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DryCal® Multiple Flow Source (MFS) Manual



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MK01-22 A

DryCal MFS Specifications

Dimensions (H x W x D) 7.75 x 14.25 x 9.75 inches • 197 x 362 x 248 mm

Weight 27 lbs • 12,247 g

Flow Range 10 – 50,000 ccm, external (unregulated)

Gas Compatibility Non-corrosive, non-condensing, non-combustible gases, less than 70% humidity

Inlet Fitting ¼ inch NPT

External Fitting ¼ inch NPT

Flow Outlets (Low & High) ¼ inch Swagelok® compression

Warranty 1 year

Ambient Temperature 10–40° C

Storage Temperature 0–70° C

Ambient Humidity 0–70%, non-condensing

Gauge Dual pressure output, 0–160 PSI & 0–100 PSI

Operating Pressure (Nominal) 150 PSI max. input

Flow Stability ± 0.03% at constant temperature

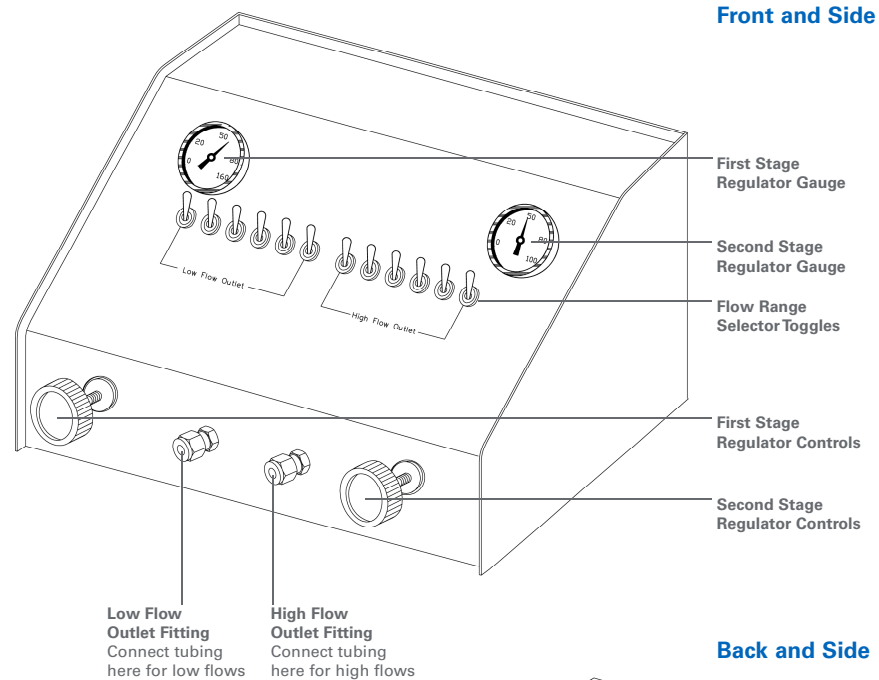
Regulators Dual high precision, non-venting

Restrictors Integrated

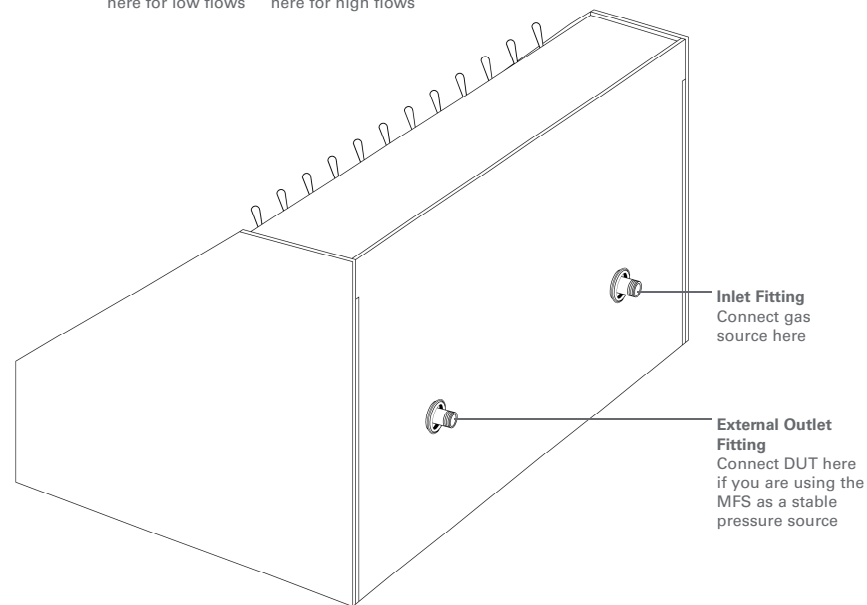
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1.0 DryCal MFS Features



Back and Side



2.0 Warnings

- ⚠ The DryCal MFS is not rated intrinsically safe and is not for use with explosive gasses or for use in explosive environments.
- ⚠ Input Pressure should not exceed 150 PSI
- ⚠ For use with clean laboratory air or other inert, non-corrosive, non-combustible, non-hazardous gasses only.

3.0 General Description

The MFS is a non-electrical multiple range flow controller. The MFS provides a stable airflow for checking any type of flow measurement device. Two precision regulators, followed by eleven precision porous restrictors, provide control over a broad range of flow rates, from 10–50,000 ccm. Twelve pneumatic toggle valves make selecting and adjusting flows quick and simple.

Additionally, an external unrestricted variable pressure flow port can provide a flow rate of up to 300,000 ccm (pressure dependent.)

4.0 Theory of Operation

The MFS provides flow metrologists a simple and cost effective solution to stable low flow gas delivery. The MFS works by forcing triple regulated compressed gas through precision porous metal flow restrictors to create stable gas flows for use in testing unregulated flow measurement devices.

Gas flow is stepped down through two high precision pressure regulators before passing through a user-selected precision porous metal flow restrictor.

Precision porous metal flow restrictors are reliable, cost-effective replacements for orifices, capillaries, or micrometering valves. A porous metal flow restrictor is, in effect, a multiple orifice device with many very small holes, creating a vast number of random pathways. Typically, a porous metal restrictor has a porous surface area 500 times that of an equivalent orifice. The flow restrictors used in the MFS channel gas through hundreds of pores instead of just one, reducing gas exit velocity. Because gas and particulate move slower through the element, porous metal flow restrictors incur less wear, and last longer. The porous metal restrictors used in the Bios DryCal MFS system resist such physical change because of the lower velocities and virtual absence of erosion, resulting in more consistent, reliable flow restriction.

5.0 Operating Instructions

For Use as a Stable Flow Source

- 1 Turn all pneumatic toggle valves to the off (up) position.
- 2 Connect the MFS inlet on rear of unit to a clean, dry, oil-free compressed gas source (150 PSI max.)
- 3 Toggle the 1K—2K valve to the on (down) position.
- 4 Set the First Stage regulator (80—100 PSI.)
- 5 Adjust the Second Stage regulator (30—60 PSI.)
- 6 Toggle the 1K—2K valve to the off (up) position.
- 7 Depending on the flow range selected, connect the flow measurement device to the Low Flow Outlet (10—1,000 ccm) or the High Flow Outlet (1,000—50,000 ccm), located on the front of the MFS.
- 8 Select the toggle switch for your desired flow range and toggle it to on (down.) Multiple toggle switches may be turned on simultaneously to obtain a cumulative flow. Allow sufficient time for thermal stabilization of the selected nozzles(s) (lower flows may take longer to stabilize.)
- 9 Vary the Second Stage regulator's pressure to dial in the desired flow.

For Use as a Stable Pressure Source

- 1 Turn all pneumatic toggle valves to the off (up) position.
- 2 Connect the MFS inlet to a clean, dry, oil-free compressed gas source (150 PSI max.)
- 3 Toggle the 1K—2K valve to the on (down) position.
- 4 Set the First Stage regulator (80—100 PSI.)
- 5 Vary pressure using the Second Stage regulator to select an appropriate pressure for the External outlet.
- 6 Toggle the 1K—2K valve to the off (up) position.
- 7 Connect the flow measurement device to the External outlet located on the back of the MFS.
- 8 Select the toggle switch for the External outlet and toggle it to on (down.)

7.0 MFS Maintenance

The MFS is a rugged instrument that with normal use does not require maintenance.

8.0 Return Authorization

Should the need for service arise, please contact Bios International for a RMA number prior to returning your MFS for service. You can telephone Bios at (800) 663 4977 or (973) 492 8400, or email service@drycal.com.

9.0 Shipment

When shipping the DryCal MFS please ensure that the packaging is adequate to protect the instrument. When possible the DryCal MFS should be shipped in the original packaging. Bios International is not responsible for damage that occurs during shipment.

10.0 Limited Warranty

The Bios DryCal MFS is warranted to the original end user to be free from defects in materials and workmanship under normal use and service for a period of 1 year from the date of purchase as shown on the purchaser's receipt. If the unit was purchased from an authorized reseller a copy of an invoice or packing slip showing the date of purchase may be required to obtain warranty service.

The obligation of Bios International Corporation under this warranty shall be limited to repair or replacement (at our option), during the warranty period, of any part which proves defective in material or workmanship under normal use and service provided the product is returned to Bios International Corporation, transportation charges prepaid.

Notwithstanding the foregoing, Bios International Corporation shall have no liability to repair or replace any Bios International Corporation product:

- 1 Which has been damaged following sale, including but not limited to damage resulting from improper electrical voltages or currents, defacement, misuse, abuse, neglect, accident, fire, flood, act of God or use in violation of the instructions furnished by Bios International Corporation,
- 2 Where the serial number has been altered or removed or
- 3 Which has been repaired, altered or maintained by any person or party other than Bios International Corporation's own service facility or a Bios-authorized service center.

This warranty is in lieu of all other warranties, and all other obligations or liabilities arising as a result of any defect or deficiency of the DryCal MFS, whether in contract or in tort or otherwise. All other warranties, expressed or implied, including any implied warranties of Merchantability and fitness for a particular purpose, are specifically excluded.

In no event shall we be liable for any special, incidental or consequential damages for breach of this or any other warranty, express or implied, whatsoever.

Notes

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