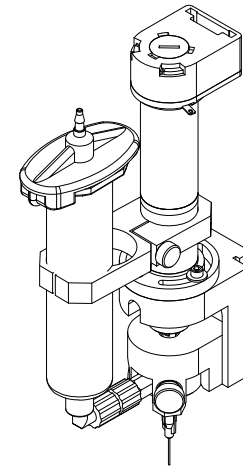


Techcon Systems
TS7000 Series
Interchangeable Material Path
Rotary Valve

User Guide



CONTENTS

| | Page number |
|--|-------------|
| 1. Specifications | 3 |
| 2. Unpacking and inspection | 4 |
| 3. Description | 4 |
| 4. Theory of operation..... | 4 |
| 5. Setup instructions | |
| 5.1 Mechanical Mounting | 5 |
| 5.2 Electrical Connection | 5 |
| 5.3 Air Connection | 6 |
| 6. Dispensing Applications | 6 - 7 |
| 7. Changing The Cartridge Assembly..... | 8 |
| 8. Adjusting the Encoder Motor Position..... | 9 |
| 9. DMP Valve Changeover Option | 9 - 10 |
| 10. Maintenance and Cleaning | 10 - 11 |
| 11. Troubleshooting | 12 - 13 |
| 12. Spare Parts and Accessories | 13 - 15 |
| 13. Warranty | 15 |

Table #5 Cartridge Body Option

| Part Number | Description |
|-------------|-----------------------------|
| 7090-0070 | Cartridge Body, Standard |
| 7090-0080 | Cartridge Body, High Output |

12.3 ACCESSORIES

| Part Number | Description |
|---------------|------------------------------|
| 7105XCON | Dispensing conditioner, 10cc |
| 7305XCON | Dispensing conditioner, 30cc |
| 7000-CLEANKIT | Cleaning Kit |
| 7090-9060 | Syringe Bracket |
| 7000-DMPBKIT | DMP Bracket Kit |

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 OK International prior to shipping a defective unit to the factory.

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

Send warranty returns to:

OK International
 12151 Monarch Street
 Garden Grove, Ca 92841

Table #2 Cartridge Assembly Option

| Part Number | Description |
|-------------|--------------------------------|
| 7090-9040 | Cartridge Assembly, 16-Pitch |
| 7090-9030 | Cartridge Assembly, 8-Pitch |
| 7090-9050 | Cartridge Assembly, 8-Pitch HO |

Table #3 Needle Retainer Option

| Part Number | Description |
|--------------|--|
| 7090-0170 | Locking Cap, Metal Needle |
| 7090-0030 | Locking Cap, TE Needle |
| 5440-000-004 | Locking Cap, TE Needle (Full UV Block) |

12.2 SPARE PARTS: CARTRIDGE ASSEMBLY

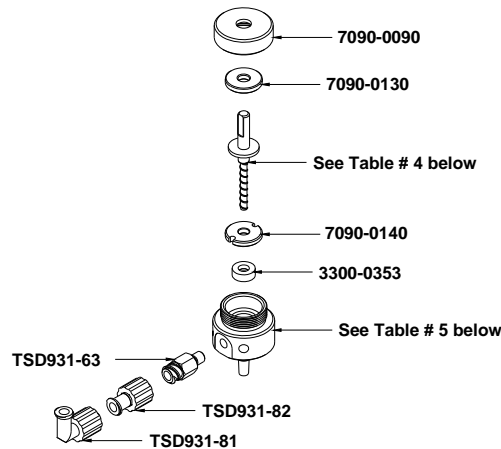


Table #4 Feed Screw Option

| Part Number | Description |
|-------------|------------------------|
| 7090-0100 | Feed Screw, 8-Pitch |
| 7090-0110 | Feed Screw, 16-Pitch |
| 7090-0120 | Feed Screw, 8-Pitch HO |

1. SPECIFICATIONS

Motor Voltage: 6-Watt, 24 VDC, 400 RPM
 Weight: 0.86 lb (0.40 kg)
 Wetted parts: Hardened Tool Steel, Stainless Steel, UHMWPE
 Feed screw size options: 16-pitch, 8-pitch, High Output 8-pitch

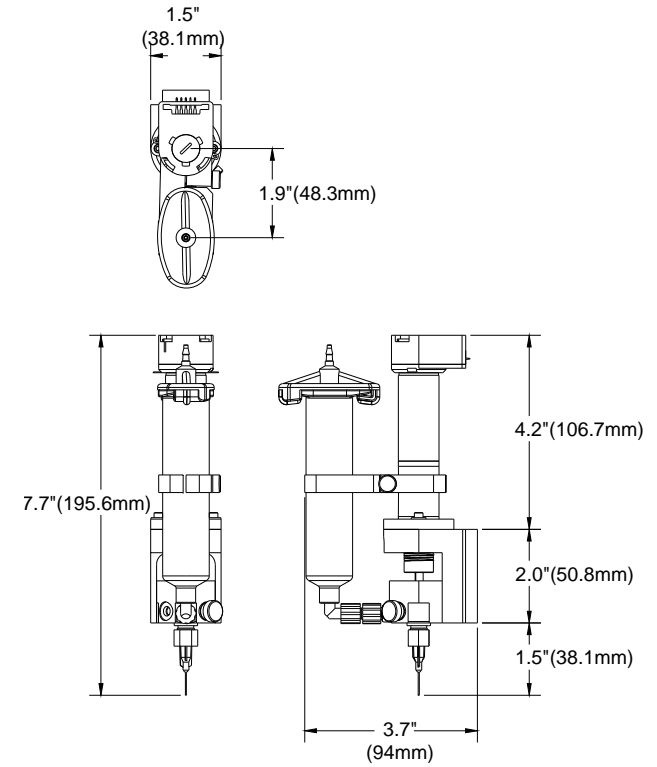


Figure 1.0

Available Configurations:

| PART NUMBER | DESCRIPTION |
|-------------|--|
| TS7000-16 | IMP Rotary Valve, 16-Pitch |
| TS7000-8 | IMP Rotary Valve, 8-Pitch |
| TS7000-8HO | IMP Rotary Valve, 8-Pitch High Output |
| TS7000E-16 | IMP Rotary Valve, 16-Pitch, Encoder |
| TS7000E-8 | IMP Rotary Valve, 8-Pitch, Encoder |
| TS7000E-8HO | IMP Rotary Valve, 8-Pitch High Output, Encoder |

2. UNPACKING AND INSPECTION

Carefully unpack the valve and examine the items contained in the carton. Inspect the unit for any damaged which may have occurred in transit. If such damage has occurred, notify the carrier at once.

3. DESCRIPTION

The TS7000 series Cartridge Rotary Valves are the latest addition to the Rotary Microvalve family. The valve uses a feed screw (auger) to dispense material with a rotary displacement action, allowing ultra-precise control of the dispensing process. The valve's modular design allows quick and easy replacement of feed screw/chamber cartridge without the need of removing the main valve from the machine. In addition, the valve can be interchanged to use with TS5000DMP feed screw inserts.

The TS7000 series valve is available in 3 choices of feed screw sizes (16-pitch, 8-pitch and high output 8-pitch), all made of precision hardened tool steel. Encoder motor version available for applications required closed-loop motor control with encoder feed back.

4. THEORY OF OPERATION

The TS7000 Series Rotary Microvalve dispenses material with a rotary displacement action using a rotary feed screw principle. Material is held in a feed reservoir (2) under a positive head of air pressure, between 1 to 30 psi, depending upon the viscosity of the material. This positive air pressure, supplied by the air line (1), forces the material out of the barrel (2) into the material feed path (3) then to the feed screw/chamber assembly (4). Material flows from this point (4) to the dispense needle outlet is controlled by the feed screw rotation in the feed direction. The feed screw is driven by the DC motor (5). Applying a DC voltage signal to the DC motor (5), will rotate the feed screw and the material will be forced out the dispense tip. The actual material deposited is dependent upon adhesion of the dispensed material to the substrate. Shearing of the material 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 material to flow out of the dispense tip. After the dwell period, the automation equipment moves the valve to the next position.

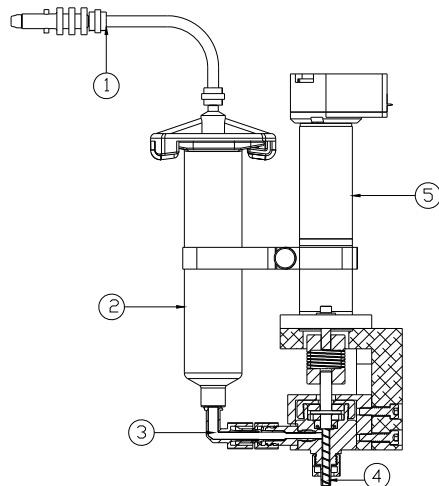


Figure 2.0

| | | |
|----------------------|------------------------------------|------------------------------|
| Dispense tip clogged | Tip contacting substrate | Increase dispense tip height |
| | Tip bent or damaged | Replace tip |
| | Particles size in material too big | Replace with larger ID tip |

12. SPARE PARTS AND ACCESSORIES

12.1 SPARE PARTS: COMPLETE VALVE ASSEMBLY

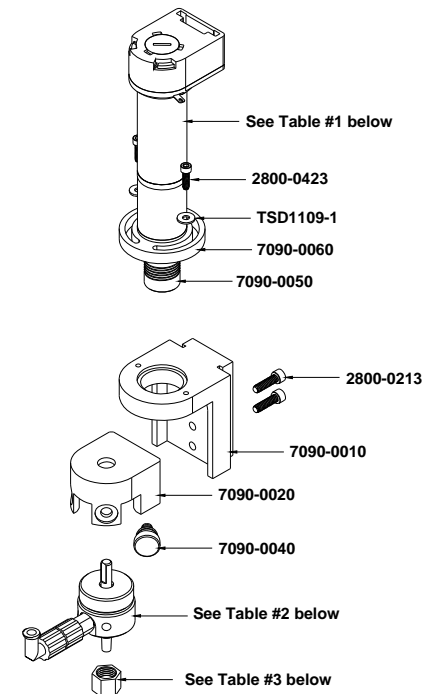


Table #1 Motor Option

| Part Number | Description |
|-------------|---------------------------|
| TSD1412-22 | Motor, 6W, 400RPM |
| TSD1412-31 | Encoder Motor, 6W, 400RPM |

11. TROUBLESHOOTING

| PROBLEM | POSSIBLE CAUSE | CORRECTION |
|--|--|---|
| No Material 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 |
| | Barrel of dispense material is emptied | Replace with new material barrel |
| | Material feed pressure is too low | Increase feed pressure. |
| | Material dried or cured | Replace with new fresh material |
| Inconsistent Shot size | Material pressure fluctuating | Make sure material pressure is constant |
| | Valve on time is too short | Increased valve on time |
| | Excessive motor reverse time | Reduce reverse time or turn off completely. |
| | Air trapped in material | Purge valve properly |
| | Feed screw damaged | Replace feed screw |
| Skipped dots | Air trapped in material | De-air material |
| Material drools after the valve turned off | Air trapped in feed screw chamber | Purge valve properly |
| | Air trapped in material reservoir | Remove air from reservoir |
| | Excessive material feed pressure | Reduce pressure or turn off pressure when the valve is idled. |

5. SETUP INSTRUCTIONS

5.1 Mechanical Mounting:

Normally, the TS7000 valve is used on an automated XYZ table with full motion control in the three planes. It is very important that the valve be 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 material will be dispensed. The mounting should provide a means of accurately adjusting the gap between the dispense tip and the substrate surface such as a touchdown sensing device or a fixed distance standoff.

5.2 Electrical Connection:

The TS7000 series valve requires an electrical connection of two wires for the DC motor. The motor lead wires are 24" long. 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 viewed from the dispense tip end.

The recommended controller for the TS7000 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:

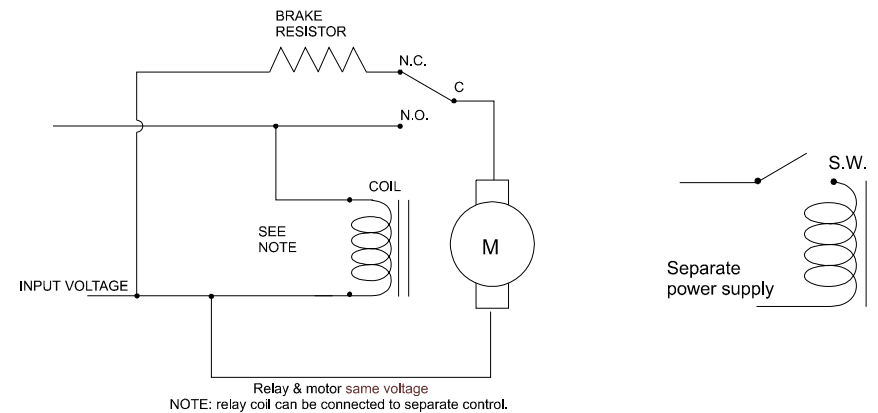


Figure 3.0

5.3 Air connection:

Filtered air supply must be precisely regulated and should be set between 1-30 psi, depending on material viscosity. The air supply is not used as the main dispensing force. It is only required to move the material to the feed screw chamber.

The valve is supplied with sample of 10 and 30cc air powered syringe assembly. The syringe of material can be mounted directly onto the valve inlet fitting. Material can also be supplied from a remotely located container, such as cartridge systems.

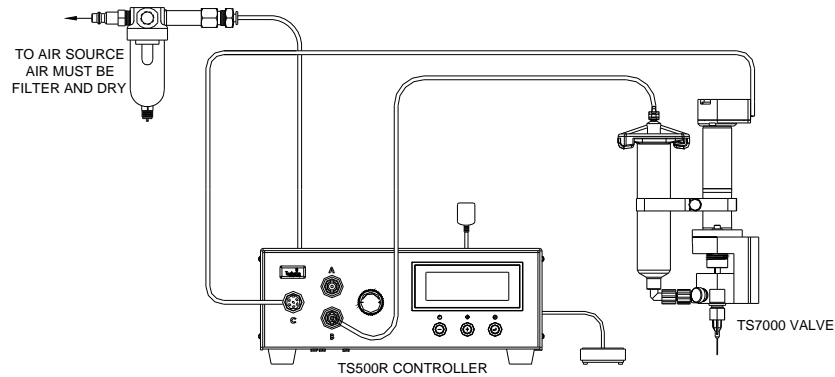


Figure 4.0 Typical Setup Systems

6. DISPENSING APPLICATIONS

6.1 DC Motor Voltage Level:

Voltage controls motor speed (RPM). High voltage produces high motor speed and low voltage reduces motor speed. Maximum Voltage input is 24 VDC

6.2 Feed screw pitch:

Rate of material 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.

6.3 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 1/2" are not recommended to use with solder paste. A normal rule of thumb to choose the dispense tip size is that the dot size equal 1.5 times the internal diameter of the dispense tip.

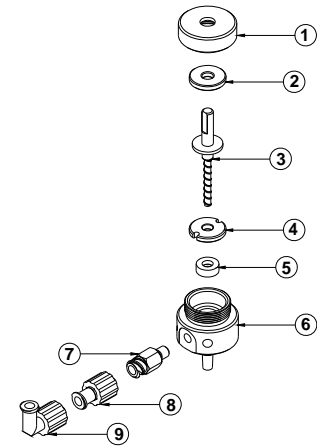


Figure 7.0

1. Follow steps 1-6 in Section 10.1 “Valve Purging”
2. Follow steps 1- 5 in Section 7.1 “Removing the Cartridge assembly”
3. Remove the Material Inlet Fitting (7) along with the Luer Lock adapter (8) and Luer Lock Elbow fitting (9) from the Cartridge
4. Remove the Cartridge Cap (1) by turning it counter clockwise
5. Pull the Feed Screw (3) straight out of the Cartridge; Make sure not to lose the upper bearing washer (2)
6. Using the tweezers (provided in the cleaning kit) to remove the lower bearing washer (4)
7. Using a cotton swap, carefully remove the seal (5) from the cartridge.
8. Clean all parts using the cleaning brush with any suitable solvent
9. Inspect parts for wear or damage and replace if necessary
10. Re-install the seal (5) into the Cartridge body, make sure the spring side is facing down
11. Fully press the lower bearing (4) washer into the Cartridge body
12. Insert the Feed Screw (3) into the Cartridge body, make sure not to damage the seal
13. Install the upper bearing washer (2) on the Feed Screw flange
14. Tighten the Cartridge Cap (1)
15. Install the Material Inlet Fitting (7)
16. Install the Cartridge assembly into valve housing
17. Purge Valve per Section 10.1

2. Remove the two bracket mounting screws (5) and pull the valve housing (7) away from the main housing (6)
3. Install a square drive adapter (include in the 7000-DMPBKIT) to the flexible coupling (4) and tighten the set screw
4. Install the DMP bracket (include in the 7000-DMPBKIT) into the main housing (6)
5. Install the DMP valve housing to the valve bracket

10. MAINTENANCE AND CLEANING:

10.1 Valve Purging:

Purging the valve with dispensing conditioner (7105XCON) between shifts or after every eight hours of dispensing is recommended. The conditioner cleans any material residue from the material path and conditions the valve for future use.

1. Release material pressure.
2. Remove barrel of material from the valve.
3. Remove dispense tip
4. Install a barrel of dispensing conditioner (Part number 7105XCON) to the valve inlet and set air pressure at 8.0 psi.
5. Turn on the valve and let it run until the conditioner is the only material being dispensed at the valve outlet. If the conditioner is unable to force the dispense material out the valve outlet then proceed to the "Thorough Cleaning" section.
6. Turn off valve and release air pressure.

10.2 Thorough Cleaning:

Through cleaning procedures should be done whenever the following occur:

- Dispense material is changed to different type
- Dispense material started to cure in the valve
- Valve has been dispensing for one month.
- Dispense tip clogged frequently

6.4 Material feed pressure:

The material feed pressure does affect the amount of material dispensed through the valve. Optimum feed pressure is dependent upon viscosity of material dispensed. Only in unusual circumstances should the feed pressure exceed 30 psi.

6.5 Dispense Material:

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

6.6 Dispense cut off:

The best method of stopping material 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 material 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 material feed pressure when the valve is not dispensing will prevent dripping and oozing.

6.7 Dispense tip height:

The distance between the dispense tip and substrate surface is extremely important. To obtain accurate dot size, the dispense tip height should remain constant for each dot/bead. If the dispense tip height fluctuates during dispense process, the dot/bead size will vary. If the dispense tip touches the dispense surface, clogging will occur.

6.8 Material condition:

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

- Freshness: Old material (most materials have a recommended shelf life) leads to erratic dispensing and frequent clogging, especially with solder paste. Make sure to check the material shelf life before starting dispensing.
- Separation: Material with high content of solid particles, such as solder paste, tends to separate at high pressure. If the dispense material starts to separate, please replace it with new fresh material.
- Particles sizing: Do not attempt to dispense solder paste with particle sizes bigger than 75 microns (-200+325 mesh size).

7. CHANGING THE CARTRIDGE ASSEMBLY

The Cartridge assembly can be removed and re-installed while the valve is on the machine. Following instructions and Refer to Figure 5.0 below to change the cartridge assembly.

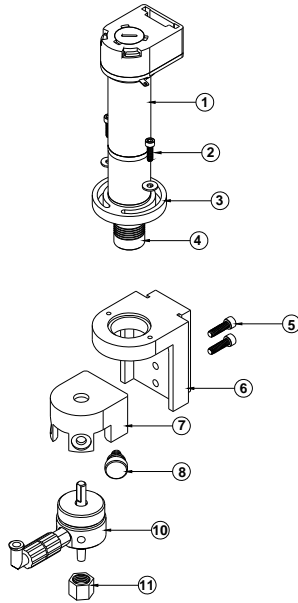


Figure 5.0

7.1 Removing the Cartridge assembly

1. Release material pressure
2. Remove barrel of dispense material from the valve
3. Grasp the cartridge feed screw assembly (10) at the material fitting inlet then remove the thumb screw (8) completely out of the valve housing (7)
4. If the set screw on the coupling (4) is tightened then using a hex wrench to loosen it
5. Pull the cartridge/feed screw assembly out of the valve housing

7.2 Re-install the Cartridge assembly

The Cartridge assembly can be installed in three different locations, left side, center, and right side position. Figure 6.0 below shows three possible mounting locations.

1. Insert the cartridge assembly (10) into the valve housing (7); Make sure the flat surface of the feed screw shaft aligns with the coupling (4) "D" shape hole. Note: The Material Inlet fitting can be installed on the left side, center or right side on the valve housing.
2. If desired, tighten the set screw on the coupling to prevent possible back lash.
3. Install the thumb screw (8)

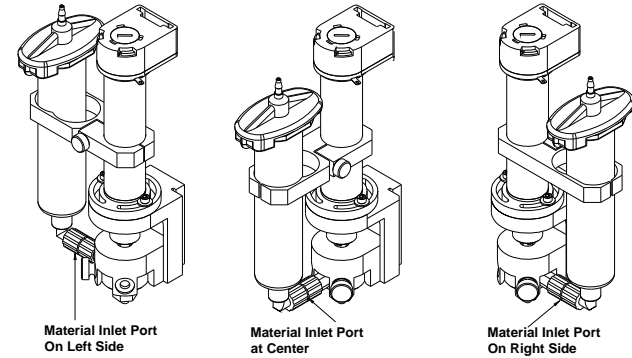


Figure 6.0

8. ADJUSTING THE ENCODER MOTOR POSITION

The valve is designed with an adjustable motor mount plate so that motor can be readjusted in different positions to prevent interference with surrounding equipment. Refer to Figure 5.0 and follow below instructions to make adjustment.

1. Loosen the two motor mounting screws (2)
2. Rotate the encoder motor assembly (1) to desired position
3. Tighten the two motor mounting screws (2)

9. DMP VALVE CHANGEOVER OPTION

The valve has the interchangeability feature that allows users to replace valve housing with the Disposable Material Path (DMP) housing to transform the valve into the DMP configuration.

Required parts:

7000-DMPBKIT = DMP Bracket Kit (Sold separately)

A0100235 = DMP Valve Housing (Sold separately)

Refer to figure 5.0 and instructions below for replacement procedures

1. Remove the cartridge assembly (10) per section 7.1