

Techcon Systems  
TS5000DMP Series  
Disposable Material Path  
Rotary Auger Valve

User Guide



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## 1. SPECIFICATIONS

	<b>TS5000DMP</b>	<b>TS5000DMPL</b>
Size	5.88" Length X 3.56" (149.35mm X 90.42mm)	5.88" Length X 3.56" (149.35mm X 90.42mm)
Weight	0.77 lb (350g)	0.77 lb (350g)
Fluid Inlet Port	Female Luer lock	Female Luer lock
Fluid Outlet Port	Male Luer Lock	Male Luer Lock
Maximum Fluid Pressure	30 psi (2bar)	30 psi (2bar)
Operating Frequency	Exceeds 300 cycles/min.	Exceeds 300 cycles/min.
Mounting	1" (25.4mm) Channel	1" (25.4mm) Channel
Wetted Parts	Delrin®, Nylon, Viton®	Delrin®, Nylon, Viton®
Viscosity Range	30,000cps – 1,300,000cps	30,000cps – 1,300,000cps

**NOTE:**

TS5000DMP = Right Hand Side Door Opening

TS5000DMPL = Left Hand Side Door Opening

### Encoder DMP Options

Techcon Systems can offer the TS5000DMP with an encoder fitted to the DC motor. This configuration is available with a right hand side door opening. Due to machine integration restrictions the encoder option is available with the flexibility of 3 encoder positions:

<b>PART NUMBER</b>	<b>DESCRIPTION</b>
TS5000DMPE	DMP Valve With 105° Encoder position
TS5000DMPE-0	DMP Valve With 0° Encoder position
TS5000DMPE-15	DMP Valve With 15° Encoder position

For spare parts, technical drawings, dimensional drawings, wiring diagrams or encoder information, relating to the encoder valve option, please contact Techcon Systems.

## 2. UNPACKING AND INSPECTION

Carefully unpack the valve and examine the items contained in the carton.

These will include:

- Valve assembly
- Valve bracket and syringe bracket
- Sample syringe kit and tip kit
- Sample DMP feed screw/chamber (1 each of 6, 8 and 16-pitch)
- User guide

Inspect the unit for any damage which may have occurred in transit. If such damage has occurred, notify the carrier at once. Claim for damage must be made by the consignee to the carrier, and should be reported to the manufacturer.

## 3. DESCRIPTION

The TS5000DMP Series Rotary Microvalve takes a revolutionary unique approach to solving some of the most difficult dispensing problems. Two-component fluids present a significant dispensing challenge, and the possibility of destroying precision valve components, upon premature curing. Highly abrasive fluids eventually decrease accuracy that is followed by total valve failure. With the patented Disposable Material Path (DMP) Rotary Microvalve from Techcon Systems, those concerns are erased.

A precision molded feed screw and chamber is captured in a “clamshell” design valve housing. Inexpensive disposable feed screw and chamber components may be changed quickly and easily. Cleanup is reduced to simply changing out the disposable material path. An inexpensive stock of disposable valve components replaces an inventory of back up valves.

The accuracy of the TS5000DMP valve meets the needs of users previously constrained to lower accuracy of time/pressure dispensing. It also meets the maintenance cost targets of users previously relegated to recurring, maintenance of non-disposable path valves. Current TS5000 Rotary Microvalve customers may find the accuracy of the TS5000DMP valve meet their current accuracy specifications.

## 13. LIMITED WARRANTY

Manufacturer warrants this product to the original purchaser for a period of one (1) year from date of purchase to be free from defects in material and workmanship, but not against damages by misuse, negligence, accident, faulty installations and instructions. Manufacturer will repair or replace (at factory's option), free of charge, any component of the equipment thus found to be defective, on return of the component, “PREPAID” to the factory during the warranty period. In no event shall any liability or obligation of the Manufacturer arising from this warranty exceed the purchase price of the equipment. This warranty is only valid if the defective product is returned as a complete assembly without physical damage. The Manufacturer's liability, as stated herein, cannot be altered or enlarged except by a written statement signed by an officer of the company. In no event shall the Manufacturer be liable for consequential or incidental damages. A return authorization is required from Techcon Systems prior to shipping a defective unit to the factory.

Manufacturer reserves the right to make engineering product modifications without notice.

All returns must be issued with a Returns Authorization number, prior to return. Send warranty returns to:

### Americas and Asia

OK International  
Garden Grove Division  
12151 Monarch Street  
Garden Grove, Ca 92841

### Europe

OK International  
Eagle Close  
Chandler's Ford Ind Est  
Eastleigh  
Hampshire  
SO53 4NF  
United Kingdom

[www.techconsystems.com](http://www.techconsystems.com)

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## 12. TROUBLE SHOOTING

PROBLEM	POSSIBLE CAUSE	CORRECTION
No Fluid Flow	Dispense tip is plugged	Replace tip
	Motor does not receive signal	Make sure all connections are secured
	Motor running in reverse	Reverse motor cable connection
	Syringe barrel of dispense fluid is empty	Replace with new syringe barrel, of fluid
	Fluid feed pressure is too low	Increase feed pressure.
Inconsistent Fluid Flow	Feed screw damaged	Replace with new feed screw/chamber
	Fluid pressure fluctuating	Make sure fluid pressure is constant
	Valve on time is too short	Increase valve on time
	Excessive motor reverse time	Reduce reverse time or turn off completely.
Fluid drools after the valve turned off	Air trapped in fluid housing	Purge valve properly
Dispense tip clogged	Air trapped in feed screw chamber	Purge valve properly
	Air trapped in fluid reservoir	Remove air from reservoir
	Excessive fluid feed pressure	Reduce pressure or turn off pressure when the valve is idle.
	Tip contacting substrate	Increase dispense height

## 4. THEORY OF OPERATION (refer to figure 1.0)

The TS5000DMP Series Rotary Microvalve dispenses fluid with a positive displacement action using a rotary feed screw principle. Fluid is held in a feed reservoir (2), normally a syringe barrel or cartridge, under a positive head of air, between 1 to 20 psi (0.07 to 1.38bar), depending upon the viscosity of the fluid. The positive air pressure, supplied by the air line (1), forces the fluid out of the syringe barrel (2) into the material feed path (3) then to the feed screw chamber (5). Fluid flows from this point (5) to the dispense point (4) and is controlled by the feed screw rotation in the feed direction. The feed screw is driven by the DC motor (6). Applying a DC voltage signal to the DC motor (6), will rotate the feed screw and the fluid will be forced out the dispense tip (4). The actual fluid deposited is dependent upon adhesion of the dispensed fluid to the substrate. Shearing of the fluid is achieved by reverse Z-motion (tip retraction). When the motor stops, the unit remains in position for a fraction of a second (dwell) to allow the last drop of fluid to flow out of the dispense tip. After the dwell period, the automation equipment moves the TS5000DMP valve to the next position.

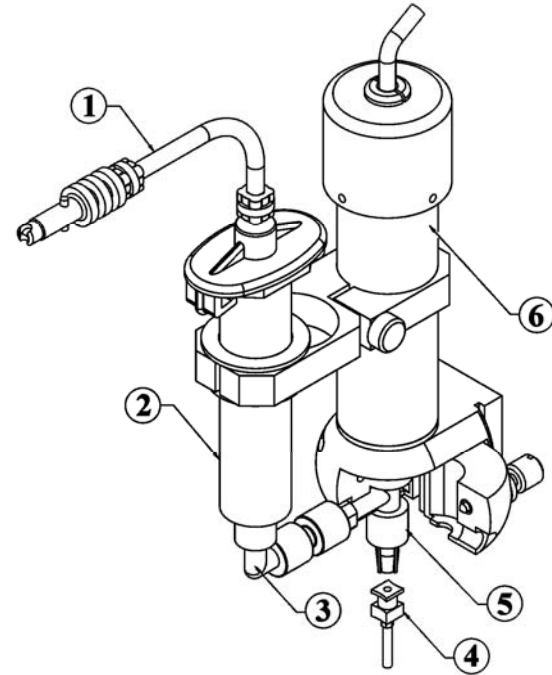


Figure 1.0

## 5. SET-UP INSTRUCTIONS

### Mechanical Mounting:

Normally, the TS5000DMP Series valve is used on an automated XYZ table, with full motion control in the three planes. It is very important that the valve is mounted on the Z-axis gantry, in a secure manner, that will not allow loosening during dispense operation. The Z-axis must move in a precise and repeatable motion for successful dispensing.

The provided mounting bracket, or customer supplied bracket, must be attached to the Z-axis in a manner that will provide the valve perpendicular travel to the horizontal plane of the surface on which the fluid will be dispensed. The mounting should provide a means of accurately adjusting the distance between the dispense tip and the substrate surface such as a touchdown sensing device or a fixed distance standoff.

### Air Connection:

Filtered air supply must be precisely regulated and should be set between 1-20 psi (0.07 to 1.38bar). The air supply is not used as the main dispensing force. It is only required to move fluid to the feed screw chamber.

### Electrical Connection:

The TS5000DMP Series valve requires an electrical connection of two wires for the DC motor. The motor lead wires are 24" (609.60mm) in length. The black lead wire should be connected to the negative or neutral lead from the motor control voltage source. To verify the connection, check the rotation direction of the feed screw. When correctly connected, a positive voltage signal will drive the feed screw in a counter clockwise direction when view from the dispense tip end.

The recommended controller for the TS5000DMP Series valve is the TS500R. If another controller is used make sure the control voltage signal is precisely controlled. The signal should be from a regulated power supply and should be shunted to positive motor stop. Below is a diagram of a simple braking circuit:

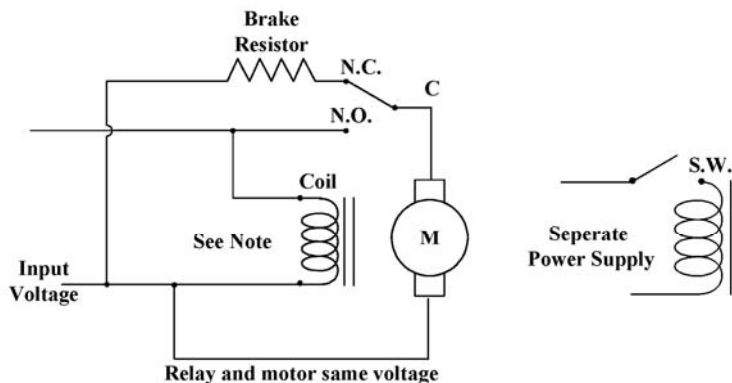


Figure 2.0

NOTE: Relay coil can be connected to separate control

## 10. DMP INSERT OPTIONS

PART NUMBER	DESCRIPTION
DMP6-10	6 Pitch DMP Assembly, Fixed Red Collar, 10 per pack
DMP6R-10	6 Pitch DMP Assembly, Rotating Red Collar, 10 per pack
DMP8-10	8 Pitch DMP Assembly, Fixed Black Collar, 10 per pack
DMP8R-10	8 Pitch DMP Assembly, Rotating Black Collar, 10 per pack
DMP16-10	16 Pitch DMP Assembly, Fixed Blue Collar, 10 per pack
DMP16R-10	16 Pitch DMP Assembly, Rotating Blue Collar, 10 per pack

## 11. STANDARD ACCESSORIES

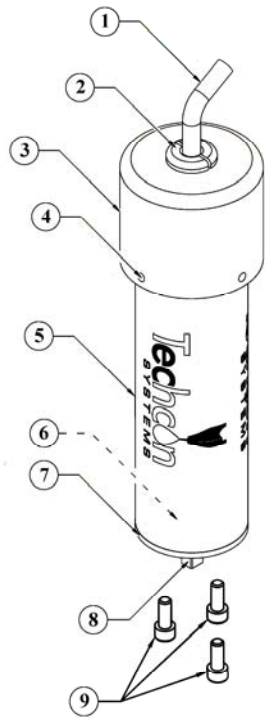
PART NUMBER	DESCRIPTION
5000-000-005	Valve Mounting Bracket
5000-015-000	TS-SS Sample Tip Kit
TS3706	Syringe Bracket Kit
TSD1135-18	6 Pin DIN Socket
71003RHB	10cc Receiver Head, 3ft (0.9M)
73003RHB	30cc Receiver Head, 3ft (0.9M)

### 11.1 OPTIONAL ACCESSORIES

PART NUMBER	DESCRIPTION
TN00DKIT	Complete Dispensing Tip Kit
9000-000-112	Sample Tip Kit
5000-000-082	TS-SS Tip Torque Tool

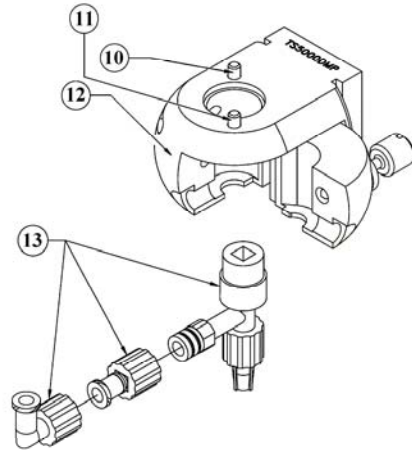


## 9. SPARE PARTS



**NOTE:** When replacing the motor (6) and square drive (8), Loctite #86 AVV must be used, to bond the square drive to the motor shaft. The square drive must be flush with the end of the motor shaft and any visible excess must be cleaned off.

Figure 5.0



ITEM	PART NUMBER	DESCRIPTION	QTY
1	TSD1415-12	Cable	1
2	TSD1401-7	Bushing	1
3	5000-000-171	Sleeve Cap	1
4	TSD1103-334	Cap Screw	4
5	5000-000-346	Motor Sleeve	1
6	TSD1412-22	Motor	1
7	T1000295	Motor Mounting Plate	1
8	2200-000-011	Square Drive	1
9	TSD1103-330	Mounting Plate Screws	3
10	TSD1103-14	Body Screw, Long	1
11	TSD1103-10	Body Screw, Short	1
12	A0100167	Body For TS5000DMP	1
12*	A0100184	Body For TS5000DMPL	1
13	See Section 10	DMP Insert	1

## 6. TYPICAL SYSTEM SET-UP

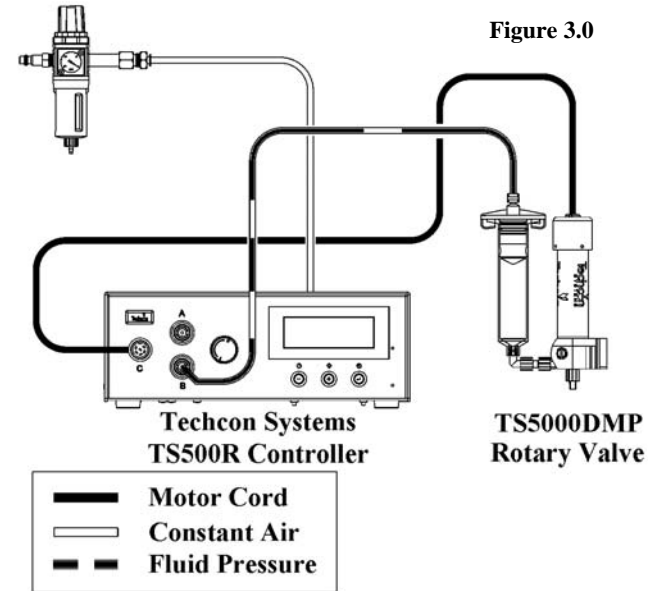


Figure 3.0

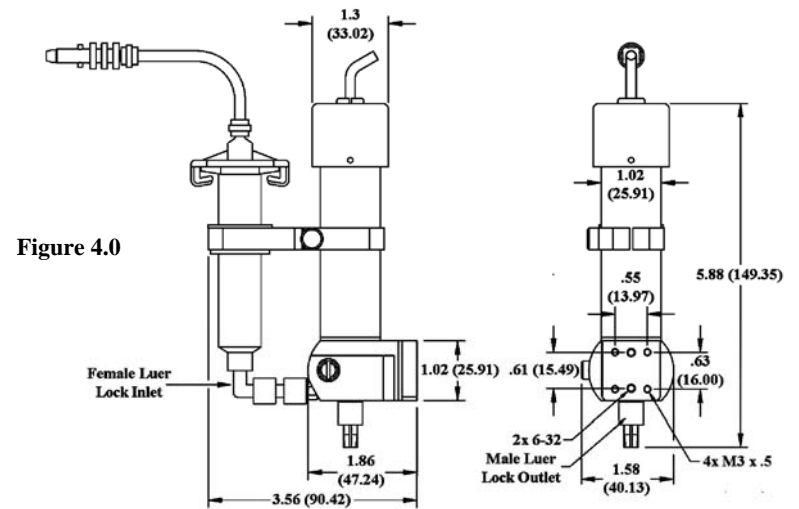
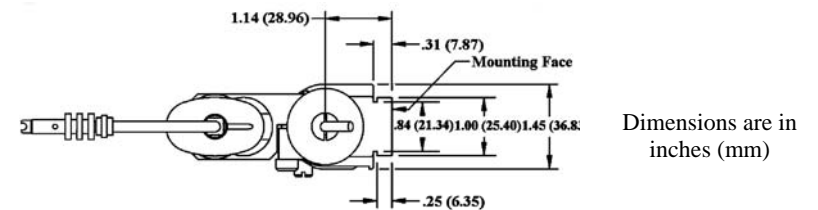


Figure 4.0

## 7. DETERMINING DISPENSING OUTPUT

### A. DC Motor Voltage Level:

Voltage controls the motor speed (RPM). Increased voltage produces increased motor speed and decreased voltage produces decreased motor speed.

### B. Motor Shaft Speed:

Motor gear ratio configuration determines final shaft speed. High RPM = High Output. Low RPM = Low Output.

### C. Feed Screw Pitch:

Rate of fluid dispensed is determined by the pitch of the feed screw. A high pitch number will produce a low dispense rate and a low pitch number will produce a higher dispense rate. A high pitch number will provide improved accuracy than a low pitch number.

### D. Dispense Tip:

The size of the dot diameter or bead width is determined by the dispense tip. A low gauge number (larger I.D.) will dispense a large diameter dot or a wide bead. A high gauge number (smaller I.D.) will dispense a smaller diameter dot or a narrower bead. Dispense tip sizes smaller than 25 gauge and longer than ½" (12.7mm) are not recommended to use with solder paste. A normal "rule of thumb", to choose the dispense tip size, is that the dot size will equal 1.5 times the internal diameter of the dispense tip. For setting the dispense tip distance from the substrate, the normal "rule of thumb" is to set the distance at ½ the internal diameter of the tip being used.

### E. Fluid Feed Pressure:

The fluid feed pressure does affect the amount of fluid dispensed through the valve. Optimum feed pressure is dependent upon the viscosity of the fluid being dispensed. Only in unusual circumstances should the feed pressure exceed 30 psi (2bar).

### F. Dispense Fluid:

The viscosity of the dispense fluid along with the particulate additives to the dispense fluid will also determine the dispense rate. The ability to dispense may be directly related to the fluid formulation.

### G. Dispense Cut Off:

The best method of stopping fluid flow at the end of the cycle is to short the motor (grounding the DC voltage signal through a current limiting resistor). This method provides a complete rotational brake of the motor at the shut off point. Another method of stopping fluid flow is to reverse the motor rotation by reversing the DC voltage signal. This can be described as "suck-back" action. In both cases, a no-drip dispensing action can be achieved. Turning off the fluid feed pressure when the valve is not dispensing will prevent dripping and oozing, with fluids at the lower end of the TS5000DMP viscosity range.

### H. Fluid (Material) Condition:

The physical condition of the dispense fluid is very important to successful dispensing. There are a number of conditions that can prevent continuous and consistent dispensing such as:

1. **Freshness:** Old fluid (most fluid have a recommended shelf life) leads to erratic dispensing and frequent clogging, especially with solder paste. Make sure to check the fluid shelf life before start dispensing.
2. **Separation:** Fluid with a high content of solid particles, such as solder paste, tends to separate at high pressure. If the dispense fluid starts to separate, replace it with new fresh fluid.
3. **Particle sizing:** Do not attempt to dispense solder paste with particle sizes larger than 75 microns (-200+325 mesh size).

## 8. DISPOSABLE MATERIAL PATH REMOVAL/REPLACEMENT:

**Removal of a feed path assembly:** Refer to figure 1.0

1. Release fluid pressure by disconnecting the air hose (1).
2. Remove syringe barrel of fluid (2) from the valve.
3. Remove dispense tip (4).
4. Loosen the thumb screw and pull the housing door open.
5. Rotate the feed screw/chamber assembly (3/5) about 30 degrees to the right (left for left hand side door opening) and pull it, in a downwards direction, away from the motor shaft.
6. Dispose of the used feed path assembly (3/5) in an appropriate waste container.

**Installation of a new feed path assembly:** Refer to figure 1.0

1. Insert a new feed path assembly (3/5) into the valve housing. Ensure the square drive of the motor shaft engages into the feed screw collar correctly.
2. Rotate the feed path assembly (3/5) until the material inlet port engages into the housing groove.
3. Close the housing door and tighten the thumb screw.

### Valve Purging

**CAUTION: Improper purging can cause air entrapment inside feed screw/chamber assembly.**

1. Attach a syringe barrel of dispensing conditioner, either part number 7105XCON (10cc) or 7305XCON (30cc), to the valve inlet.
2. Apply 8 psi (0.55 bar) pressure onto the syringe barrel and allow the pressure to push the conditioner through the valve, for 2 minutes. Do not apply more than 10 psi (0.69 bar) on the conditioner when priming as this may cause compressed air pockets in the valve chamber.
3. Turn on the motor and let it run, until a steady stream of fluid is being dispensed.
4. Turn off the motor and install the appropriate dispense tip to the valve outlet. Do not over tighten the dispense tip. For TS-SS Series dispense tips a torque tool is available, part number 5000-000-082.
5. Turn on the motor and let it run until a steady stream of fluid is being dispensed.



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