. Up to 31 TMC400s may be used in a multi-drop configuration using the RS-485 interface. Once the system is setup, a host computer can load patterns, download messages, take the printer on and offline, and monitor system errors.



TMC400 Controller

TMC400 Specifications

Rating	NEMA 1 (I.P. 30)
Weight	9.5 lb. (4.32 Kg)
Operating Temp.	32° to 105° F (0°-40°C), non-condensing
Power Requirements	95-130 VAC, 2 amps, 50-60 Hz single phase 200-250 VAC, 1 amp, 50-60 Hz single phase
I/O Voltage	12 to 24 VDC (customer-supplied)

I/O Control Signals

As an option to local keyboard control, the printer can be remotely controlled through an I/O connector on the back of the controller. The TMC400 is configured for DC I/O only. A cable connector (with pins) is supplied for customer wiring of an I/O cable.

START PRINT	Input signal, begins print cycle
ABORT	Input signal, aborts print cycle
SEL_0, 1, 2, 3	Input signals (custom applications only)
INPUT COMM	For all inputs (+ or – supply)
READY	Output signal, ready for message or start print
DONE	Output signal, print cycle complete
OUTPUT COMM	For all outputs (+ or – supply)

Serial Communications

The TMC400 controller has one DB25 serial port for either RS232 or RS485 communication. The RS232 interface is most often used with remote devices such as Bar Code Readers or Host Computers. The RS485 interface is normally used for long transmission distances or multi-drop networks of up to 31 TMC400 controllers.

Communication Protocols

The TMC400 serial port may be configured to communicate with a remote device using either the Telesis Programmable or Extended Protocol. The following describes the serial data character format on all transmissions to and from the TMC400 controller.

- RS-232
- Asynchronous
- 1200, 2400, 4800, 9600, or 19200 baud-host
- One Start Bit
- One or Two Stop Bit(s)
- Seven or Eight Data Bits
- None, Even or Odd Parity

Programmable Protocol. Programmable Protocol is used 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 ASCII decimal format such as 2 for STX.

Terminating Character – identifies the end of transmitted string (usually a carriage return, i.e., CR-ASCII, decimal 13).

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 a line feed, LF-ASCII, decimal 10).

Message Type – enables characters to be extracted from data transmitted from the host. Programmable Protocol supports three message types: I, V, and P. Refer to *Extended Protocol* for an explanation of these message types.

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Extended Protocol. Extended Protocol includes error checking and transmission acknowledgment. It should be used in applications where serial communication is a vital part of the marking operation. Extended Protocol must be used in multi-drop applications. All communications are carried out in a master-slave relationship with the host being the master. Only the master 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 message format as sent from the master to the TMC400 controller.

SOH TYPE [##] STX [DATA TEXT] 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:

- I** overwrites a text field of the currently loaded pattern
- V** updates a variable text field of the currently loaded pattern
- P** specifies a pattern name to be loaded for printing
- O** resets the printer and places it online
- G** initiates a print cycle to mark the currently loaded pattern
- Q** specifies the number of times to print the pattern
- I** polls the output status of READY and DONE signals

[##] Two optional ASCII decimal digits that specify the Station ID number for use in multi-drop network applications. The ID may range from 00-31. **Note:** "00" is reserved for applications where only one controller is used. In such applications, this field may be eliminated and "00" will be assumed.

STX ASCII Start of Text Character (002H).

[DATA TEXT] Optional field that may be required for certain message types.

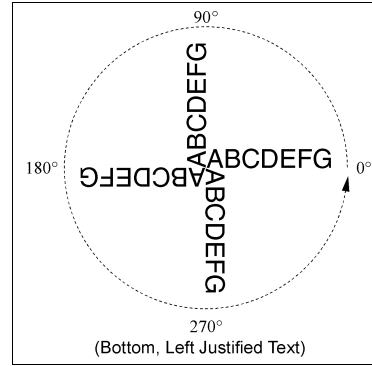
ETX ASCII end of text character (003H).

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).

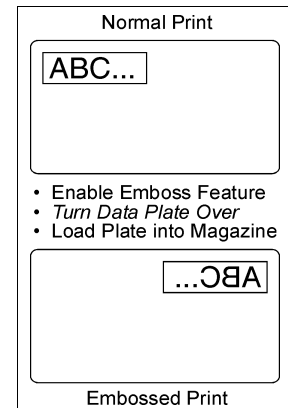
System Software

Installed within the TMC400 controller, the system software provides the operator's interface to marking system. Users can create and store information to be printed. The way information is organized and presented is called a pattern. Individual parts of a pattern are called fields. Each field is unique and allows the user to specify information such as its X and Y location, character size, font style, and special features like auto serialization, date codes, or shift codes. Once the system is setup, a host computer can load patterns, download messages, place the printer on and offline, and monitor system errors.



Rotated Text - Characters and shapes can be rotated in 90° increments. The text will be rotated about the anchor point, which is defined by the justification setting (e.g., bottom, left).

Embossing - The printer can also emboss a printed message. This allows you to print a mirror image of the message when printing from the back side of a data plate.



Message Flags. Certain "flags" may be included in the text to automatically insert data at the location of the flag within the pattern field. For example:

- %C Date and Time (MM/DD/YY HH:MM)
- %F Single-digit checksum for PSOCR®
- %J Julian Day of the Year (001 - 366)
- %R Week Number (01 contains *January 1*)
- %r Week Number (01 contains *first Thursday* of new year)
- ##S Serial Number Insertion
- ##V Variable Text Insertion

User Parameters. Define shift starting times, user shift codes, single character year tables, and single character month tables.

- %E User Year Code
- %U User Month Code
- %Z User Shift Code