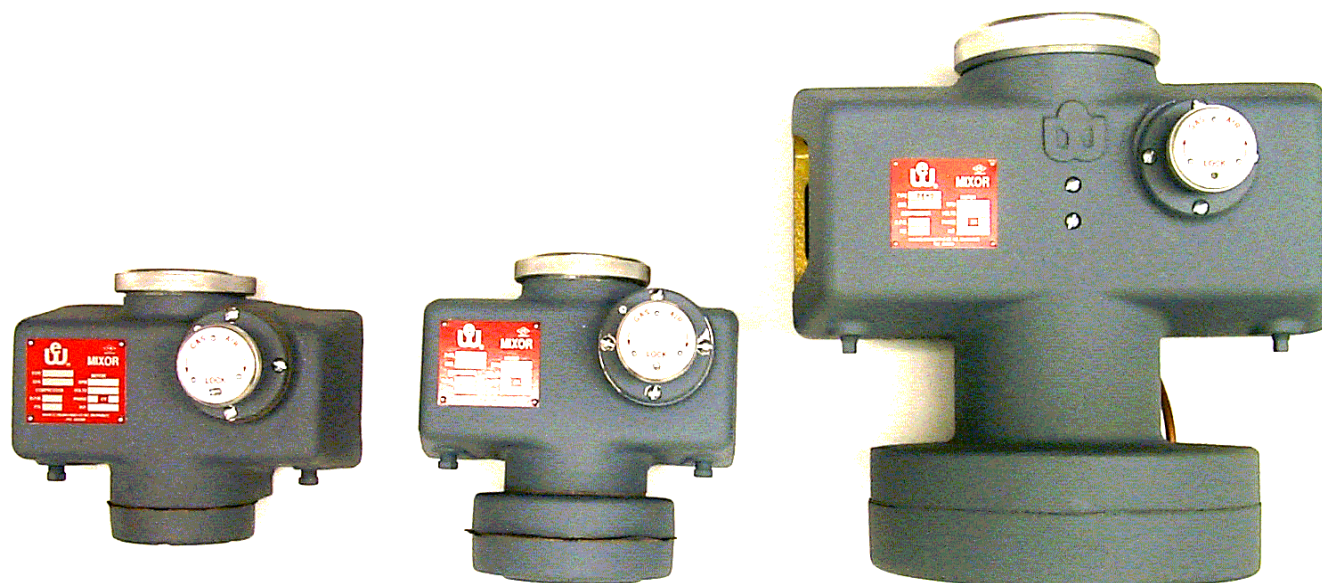




UPC-MARATHON

# CARBURETOR

## User Manual



CONNECT WITH US



MASTERING  
STRENGTH.  
WORLDWIDE.



## MANUAL #: 408

Revision #	Revision Date	Revision Description
004	March 29, 2013	

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### DISCLAIMER:

The **Carburetor** is to be used by the industrial operator under his/her direction. UPC-Marathon is not responsible or liable for any product, process, damage or injury incurred while using the **Carburetor**. UPC-Marathon makes no representations or warranties with respect to the contents hereof and specifically disclaims any implied warranties or merchantability or fitness for any purpose.

### TECHNICAL ASSISTANCE

For all questions or concerns regarding the operation of the **Carburetor**, please consult the last page of this manual for contact information.



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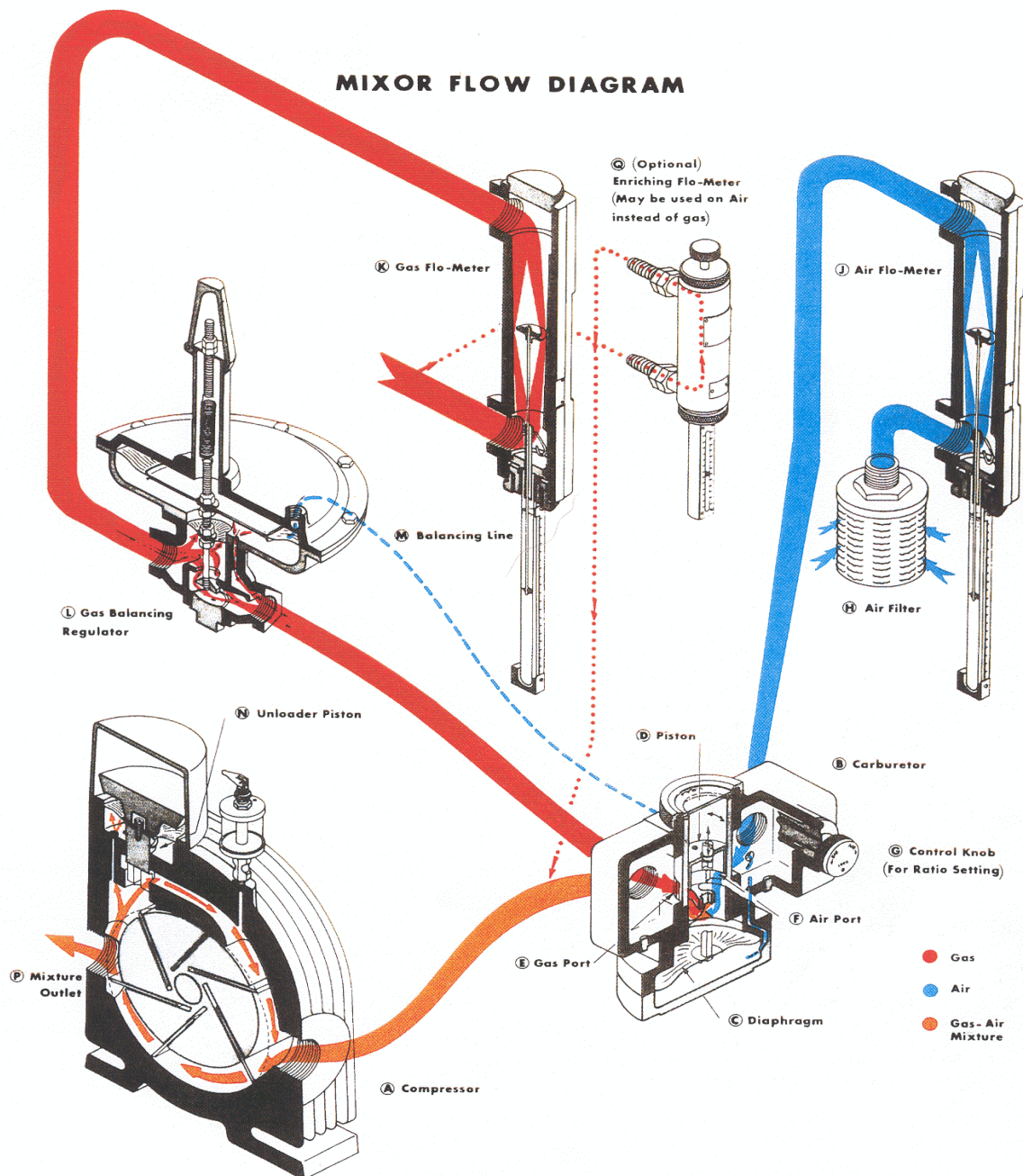
## 1 DESCRIPTION

Carburetors™ are designed to be easy to maintain and service so that down time is kept to a minimum. These units have a simple, compact design with minimal moving parts and are available in a wide range of sizes with capacities from 200 CFH to 12,000 CFH.

Carburetors™ are designed specifically for high-precision mixing. Backlash has been reduced so that a given increment of change in the known ratio setting will produce the same increment of change in both the gas and air flows over the entire range of the unit. This is achieved without the use of gears, worms, or other complex devices. Time is saved because the operator can be sure of getting the exact ratio desired. Flo-Meters™ (not included) can be used in conjunction with the carburetor to provide a means of monitoring both air and gas so the ratio can be checked at any time.



## 2 PRINCIPLE OF OPERATION



Compressor (A) imposes suction on Carburetor (B) causing carburetor diaphragm (C) to raise lifting piston (D) to uncover gas port (E) and air port (F) which are adjusted for ratio by control knob (G). Air flows through air filter (H) and air flow meter (J) to carburetor (B). Gas flows through Flo-Meter (K) and is reduced to same pressure as air by gas balancing regulator (L) (which is cross connected by line (M) to air side of carburetor). Mixture of gas and air is drawn into compressor (A) and discharged at desired pressure. If compressor output to generator or process is reduced, unloader piston (N) raises and bypasses excess mixture within compressor body. Diaphragm in carburetor lowers piston to balance to new output level.



## 3 SPECIFICATIONS

### Carburetor™

#### **All Sizes**

Ratio Range: 1:1 to 40:1 Air to Gas Ratio

Turn down: 3:1

Type 200 thru 750 (Carb 1)

Inlet/Outlet Connections:  $\frac{3}{4}$ "NPT

Capacity: 200 – 750 CFH (5.6 – 21.2 M3H)

#### **Type 1000 thru 2500 (Carb 2)**

Inlet/Outlet Connections: 1- $\frac{1}{4}$ "NPT

Capacity: 1,000 – 2,500 CFH (28.3 – 70.8 M3H)

#### **Type 3000 thru 8000 (Carb 3)**

Inlet/Outlet Connections: 2"NPT

Capacity: 3,000 – 8,000 CFH (85 – 226.5 M3H)

#### **Type 8000 thru 10000 (Carb 5)**

Inlet/Outlet Connections: 2"NPT

Capacity: 8,000 – 10,000 CFH (226.5 – 283.2 M3H)

### Gas Balancing Regulator

#### **Type 3xx**

Max Inlet Pressure: 2.0 PSIG (13.8 kPa)

Max Gas Flow: Natural Gas 650 CFH (18.4 M3H) / Propane 410 CFH (11.6 M3H)

#### **Type 4xx**

Max Inlet Pressure: 2.0 PSIG (13.8 kPa)

Max Gas Flow: Natural Gas 1,290 CFH (36.5 M3H) / Propane 820 CFH (23.2 M3H)

#### **Type 5xx**

Max inlet Pressure: 2.0 PSIG (13.8 kPa)

Max Gas Flow: Natural Gas 2,580CFH (73 M3H) / Propane 1,640 CFH (46.4 M3H)

#### **Type 6xx**

Max Inlet Pressure: 2.0 PSIG (13.8 kPa)

Max Gas Flow: Natural Gas 4,520CFH (128M3H) / Propane 2,860 CFH (81 M3H)



## 4 INSTALLATION

### 4.1 Mounting

The carburetor can be mounted to a panel if needed, for panel mounting dimensions refer to dimension drawings located in Appendix A. The carburetor must be mounted vertical for proper operation.

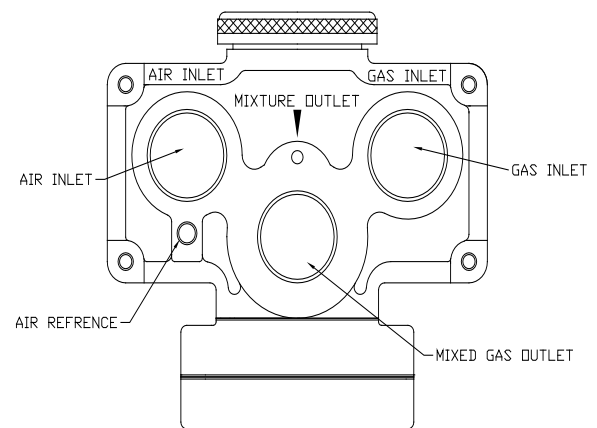
### 4.2 Plumbing Guidelines

Your company may have guidelines for plumbing installation. If so, you should check those before you begin the installation. As a guideline all plumbing recommendations and requirements in this manual are for reference only. The diagrams show important and recommended plumbing of the gas supply to the carburetor. Not all components shown in these drawing are included with the Carburetor™.

The customer is responsible for purchasing any recommended components and any additional safety equipment required by their company or equipment manufacture to meet any and all applicable national or local codes.

### 4.3 Plumbing

When looking at the back of the carburetor the gas inlet is located on the right side, the air inlet is located on the left side and the mixed gas outlet is located in the center. See Figure 1. The Air inlet should have a filter installed to minimize the amount of dirt that enters the carburetor. The filter will improve performance and extend the time between maintenance intervals. The gas inlet should be connected to a gas balancing regulator referenced to the air inlet pressure. Use threading compound sparingly as any excess may enter the carburetor and affect its performance.



**Figure 1**

### 4.4 Recommended Plumbing

UPC-Marathon recommends piping the Carburetor™ as shown in Figure 2. The Flo-Meters™ shown are not required, but provide visual indication of the actual flow rates for easy verification of ratio. The recommended plumbing does not show any safety devices that may be required, it is the customer's responsibility to install any safety devices that are required by the equipment manufacture or specified by their company.

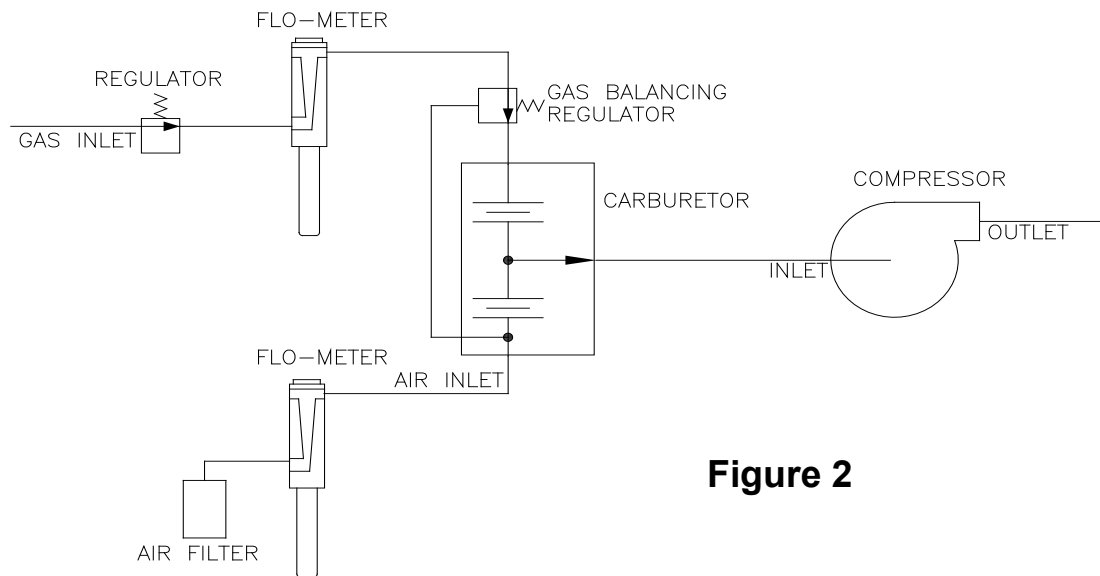


**WARNING: Your equipment may require additional safety components; it is the customer's responsibility to install any additional components required for safety. Consult with the**





**equipment manufacturer as well as conforming to any guidelines specified by your company or governing agencies.**



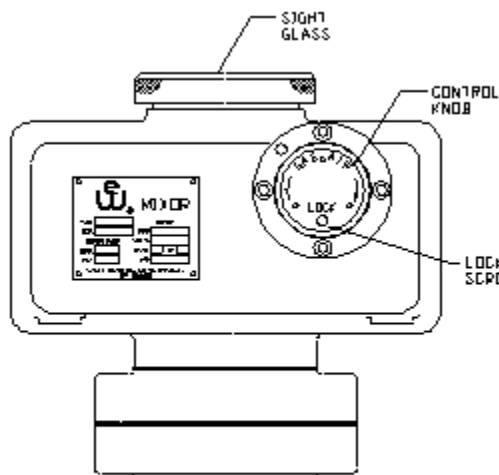
**Figure 2**





## 5 FIRST TIME STARTUP AND OPERATION

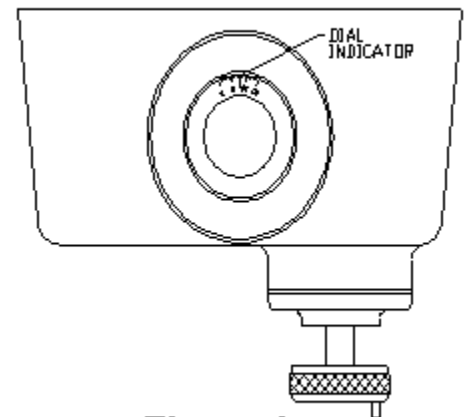
Before starting up the equipment you should adjust the ratio of the carburetor with the control knob to a ratio close to what you plan to run at. To do this turn the control knob to the desired dial indicator setting, (Refer to Figure 3) turning the control knob clockwise will add more air and the dial indicator will decrease (Refer to Figure 4). Turning the control knob counterclockwise will add more gas and the dial indicator will increase. The numbers on the dial indicator are for reference only and do not indicate ratio. Table 1 shows some typical ratios and the number to set the dial indicator to achieve that ratio. Once you dial in the ratio you can start-up you equipment and make any final adjustments if needed. If desired you can lock the control knob in place with the lock screw. (See Figure 3)



**Figure 3**

Ratio	Dial Indicator
2.5:1	7
2.8:1	6.5
7.5:1	4
10:1	3

**Table 1**



**Figure 4**



## 6 MAINTENANCE

### 6.1 Carburetor™

In order to maintain the precision of your Carburetor™, it is suggested that it be cleaned at least once a Month. The Carburetor™ has been designed to perform this maintenance with ease. This maintenance can be performed in minimal time since no special tools are required. The only tool needed is a screwdriver. Refer to Figure 3.



**CAUTION: Before performing any maintenance, make sure all supply gases to the carburetor and compressor are “Shut-Off” Failure to “Shut-Off” the supply gas may expose flammable gases that may be ignited by open flames.**

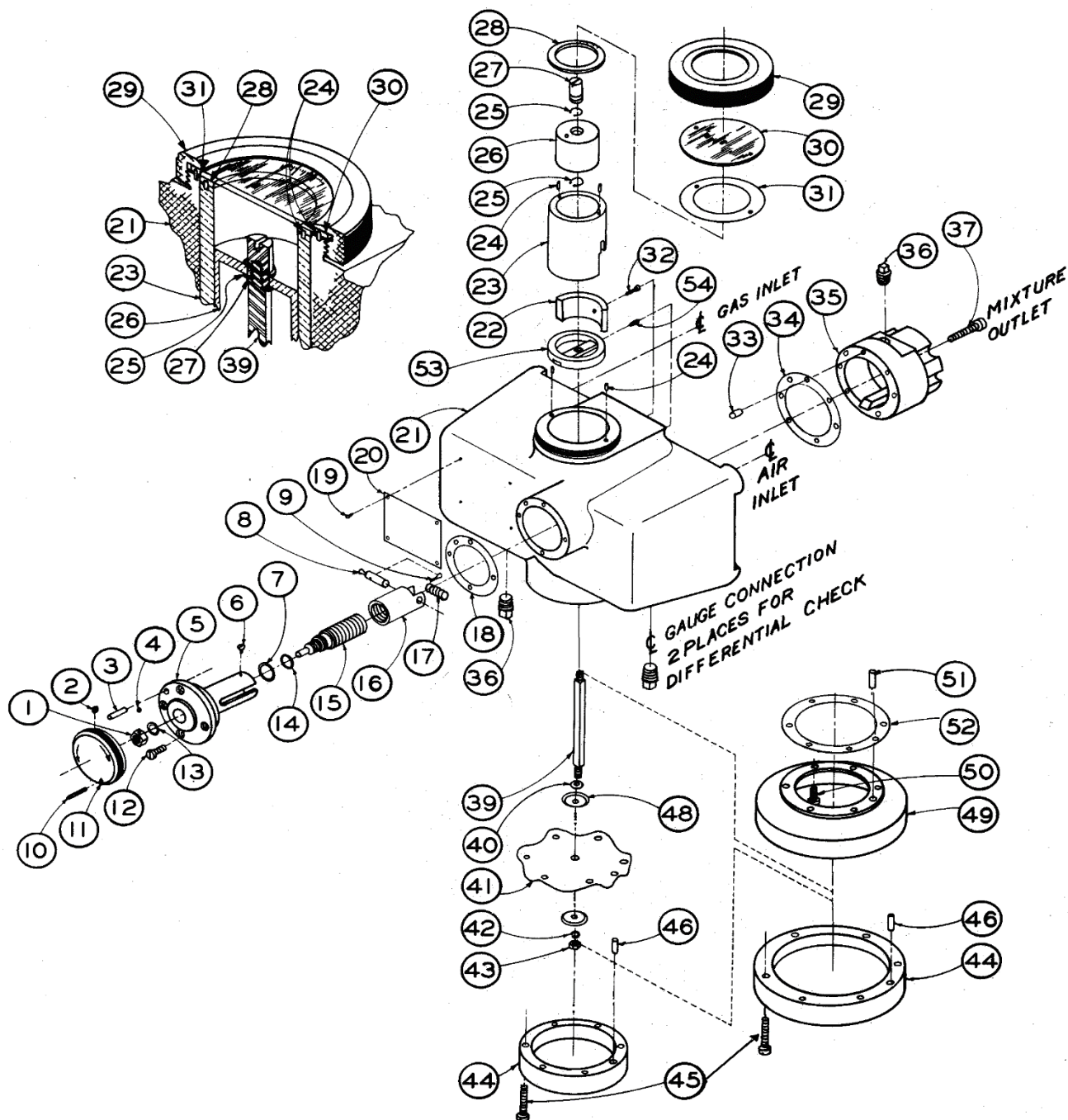
To clean the carburetor, unscrew the top closure ring (29) by hand and carefully remove the sight glass dial indicator (30) and gasket (31). Next, unscrew the piston nut (27) by hand or carefully with screw driver. Pull the piston (26) out of the carburetor. The piston nut is fastened to the piston and will not fall in the carburetor. Next, by hand, pull the upper sleeve (23) “bronze bushing” out of the carburetor. Clean thoroughly with a solvent or good metal polish. Clean the piston in a similar manner. The segment (22) and lower guide (53) are not removable and must be cleaned in place with a rag soaked in solvent. After all parts have been thoroughly cleaned and dried, reassemble in this manner: With the slot in the upper sleeve (23) lined up with the adjustment screw plunger (8), lower the upper sleeve into the carburetor until it rests on the plunger. Next, push the plunger away from the sleeve by hand until the sleeve drops to a seated position. If alignment was correct, the slot in the upper sleeve will engage with the plunger. If not, rotate the upper sleeve until the plunger drops into the slot. Then replace the piston (23) and secure the piston nut (27) into place (Caution: Do not over tighten). Next, replace the sight glass dial indicator (30) which, if the assembly of the upper sleeve has been made correctly, will be flush with the top of carburetor. If the dial is flush, proceed with assembly as follows: gasket (31) above dial sight glass (30) and finally, top closure ring.

The micrometer adjusting screw (1 thru 18) is a self-contained mechanism held in place on the front of the carburetor by four screws. It should be removed once a year or so depending on the cleanliness of the air drawn into the carburetor. To service, remove the four screws(12); pull unit out; wash in solvent; oil and reassemble components; inspect the condition of the gasket and install into the carburetor. Check to see that the adjustment screw plunger is engaged into the slot in the upper sleeve (23).

If it is noticed through the sight glass that the piston does not move up and down as the flow is increased or decreased when the piston and other parts are clean, the cause of this is due to either a bad diaphragm or plugged vent holes. These parts can be serviced as follow: To remove the carburetor diaphragm (41), remove the top closure ring (29), sight glass (30), gasket (31), dial (28) and piston (26). Turn the carburetor upside down and remove bottom flange (44) which is held in place by six or eight screws (45). Remove diaphragm and piston



rod assembly (39 thru 43). Clean carburetor body and all other parts. Pass wire through vent tube in carburetor body and vent hole in diaphragm flange. Remove defective diaphragm from piston rod and replace with a new one. Refer to Diaphragm assembly on page 10. Care must be exercised in positioning the new diaphragm on the piston rod so that the rod does not bind when it passes through the square hole in the lower guide. If position is correct, then the vent tube hole in the diaphragm will move an equal distance to the right or left of the vent tube. When properly located, replace bottom flange and turn carburetor right side up. If assembly has been made correctly and by-pass holes are clean, a slight hissing of air can be heard when piston rod is moved up or down. Continue assembly of piston and other parts as explained below.



**PAT. 2865389**



## 6.2 Diaphragm Assembly

To assemble piston shaft (39), assemble in the following sequence:

1. diaphragm thrust washer (40)
2. diaphragm pan (48)
3. diaphragm (41)
4. diaphragm pan (48)
5. diaphragm lock washer (42)
6. diaphragm nut (43)

To finish the assembly insert the diaphragm piston shaft assembly into the carburetor, insert the locating pin. Then line up the bottom flange (44) with the locating pin and securely fasten bottom flange with flange screws (45).

## 6.3 Gas Balancing Regulator

The purpose of the gas balancing regulator is to maintain the proper gas and air pressure across the parts of the carburetor at varying flows or outputs of the mixing equipment. Your UPC-Marathon Carburetor™ has been completely tested at the factory and has been set up to give the best results for ratio control throughout the range specified at the time of order and will not require resetting except in unusual cases.

The following procedure is used if you should want to determine if the balancing regulator is functioning properly. First, check the incoming gas pressure. If gas pressure is constant within the range of 4" to 8" W.C., then check the air filter and Flo-Meters™ to see if they are clean. Remove the 1/8" pipe plugs on the bottom of the carburetor. Insert 1/8" pipe nipples or 1/8" pet cock. Connect a water manometer across these two points with rubber tubing. Close the valve between the outlet side of the compressor and the unit being served. Open the gas valve on the gas line. Start the compressor. Now open the outlet valve to the flow desired as indicated on the Flo-Meters™. Adjust the ratio to that desired by turning the micrometer adjusting knob on the carburetor to the direction indicated on the knob for more gas or more air, whichever the case may be. Now observe the reading on the manometer. If the reading is not within the differential (total distance from top and bottom of water level in manometer) adjust by removing the cap on the balancing regulator and screwing the adjustment nuts clockwise or counter-clockwise as the case may be. Make a slight adjustment first and then replace the cap tightly on the regulator, as THE CAP MUST BE SEALED TO OBTAIN AN ACCURATE READING. Repeat removing the cap and adjusting and replacing the cap before taking a reading until the manometer reads the same as the factory setting. Check several different flows at the ratio you desire to operate. Do not attempt to run at flows lower than ¼ output. Look into the observation window on carburetor to see if the piston moves up and down when unit is changed from low flow to maximum output. If not, refer to maintenance and trouble shooting. Good ratio control cannot be obtained unless all parts such as Flo-Meters™, carburetor piston and unloader piston are clean and in good working order.



If it is still impossible to balance the differential for good ratio control, then the chances are that one of the two diaphragms in the regulator is leaking. Replace with a new regulator.

## 7 TROUBLESHOOTING

PROBLEM	SYMPTOMS	RECOMMENDED ACTION
<b>Failure to maintain constant ratio</b>	Insufficient or varying gas pressure	Check and regulate pressures upstream of the carburetor.
	Dirty carburetor	Clean as outlined under MAINTENANCE OF THE CARBURETOR™. Check and replace diaphragm as necessary.
	Dirty air filter or Flo-Meter	Clean or replace as necessary.
	Differential across carburetor out of adjustment	Adjust as outlined under MAINTENANCE OF THE GAS BALANCING REGULATOR. Check and replace diaphragm as necessary.

## 8 APPENDIX “A” DRAWINGS

On demand



## 9 APPENDIX “B” PARTS LIST

ITEM	200-750 CFH PART #	1000-2500 CFH PART #	3000-8000 CFH PART #	REQUIRED	DESCRIPTION
1	1-868	1-868	1-868-1	1	Take-Up Nut
2	1-869	1-869	1-869	1	Control Knob Lock Screw
3	1-870	1-870	1-870	1	Adjustment Housing Locating Pin
4	1-871	1-871	1-871	1	Take-Up Nut Lock Screw
5	2-604	2-604	2-604	1	Adjustment Housing
6	1-872	1-872	1-872	1	Adjustment Nut Stop Screw
7	1-601	1-601	1-601	1	Adjustment Screw Thrust Washer
8	2-611	2-611	2-611	1	Adjustment Plunger Arm
9	1-873	1-873	1-873	1	Plunger Arm Cotter Pin
10	1-874	1-874	1-874	1	Ratio Setting Lock Screw
11	1-383	1-383	1-383	1	Control Knob
12	1-875	1-875	1-875	4	Adjustment Housing Screw
13	1-876	1-876	1-876	1	Take-Up Nut Thrust Washer
14	1-877	1-877	1-877	1	Adjustment Screw “O” Ring
15	2-610	2-610	2-610	1	Adjustment Screw
16	2-609	2-609	2-609	1	Adjustment Nut
17	1-416	1-416	1-416	1	Adjustment Plunger Arm Spring
18	1-367	1-367	1-367	1	Adjustment Housing Gasket
19	1-878	1-878	1-878	4	Nameplate Screw
20	1-954	1-954	1-549	1	Nameplate
21	4-601	4-001	5-1117-1	1	Main Body
22	2-617	2-626	1-556	1	Segment
23	2-616	2-526	2-752	1	Upper Sleeve
24	1-879	1-879	1-879	4	Dial & Sight Glass Locating Pins
25	1-880	1-880	1-880	2	Piston Nut Retaining Rings
26	2-605	2-522	2-754	1	Piston
27	2-618	2-618	2-618	1	Piston Nut
28	1-307	1-316	1-702	1	Dial Indicator
29	2-619	2-314	2-756	1	Top Closure Ring
30	1-301	1-361	1-718	1	Sight Glass
31	1-373	1-360	1-471	1	Top Closure Ring Gasket
32	1-881	1-881	1-881	1	Segment Screw
33	-	-	-	N/A	Outlet Flange Locating Pin ( <b>Obsolete</b> )
34	-	-	1-721	1	Outlet Flange Gasket
35	-	-	2-1466	1	Outlet Flange
36	-	-	-	N/A	Pipe Plug ( <b>Obsolete</b> )
37	-	-	-	N/A	Outlet Flange Screw ( <b>Obsolete</b> )
38	1-302	1-443	1-469	2	Diaphragm Gaskets
39	2-607	2-310	1-711	1	Piston shaft
40	1-885	1-885	1-885	1	Diaphragm Thrust Washer
41	1-491	1-442	1-557	1	Diaphragm
42	1-886	1-886	1-886	1	Diaphragm Lock washer
43	1-887	1-887	1-887	1	Diaphragm Nut
44	2-603	3-308	3-752	1	Bottom Flange
45	1-888	1-888	1-888	6 or 8	Bottom Flange Screws
46	1-889	1-889	-	1	Orifice Locating Pin
47	1-380	1-380	1-380	2	Diaphragm Pan Gaskets
48	2-620	2-620	2-620-1	2	Diaphragm Pans
49	-	3-305	-	1	Bottom Flange Adapter
50	-	1-890	-	6	Bottom Flange Adapter Screws
51	-	1-889	-	1	Orifice Locating Pin





52	-	1-302	-	1	Bottom Flange Adapter Gasket
53	-	-	1-705	1	Lower Guide
54	-	-	-	N/A	Lower Guide Screw ( <b>Obsolete</b> )
55			2-767	2	Inlet Flange (Not Shown)
56			1-475	2	Inlet Flange Gasket (Not Shown)

## 10 WARRANTY

### EXPRESS WARRANTY ON UPC-MARATHON EQUIPMENT

UPC-Marathon warrants its products for a period of one (1) year from date of shipment from UPC-Marathon to the original purchaser to be free from defects in material and workmanship under normal recommended use, service, inspection and maintenance. Normal recommended use, service inspection and maintenance mean:

1. Not to be used in excess of nor below the rated capacity, pressures and temperature ranges specified in the applicable quotation, purchase order, acknowledgment, marketing literature, nameplate(s), specification sheet or the Installation, Operation, Inspection and Maintenance Manual (THE MANUAL);
2. Using only clean liquids or gases (only liquids in liquid Flo-Meters and only gases in gas Flo-Meters); air and fuel gases used in mixing equipment to be clean and free of solids all as further explained in THE MANUAL; and
3. Installation, operation, inspection and maintenance in compliance with THE MANUAL; and
4. The UPC-Marathon products being used only in:
  - a) Ambient environments lower than 132° Fahrenheit (54° Celsius) unless specifically designed and so labeled by UPC-Marathon for higher temperatures; and
  - b) Non-corrosive environments; and
  - c) Completely protected from moisture, rain, snow or other outside environments; and
  - d) Not to be used below 32° Fahrenheit (0° Celsius) unless special precautions are taken for low temperature conditions as shown in THE MANUAL
5. Being used only for applications permitted by THE MANUAL or other UPC-Marathon literature or special applications approved in a separate written authorization by UPC-Marathon



## **WARRANTY EXCEPTIONS**

This Warranty does not apply to damage caused by any or all of the following circumstances or conditions:

1. Freight damage;
2. Parts, accessories, materials or components not obtained from nor approved in writing by UPC-Marathon;
3. Any consequential or incidental damages including but not limited to loss of use, loss of profits, loss of sales, increased costs, arising from the use of any product, system or other goods or services manufactured, sold or provided by UPC-Marathon;
4. Misapplication, misuse and failure to follow THE MANUAL or other literature, instructions or bulletins (including drawings) published or distributed prior to THE MANUAL

The exclusive remedy under this Warranty or any other express warranty is the repair or replacement without charge for labor and materials of any UPC-Marathon parts found upon examination by UPC-Marathon to have been defective. Since certain UPC-Marathon equipment is heavy, bulky and not deliverable by U.S. mail or other parcel service, UPC-Marathon equipment may be returned only upon written consent of UPC-Marathon and then only to the location designated by UPC-Marathon. Generally such consent will be given only upon the condition that the customer assume and prepay all carrier charges and responsibility for damage in transit.

Purchasers of UPC-Marathon products, equipment, goods or services waive subrogation on all items covered under their own or any other insurance.

## **DISCLAIMER**

THIS WARRANTY IS EXCLUSIVE. UPC-MARATHON EXPRESSLY DISCLAIMS ANY AND ALL OTHER WARRANTIES WHETHER EXPRESS OR IMPLIED INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR ANY PURPOSE.

No person, including any dealer, seller or other representative of UPC-Marathon is authorized to make, on behalf of UPC-Marathon, any representations beyond those contained in UPC-Marathon literature and documents or to assume for UPC-Marathon any obligations or duties not contained in this Warranty and Warranty Policy.

UPC-Marathon reserves the right to make design and other changes, modifications or improvements to its products, services, literature or systems, without any obligation, to furnish or install same on any previously sold or delivered products or systems.



## **LIMITATION OF LIABILITY**

It is expressly agreed that the liability of UPC-Marathon is limited and UPC-Marathon does not function as an insurer. The purchaser and/or user agree that UPC-Marathon is not liable for loss, harm or damage due directly or indirectly to any occurrence or consequences there from. If UPC-Marathon should be found liable to anyone on any theory (except any express warranty where the remedy is set forth in Section 2 of this Warranty and Warranty Policy) for loss, harm or damage, the liability of UPC-Marathon shall be limited to the lesser of the actual loss, harm or damage or the purchase price of the involved UPC-Marathon equipment or service when sold (or when service performed) by UPC-Marathon to its customer. This liability is exclusive and regardless of cause or origin resulting directly or indirectly to any person or property from:

1. The performance or nonperformance of any obligations set forth in this Warranty and Warranty Policy;
2. 2 Any agreement including specifications between UPC-Marathon and the customer;
3. 3 Negligence, active, passive or otherwise of UPC-Marathon or any of its agents or employees;
4. Breach of any judicially imposed warranty or covenant of workmanship, durability or performance; and
5. Misrepresentation (under the Restatement, common law or otherwise) and/or strict liability involvement
6. Liability for fraud-in-the-inducement

## **INFORMATION NECESSARY TO OBTAIN TECHNICAL ASSISTANCE**

For UPC-Marathon to appropriately respond to a request for assistance or evaluation of customer or user operating difficulty please provide at a minimum the following information:

1. Serial number and type or model of meter, compressor or other equipment and all other data shown on the nameplate and on the specific component which appears to be involved in the difficulty;
2. The date and from whom you purchased your UPC-Marathon equipment and your purchase order number
3. State your difficulty, being sure to mention at least the following:
4. Application



5. Input pressure where Flo-Meters or compressors are involved
6. Condition of filters, strainers or screens, upstream or downstream of the UPC-Marathon equipment
7. Gas or liquid temperatures and other ambient conditions at the time of the difficulty
8. Type of lubrication being used (if any) - give specifics
9. Any other relevant pressures including gauge readings both upstream and downstream of the UPC-Marathon equipment.
10. All electrical information available.
11. Performance activity.
12. Any other pertinent information. If a sketch would help explain the difficulty, please include one.

## **WARRANTY FIELD SERVICE**

If warranty Field Service at the request of the purchaser or user is rendered and the difficulty is found not to be with UPC-Marathon's product, the purchaser shall pay the time and expense (at the prevailing rate at the time of the service) of UPC-Marathon's field representative(s). Charges for service, labor and other expenses that have been incurred by the purchaser, its customer or agent without written approval of UPC-Marathon will not be accepted. The OEM or other reseller is responsible for transmitting installation and operating instructions, THE MANUAL or other service literature supplied by UPC-Marathon with the equipment



## 11 CUSTOMER SUPPORT

Americas	Asia	Europe
<u><a href="mailto:support.na@upc-marathon.com">support.na@upc-marathon.com</a></u>	<u><a href="mailto:service@mmichina.cn">service@mmichina.cn</a></u>	<u><a href="mailto:support.eu@upc-marathon.com">support.eu@upc-marathon.com</a></u>
<b>USA:</b> +1 414 462 8200	<b>Shanghai:</b> +86 21 3463 0376	<b>France:</b> +33 3 81 48 37 37
<b>Canada:</b> +1 514 335-7191	<b>Beijing:</b> +86 10 8217 6427	<b>Germany:</b> +49 7161 94888-0
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