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# OPERATOR'S MANUAL

## PURGE STAR & RING PURGE SYSTEMS

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Additional instruction for Purge Star Single Hose, Purge Star Double (bypass) Hose and Ring Purge with bypass hose and gas dump valve feature.



**WARNING!**  
Before operating this product,  
read and understand this  
Operator's Manual.  
Become familiar with the  
potential hazards of this unit.  
Contact SUMNER  
if you have any questions.



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## OWNER'S RESPONSIBILITIES

Throughout this publication, the words **WARNING**, **CAUTION** and **IMPORTANT** will be used to alert the user to special instructions concerning a particular operation that may be hazardous if performed incorrectly or carelessly.

### OBSERVE THEM CAREFULLY !!



#### WARNING

Hazards or unsafe practices which could result in severe personal injury or death.



#### CAUTION

Hazards or unsafe practices which could result in minor personal injury, product or property damage.



#### IMPORTANT

Indicates information or instructions that are necessary for proper operation and/or maintenance.



### WARNING

Welding using a purge dam system requires use of an inert gas such as argon. Argon gas is classified as a simple asphyxiant. On loss of containment argon evaporates very quickly causing supersaturation of the air with serious risk of suffocation when in confined areas.

Under ambient conditions, argon is a colorless, odorless, tasteless gas. Inhalation in excessive concentrations can result in dizziness, nausea, vomiting, loss of consciousness, and death.



### CAUTION

Using argon in welding and cutting may create hazardous fumes. Short-term overexposure to fumes may result in dizziness, nausea, dryness or irritation of nose, throat, and eyes, or other similar discomfort.

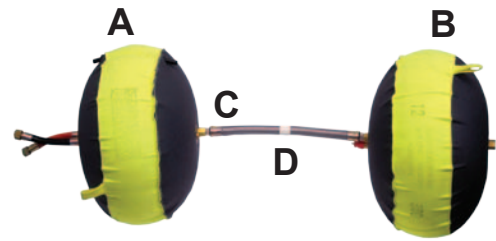
## General

The Sumner Purge Star and Ring Purge system provides an air-tight seal and helps achieve a small volume weld chamber. This considerably reduces the amount of purging gas and time needed to reach appropriate atmosphere in the weld proximity which is safe for welding (approximately 0.1 % oxygen content). Use of a tandem Purge Star and Ring Purge system guarantees oxidation-free, clean welds and uniform weld profiles every time.

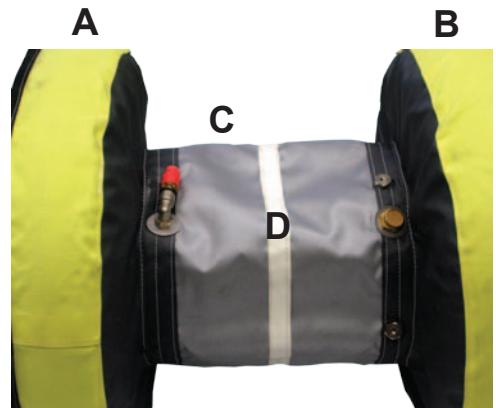
## Before Use

- Carefully read these instructions before using your Purge Star or Ring Purge system.
- Connect a multi-stage or two-stage regulator and gas flow meter to the gas cylinder to ensure a constant gas flow rate when using your Purge Star or Ring Purge system. All Purge Star and Ring Purge connecting hoses utilize a 1/4" BSP female nut.
- If you have any problems with these instructions or the Purge Star system itself, please contact Sumner Manufacturing at 281-999-6900 or if outside of North America please call internationally +1281-999-6900.

## Understanding Your Purge Star and Ring Purge System



*Purge Star*



*Ring Purge*

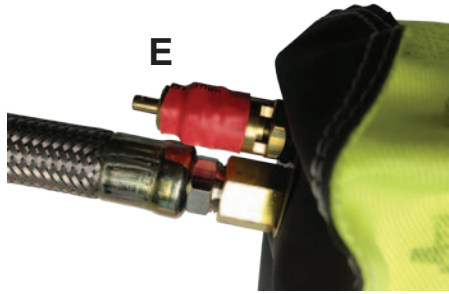
Your Purge Star and Ring Purge systems are re-usable multiple times and consists of 2 inflatable dams (A and B). Purge Star dams are connected by an armored joining hose (C).

Ring Purge Dams are connected with a heat protective sleeve (C). The armored hose and heat protective sleeve both have an illumination band in its center (D) to assist locating the purge system inside the pipe with the dams equidistant from the weld.


The 2 dams, when inflated, tightly seal inside the pipe and considerably decrease the length of pipe needed for purging. Therefore the use of a purge dam system cuts down on purging gas and purging time and will save argon costs and time while increasing production rate.

The Ring Purge design reduces the volume yet further as the sleeve diameter is only 6 " (150 mm) in diameter smaller than the inflated dams and so you only effectively purge the volume between the sleeve and the inner pipe circumference.

**Understanding Your Purge Dam System cont.**



The valve (E) that exhausts argon gas into the purge volume once the purge dam system has inflated and sealed is located on the secondary inflatable purge dam, parallel to the Purge Star joining armored hose or Ring Purge heat protective sleeve.



**WARNING**  
**Purge Star and Ring Purge valves are pre-set and should not be tampered with. If operators have altered the tension of the valve, please refer to the section later in the Operator's manual for "Adjusting the Valves" for instructions of how to set the valve correctly.**



Example of a factory set valve.



An unsheathed valve could have been altered and might affect the purge system's performance.



Purge Star with single inflation hose for sizes 2" to 10".

F depicts the red argon inflation hose.

H depicts the external exhaust hose on the perimeter of the inflatable purge dam end.



Purge Star Primary End with red inflation hose and black bypass hose for sizes 12" to 16" only.

F depicts the red argon inflation hose.

G depicts the black argon bypass hose.

H depicts the external exhaust hose on the perimeter of the inflatable purge dam end.



Purge Star with argon bypass hose installed for sizes 12" to 16" only.

Exit port (I) for argon to escape from the argon bypass hose (G) to accelerate the rate of purge gas filling the volume created between two sealing purge dams.

## How To Use Your Purge Star and Ring Purge Systems – Quick Guide



Ring Purge with red inflation hose fitted with gas deflation dump valve and black bypass hose for sizes 18” to 80”.

**F** depicts the red argon inflation hose.  
**G** depicts the black argon bypass hose.



Exit port (I) for argon to escape from the argon bypass hose (G) to accelerate the rate of purge gas filling the volume created between two sealing purge dams.

The red inflation hose (F) is connected to the argon source. This hose inflates the dams and then exhausts excess argon gas into the purge volume through the valve.

The Ring Purge vents the exhausting atmosphere and argon through 4 ports (J) located on the connecting sleeve near the primary inflation dam end.

Welders operating a Purge Star range 12” to 16” and Ring Purge range 18” to 80” have an additional central black hose. The black bypass hose (G) can be used to introduce more argon gas into the purge volume e.g. when customers are welding the initial root pass with wider weld gaps. Back-up purge gas through the black hose enters the purge volume through a gas inlet (I). In this way, additional gas can be introduced without effecting the inflation rate inside the balloon dams and eliminate the risk of bursting the purge dams.

1. The valve on your Sumner Purge Star and Ring Purge systems comes pre-set. Do not tamper with it. If you accidentally change the valve setting please refer to page 5 for instructions on re-setting the valve.



2. Always connect a multi-stage or two-stage regulator, a Y-piece and a gas flow tube between your gas bottle and the purge system.
3. Connect the red fitting or hose of your purge system to an argon hose connected to one side of the Y-piece. The red fitting or hose inflates the purge dams and purges the volume between the dams through the valve.
4. Inflate the dams at a rate no greater than 31.8 scfh (15 lpm).



### CAUTION

**Be sure your flowmeter is set at a rate no greater than 31.8 scfh (0.53 scfm or 15 lpm). Using a flow rate that is too high will exceed the argon release valve’s pre-determined setting and could cause the bags to burst.**

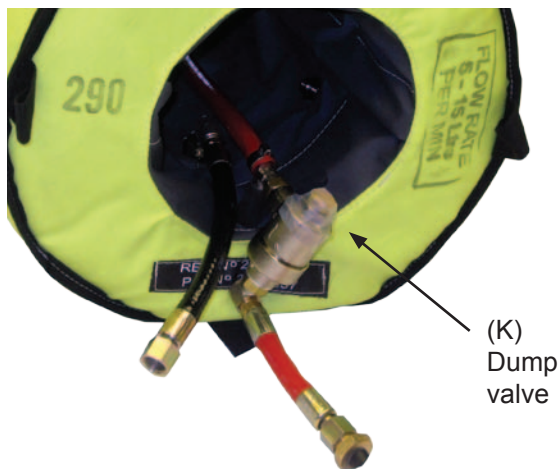
5. As soon as the dams are inflated sufficiently (they should never be rock-hard, but give a good seal to the pipe), reduce the flow rate through the red fitting or hose to 10.6 scfh (0.18 scfm or 5 lpm).

Welders operating a Single Hose Purge Star for pipe sizes 2” - 10” can safely fluctuate the argon rate between 10.8 – 31.8 scfh to provide adequate Argon gas shielding and maintain an oxygen level down to 0.1%.

**Note: Sumner recommends that the red fitting or hose should remain at 10.6 scfh (0.18 scfm or 5 lpm) throughout the welding procedure.**



6. Especially during the root pass you may have to add additional gas flow through the black bypass hose. This will guarantee maintenance of the 0.1% O<sub>2</sub> purge environment without any risk of bursting the dams.
7. Connect the black hose on any Purge Star with a bypass hose or Ring Purge system to the second end of the Y-piece.
8. Adjusting the bypass hose - Add additional gas to the purge with a gas flow between 10.8 and 108.0 scfh (0.18 scfm and 1.8 scfm; 5 and 50 lpm) depending on the width of the gap between your pipes.
9. Once the root pass has been completed, the gas flow into the purge can be adapted by changing the flow through the black bypass hose. This may be necessary as a too high flow rate can cause pressure that may blow out the root pass.
10. Once welding has been completed, the inflated purge system should stay in place and purging should continue until the pipe's weld has cooled down to avoid any risk of oxidation of the hot metal.
11. Once the weld has cooled down, disconnect the hoses of the Purge Star or Ring Purge system from the gas source and wait for a few minutes for it to deflate before removing it from the pipe.



When operating the Ring Purge system once you completely turn off the argon gas inflating the dams the dump valve releases the gas pressure inflating the dams to rapidly deflate the Ring Purge and break its seal against the internal pipe circumference.

## Adjusting the Valves

**NOTE: The valve of your bypass Purge Star and Ring Purge system has been pre-set in our workshops. Please do not tamper with it!**

**If you accidentally change the valve setting please follow the instructions below to re-set the valve appropriately.**

When the purge dam system is connected to a gas supply (please use multi-stage or 2 stage regulator), the purge gas will initially inflate the 2 dams (A and B). Once the dams are fully inflated, the valve (D) will open and release the purging gas into the purge volume around the weld.

**If the valve is closed**, the dams of your purge dam system will over-inflate and burst since no gas can be exhausted into the purge volume.

**If the valve is fully open**, the dams will not sufficiently inflate and no air-tight seal within the pipe can be achieved.



### IMPORTANT

**Use a flow rate of 10.6 scfh (0.18 scfm or 5 lpm) for initial valve adjustment.**



*If the valve is in the above position it is possible to over-inflate purge dams.*

### 1. The valve is fully closed.

Using the purge dam system with the valve in this position will ultimately cause over-inflation and the product might burst.

Purge systems are designed for one pipe size (including all schedules of the pipe diameter) only. Over-inflation will destroy the covers of the dams.

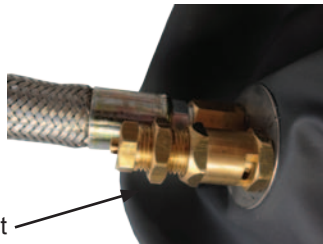


*If the valve is in the above position it is possible the dams will not seal against the pipe.*

## 2. The valve is fully open.

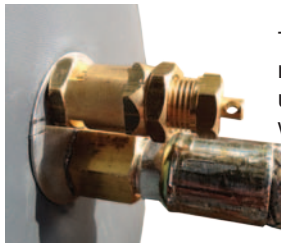
Using the purge dam system in this position will not allow inflation of the dams since all gas is exhausted into the purge volume. No seal within the pipe can be achieved using this valve position.

This will also happen if the valve was detached from the purge dam system.



Locking nut

Adjust the valve with the locking nut loose.



Tighten locking nut to valve using two 9/16" wrenches

Correct setting once locking nut is secure and locked down.

## 3. Adjust the valve by turning the threaded stem and securing the position with the free-spinning nut.

On first inflation outside the pipe start with the valve fully open (see 2).

Connect the purge system to a regulated gas supply at 10.8 scfh (0.18 scfm or 5 lpm). All the gas will be exhausted through the valve. The dams will not inflate.

Slowly start closing the valve until the dams start to inflate. Carefully check the inflation of the dam ends by pressing them with your hand.

**NOTE: The dam ends should be inflated to be wrinkle free for a tight seal. They must not be rock hard since this might damage the product.**

## 4. If the dam ends become too hard (over-inflation) slightly open the valve to allow gas to be exhausted.

If the dam ends do not inflate enough slightly close the valve. Find a position where the dams will seal but not over-inflate.

Always use the Purge Star and Ring Purge system

with a multi or two stage regulator since gas pressure can fluctuate according to the filling level of the gas bottle which might affect your purge and damage the device.

Once the valves have been adjusted, the tandem purge system is ready to use inside a pipe.

## How To Use Your Purge Star and Ring Purge System



### 1. Insert Purge Star or Ring Purge system into the pipe.

If the Purge Star or Ring Purge system is to be positioned too far inside the pipe to reach without difficulty:

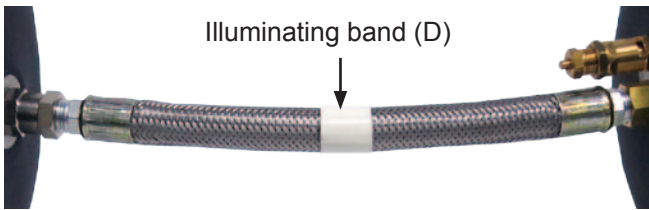
- Attach pull wires or ropes to the pull eyelets (L) to ensure easy removal after use.
- Connect an additional exhaust hose to enable monitoring of the exhaust gas.
- Position the purge dam system within the pipe using the pull wire or ropes attached to the pull eyelets.

### 2. Connect the Purge Star or Ring Purge System to the gas supply

Connect the gas supply to the red gas inlet hose via a Y-piece. If additional gas is needed connect secondary gas supply to black bypass hose.

### 3. Position the Purge Star or Ring Purge system under the weld gap

Ideally the purge system should be positioned so the dams are an equal distance away from the weld. An illuminating band is taped to the connecting hose to assist welders in centering the Purge Dams and to ensure each purge dam is equal distance from the weld.



An illuminating band (D) is taped to the connecting hose to assist Welders centralizing the Purge Dams and to ensure each purge dam is equal distance from the weld.



#### IMPORTANT

The flame-resistant proban cotton covered dams will resist the heat produced during welding if positioned correctly. However, if the dams are too close to the weld or directly below, this can reduce the longevity of the product or even cause damage.

#### 4. Start the gas supply

The dams will now inflate and seal inside the pipe around the weld. Once the dams are inflated the valve will release purge gas into the weld chamber. The weld chamber will purge quickly, however, gas flow can be increased by feeding additional purge gas through the supplementary inlet while the weld gap is open.

Use a flow rate between 10.8 and 31.8 scfh (0.18 and 0.53 scfm or 5 and 15 lpm) for inflation. A higher flow rate may cause over-inflation and damage the product voiding the product warranty.



#### IMPORTANT

Sumner Manufacturing recommends the use of an Argo-Naught Weld Gas Analyzer to closely and accurately monitor the oxygen level in the weld chamber.



779281 Sumner Argo-Naught Weld Gas Analyzer

Once the required oxygen level (typically 0.1 %) has been achieved, welding can begin.

#### 5. Welding the root pass

Sumner recommends reducing the flow rate through the red inflation hose to 10.8 scfh (0.18 scfm or 5 lpm) for the duration of the weld. Gas flow rate can be adapted more easily through additional gas supply through the black bypass hose which will eliminate the risk of bursting the purge dams.

Especially if larger weld gaps are used through which argon gas can freely escape, contamination may occur if the purge gas flow rate is not high enough to prevent oxygen penetration through the gap. To prevent oxygen penetration additional back-up gas can be introduced into the weld proximity by connecting a secondary gas supply to the especially designed black bypass hose on the bypass Purge Star and Ring Purge systems. Working with a second gas supply will allow the welder to compensate for any gas loss through the weld gap while not exposing the dams to over-inflation which might occur if the flow rate of the primary gas supply is too high.

#### 6. Welding hot passes

Once the weld gap is closed, loss of purge gas should be minimal due to the tight seal of the inflatable system in the pipe. A flow rate between 10.8 and 21.2 scfh (0.18 scfm and 0.35 scfm; 5 and 10 lpm) is recommended during welding of the hot passes as this is sufficient to maintain an oxygen-free environment and will avoid that the root pass is "blown out" by too high flow rates.

#### 7. Remove Purge Star or Ring Purge system from pipe

After completion of the weld the purge dam system should remain inflated with argon gas in the pipe until the weld has cooled down enough to avoid oxidation.

Turn off the gas supply, disconnect gas inflation line from the purge dam system by loosening the hose fitting at the Y-piece to allow the product to deflate inside the pipe.

Once deflated, the purge dam system can easily be pulled out of the pipe using pull wires or ropes attached to eyelets.



## Purge System Preparation



### **WARNING**

Stainless steel fabricators using a purge system are encouraged to clean pipes prior to installing purge dams and welding. Any dirt or dust present in the pipes when purging the weld can oxidize the weld root as well as generate heat, creating discolored lines that run parallel to the internal weld.

If the pipes are not cleaned prior to welding or if any tacks are ground out when welding two pipe lengths together, the internal pipe surface is likely to contain dust or liquids from a machining process or storage. The purge system, when sealed against the pipe and pulled through the pipe, can be contaminated with these materials.

Depending on the amount of dirt, some dusts can be cleaned with a soft brush. If the Purge System is covered with oils, owners might use detergents and stiffer brushes and rinse the product with clean water. Excessive cleaning with detergents will reduce the additives in the Proban cotton reducing the effectiveness to withstand grinding sparks.

Using the purge dams equidistant from the weld maximizes the usage life of both purge dams. Locating the reflective band below the weld ensures the purge system is centrally located. When welding a flange or a fitting to the pipe end, one end of the purge system may be located closer to the weld. Using flange pins to locate a second flange to a welded flange or clamping a short length of pipe to an elbow or T piece will increase the length of available pipe to seal a purge dam inside and ensure the reflective band can be located below the weld.

## Flow Rate Conversion Table

LPM	SCFH	SCFM
20.0	42.4	0.71
19.0	40.3	0.67
18.0	38.1	0.64
17.0	36.0	0.60
16.0	33.9	0.56
15.0	31.8	0.53
14.0	29.7	0.49
13.0	27.5	0.46
12.0	25.4	0.42
11.0	23.3	0.39
10.0	21.2	0.35
9.0	19.1	0.32
8.0	16.9	0.28
7.0	14.8	0.25
6.0	12.7	0.21
5.0	10.6	0.18

Recommended range for inflating Purge Star is between 5.0 and 15.0 LPM (10.6 and 31.8 SCFH).

Flow rates may be increased when utilizing black bypass hose for Purge Stars 12" to 16" or Ring Purge products.

LPM = Liters per minute  
 SCFH = Standard cubic feet per hour  
 SCRM = Standard cubic feet per minute