

FEDERAL SUPPLY SERVICE
Authorized Federal Supply Schedule Price List

66 - Scientific Equipment and Services

**Special Item No. 66-616 Liquid/Gas Flow and Level
Instruments**



SMART GAS FLOWMETERS
AND CALIBRATORS

The Originators Of
Gas Laminar Flowmeters

CME Division a division of Aerospace Control Products, Inc.
1314 West 76TH Street
Davenport, IA 52806

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CONTRACT NUMBER: _ **GS-07F-0256T**

PERIOD COVERED BY CONTRACT: **FEBRUARY 27, 2007 - FEBRUARY 26, 2012**

Small Business

**General Services Administration
Federal Supply Service**

Pricelist current through Modification # _____, dated _____.

Products and ordering information in this Authorized FSS Information Technology Schedule Pricelist are also available on the GSA Advantage! System. Agencies can browse GSA Advantage! by accessing the Federal Supply Service's Home Page via the Internet at <http://www.fss.gsa.gov/>

All products are available for expedited delivery on a case-by-case basis for domestic delivery

FEDERAL SUPPLY SERVICE
Authorized Federal Supply Schedule Price List

66 – Scientific Equipment and Services

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Information Applicable to all Special Item Numbers

SPECIAL NOTICE TO AGENCIES: Small Business Participation

SBA strongly supports the participation of small business concerns in the Federal Supply Schedules Program. To enhance Small Business Participation SBA policy allows agencies to include in their procurement base and goals, the dollar value of orders expected to be placed against the Federal Supply Schedules, and to report accomplishments against these goals.

For orders exceeding the micropurchase threshold, FAR 8.404 requires agencies to consider the catalogs/pricelists of at least three schedule contractors or consider reasonably available information by using the GSA Advantage!™ on-line shopping service (www.fss.gsa.gov). The catalogs/pricelists, GSA Advantage!™ and the Federal Supply Service Home Page (www.fss.gsa.gov) contain information on a broad array of products and services offered by small business concerns.

This information should be used as a tool to assist ordering activities in meeting or exceeding established small business goals. It should also be used as a tool to assist in including small, small disadvantaged, and women-owned small businesses among those considered when selecting pricelists for a best value determination.

For orders exceeding the micropurchase threshold, customers are to give preference to small business concerns when two or more items at the same delivered price will satisfy their requirement.

1. Table of Awarded SINs

SIN	Description	Page
66-616	Liquid/Gas Flow and Level Instruments	5

b) Identification of the Lowest Priced Model Number and Lowest Unit Price

SIN	Product No.	Product	GSA Net Price
66-616	SM 10 Recal	Recalibration for the Laminar Flow Elements Standard Model 10. Price includes calibration with full Calibration Report and NIST traceable certification.	207.36
66-616	SM 11 Recal	Recalibration for the Laminar Flow Elements Standard Model 11. Price includes calibration with full Calibration Report and NIST traceable certification.	207.36
66-616	SM 12 Recal	Recalibration for the Laminar Flow Elements Standard Model 12. Price includes calibration with full Calibration Report and NIST traceable certification.	207.36

c) Hourly Rates

Not Applicable

2. Maximum Order

\$150,000.00

3. Minimum Order

\$100.00

4. Geographic Coverage

The geographic scope of this contract is **Domestic delivery is delivery within the 48 contiguous states, Alaska, Hawaii, Puerto Rico, Washington, DC, and U.S. territories.**

5. Points of Production

CME, A Division of Aerospace Control Products
1314 West 76TH Street
Davenport, IA 52806

6. Discounts from list

Prices are net, discounts have been deducted.

7. Quantity Discounts

See Price list attached

8. Prompt Payment Terms

Net 30

9. Notification that Government purchase cards are accepted at or below the micro-purchase threshold

CME Flow will accept Government purchase cards at or below the micro-purchase threshold.

b) Notification whether Government purchase cards are accepted or not accepted above the micro-purchase threshold

CME Flow will accept Government purchase cards at or below the micro-purchase threshold.

10. Foreign items

All Products are manufactured in USA

11. Time of Delivery

30 days*.

**30 days for products in stock, customized products will require a longer delivery time to be determined on a case-by-case basis*

a) Expedited Delivery

Expedited delivery is available on a case-by-case basis

b) Overnight and 2-day delivery

Not Applicable

c) Urgent Requirements

Not Applicable

12. FOB Points

Destination

13. Ordering Address

Aerospace Control Products DBA CME Division
1314 West 76TH Street
Davenport, IA 52806

b) Ordering Procedures

For supplies and services, the ordering procedures, information on Blanket Purchase Agreements (BPA), and a sample BPA can be found at the GSA/FSS Schedule homepage (fss.gsa.gov/schedules).

14. Payment Address:

Aerospace Control Products DBA CME Division
1314 West 76TH Street
Davenport, IA 52806

15. Warranty Provisions

Standard Commercial Warranty (1 year)

16. Export Packing Charges

Not Applicable.

17. Terms and conditions of Government purchase card acceptance (any thresholds above the micro-purchase level)

None.

18. Terms and conditions of rental, maintenance, and repair (if applicable)

Factory service is available 8:00 AM to 4:30 PM, Monday through Friday at 1314 West 76th Street; Davenport, IA 52806.

The customer is responsible for freight in both directions, if under warranty, factory will refund amount equal to lowest cost air, as determined by the company. Note: Refund issues will be handled on a case-by-case basis with individual contracting officers.

19. Terms and conditions of installation (if applicable)

Not Applicable.

20. Terms and conditions of repair parts indicating date of parts price lists and any discounts from list prices (if applicable).

None

b) Terms and conditions for any other services (if applicable)

Not Applicable.

21. List of service and distribution points (if applicable).

CME, A Division of Aerospace Control Products
1314 West 76TH Street
Davenport, IA 52806

22. List of participating dealers (if applicable).

Not Applicable.

23. Preventive maintenance (if applicable)

Not Applicable.

24. Special attributes such as environmental attributes (e.g., recycled content, energy efficiency, and/or reduced pollutants).

Not Applicable.

b) 508 Compliance

If applicable, indicate that Section 508 compliance information is available on Electronic and Information Technology (EIT) supplies and services and show where full details can be found WWW.CMEFLOW.COM. The EIT standards can be found at: www.Section508.gov/.

25. Data Universal Number System (DUNS) number:

098018112.

26. Notification regarding registration in Central Contractor Registration (CCR) database

CME Flow registered in the CCR.



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Gas Laminar Flowmeters**

Company Profile

CME and its predecessor company have been successfully supplying flow calibration systems, transfer standards and Oxygen Test Stands to the U.S. Military and industrial calibration laboratories for more than forty-five years.

Over the past decade, CME has concentrated on applying the original Laminar Flowmeter technology to high accuracy gas flow measurement. They have emphasized merging their gas flow expertise with rapidly changing transducer and computer technology to produce SMART, user-friendly Gas Flowmeters, Advanced Gas Flow Calibrators and Automated Test Stands, especially in the case of Automated Oxygen Regulator Testing. As a result of these efforts, the OTS567B and OTS570 Portable Oxygen Regulator Test Stands and two related versions of Improved Portable Gas Flow Calibration Sets have emerged.

CME flowmeters and systems are:

- Economical to purchase and operate
- NIST Traceable
- Easy to operate
- Accurate and Reliable.

Pricelist and product information follows:



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CME Division				
SIN#	Part Number	Product Description	GSA Price w/ IFF	Qty/Vol Pricing From List 10+ Products W/IFF
Laminar Flow Elements				
66-616	Model 10 10-5-.01G*	Laminar Flow Elements F.S. Flow Range 0.01 LPM (10 CCM) (0.00035 CFM)	\$543.07	\$498.74
66-616	Model 10 10-5-.03G*	Laminar Flow Elements F.S. Flow Range 0.03 LPM (30 CCM) (0.001 CFM)	\$493.70	\$453.40
66-616	Model 10 10-5-.1G*	Laminar Flow Elements F.S. Flow Range 0.1 LPM (100 CCM) (0.0035 CFM)	\$493.70	\$453.40
66-616	Model 10 10-5-.3G*	Laminar Flow Elements F.S. Flow Range 0.3 LPM (300 CCM) (0.01 CFM)	\$493.70	\$453.40
66-616	Model 10 10-5-1G*	Laminar Flow Elements F.S. Flow Range 1.0 LPM (1000 CCM) (0.035 CFM)	\$493.70	\$453.40
66-616	Model 10 10-5-3G*	Laminar Flow Elements F.S. Flow Range 3.0 LPM (3000 CCM) (0.1 CFM)	\$493.70	\$453.40
66-616	Model 10 10-5-10G*	Laminar Flow Elements F.S. Flow Range 10.0 LPM (0.35 CFM) (21.2 CFH)	\$493.70	\$453.40
66-616	Model 10 10-5-30G*	Laminar Flow Elements F.S. Flow Range 30.0 LPM (1.1 CFM) (64 CFH)	\$493.70	\$453.40
66-616	Model 10 10-5-100G*	Laminar Flow Elements F.S. Flow Range 100.0 LPM (3.5 CFM) (212 CFH)	\$493.70	\$453.40
66-616	Model 10 10-5-300G*	Laminar Flow Elements F.S. Flow Range 300.0 LPM (10.6 CFM) (636 CFH)	\$493.70	\$453.40
66-616	Model 10 10-5-1000G*	Laminar Flow Elements F.S. Flow Range 1000.0 LPM (35 CFM) (2120 CFH)	\$543.07	\$498.74
66-616	Model 11 11-5-.01G*	Laminar Flow Elements F.S. Flow Range 0.01 LPM (10 CCM) (0.00035 CFM)	\$543.07	\$498.74
66-616	Model 11 11-5-.03G*	Laminar Flow Elements F.S. Flow Range 0.03 LPM (30 CCM) (0.001 CFM)	\$493.70	\$453.40
66-616	Model 11 11-5-.1G*	Laminar Flow Elements F.S. Flow Range 0.1 LPM (100 CCM) (0.0035 CFM)	\$493.70	\$453.40
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66-616	Model 11 11-5-30G*	Laminar Flow Elements F.S. Flow Range 30.0 LPM (1.1 CFM) (64 CFH)	\$493.70	\$453.40
66-616	Model 11 11-5-100G*	Laminar Flow Elements F.S. Flow Range 100.0 LPM (3.5 CFM) (212 CFH)	\$493.70	\$453.40
66-616	Model 11 11-5-300G*	Laminar Flow Elements F.S. Flow Range 300.0 LPM (10.6 CFM) (636 CFH)	\$493.70	\$453.40
66-616	Model 11 11-5-1000G*	Laminar Flow Elements F.S. Flow Range 1000.0 LPM (35 CFM) (2120 CFH)	\$543.07	\$498.74
66-616	Model 12 12-5-.01G*	Laminar Flow Elements F.S. Flow Range 0.01 LPM (10 CCM) (0.00035 CFM)	\$543.07	\$498.74
66-616	Model 12 12-5-.03G*	Laminar Flow Elements F.S. Flow Range 0.03 LPM (30 CCM) (0.001 CFM)	\$493.70	\$453.40
66-616	Model 12 12-5-.1G*	Laminar Flow Elements F.S. Flow Range 0.1 LPM (100 CCM) (0.0035 CFM)	\$493.70	\$453.40
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66-616	Model 12 12-5-1G*	Laminar Flow Elements F.S. Flow Range 1.0 LPM (1000 CCM) (0.035 CFM)	\$493.70	\$453.40
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66-616	Model 12 12-5-300G*	Laminar Flow Elements F.S. Flow Range 300.0 LPM (10.6 CFM) (636 CFH)	\$493.70	\$453.40
66-616	Model 12 12-5-1000G*	Laminar Flow Elements F.S. Flow Range 1000.0 LPM (35 CFM) (2120 CFH)	\$543.07	\$498.74
Digital Flow Meter				
66-616	40L-5-.01G*	Digital Flow Meter 0.01 LPM (10 CCM) (0.00035 CFM)	\$1,086.15	\$997.48
66-616	40L-5-.03G*	Digital Flow Meter 0.03 LPM (30 CCM) (0.001 CFM)	\$1,086.15	\$997.48
66-616	40L-5-.1G*	Digital Flow Meter 0.1 LPM (100 CCM) (0.0035 CFM)	\$1,086.15	\$997.48
66-616	40L-5-.3G*	Digital Flow Meter 0.3 LPM (300 CCM) (0.01 CFM)	\$1,086.15	\$997.48
66-616	40L-5-1G*	Digital Flow Meter 1.0 LPM (1000 CCM) (0.035 CFM)	\$1,086.15	\$997.48



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66-616	40L-5-10G*	Digital Flow Meter 10.0 LPM (0.35 CFM) (21.2 CFH)	\$1,086.15	\$997.48
66-616	40L-5-30G*	Digital Flow Meter 30.0 LPM (1.1 CFM) (64 CFH)	\$1,086.15	\$997.48
66-616	40L-5-100G*	Digital Flow Meter 100 LPM (3.5 CFM) (212 CFH)	\$1,086.15	\$997.48
66-616	40L-5-300G*	Digital Flow Meter 300 LPM (10.6 CFM) (636 CFH)	\$1,086.15	\$997.48
66-616	40L-5-1000G*	Digital Flow Meter 1000 LPM (35 CFM) (2120 CFH)	\$1,086.15	\$997.48
66-616	41L-1-.01G*	Digital Flow Meter 0.01 LPM (10 CCM) (0.00035 CFM)	\$1,184.89	\$1,088.16
66-616	41L-1-.03G*	Digital Flow Meter 0.03 LPM (30 CCM) (0.001 CFM)	\$1,184.89	\$1,088.16
66-616	41L-1-.1G*	Digital Flow Meter 0.1 LPM (100 CCM) (0.0035 CFM)	\$1,184.89	\$1,088.16
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66-616	41L-1-100G*	Digital Flow Meter 100 LPM (3.5 CFM) (212 CFH)	\$1,184.89	\$1,088.16
66-616	41L-1-300G*	Digital Flow Meter 300 LPM (10.6 CFM) (636 CFH)	\$1,184.89	\$1,088.16
66-616	41L-1-1000G*	Digital Flow Meter 1000 LPM (35 CFM) (2120 CFH)	\$1,184.89	\$1,088.16
66-616	42L-1-.01G*	Digital Flow Meter 0.01 LPM (10 CCM) (0.00035 CFM)	\$1,184.89	\$1,088.16
66-616	42L-1-.03G*	Digital Flow Meter 0.03 LPM (30 CCM) (0.001 CFM)	\$1,184.89	\$1,088.16
66-616	42L-1-.1G*	Digital Flow Meter 0.1 LPM (100 CCM) (0.0035 CFM)	\$1,184.89	\$1,088.16
66-616	42L-1-.3G*	Digital Flow Meter 0.3 LPM (300 CCM) (0.01 CFM)	\$1,184.89	\$1,088.16
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66-616	42L-1-100G*	Digital Flow Meter 100 LPM (3.5 CFM) (212 CFH)	\$1,184.89	\$1,088.16
66-616	42L-1-300G*	Digital Flow Meter 300 LPM (10.6 CFM) (636 CFH)	\$1,184.89	\$1,088.16
66-616	42L-1-1000G*	Digital Flow Meter 1000 LPM (35 CFM) (2120 CFH)	\$1,184.89	\$1,088.16
Laminar Flow Meter				
66-616	50A-2-.01L*	Laminar Flow Meters 0.01 LPM (10 CCM) (0.00035 CFM)	\$543.07	\$498.74
66-616	50A-2-.03L*	Laminar Flow Meters 0.03 LPM (30 CCM) (0.001 CFM)	\$543.07	\$498.74
66-616	50A-2-.1L*	Laminar Flow Meters 0.1 LPM (100 CCM) (0.0035 CFM)	\$543.07	\$498.74
66-616	50A-2-.3L*	Laminar Flow Meters 0.3 LPM (300 CCM) (0.01 CFM)	\$543.07	\$498.74
66-616	50A-2-1L*	Laminar Flow Meters 1.0 LPM (1000 CCM) (0.035 CFM)	\$543.07	\$498.74
66-616	50A-2-3L*	Laminar Flow Meters 3.0 LPM (3000 CCM) (0.1 CFM)	\$543.07	\$498.74
66-616	50A-2-10L*	Laminar Flow Meters 10.0 LPM (0.35 CFM) (21.2 CFH)	\$543.07	\$498.74
66-616	50A-2-1*	Laminar Flow Meters 1 CFM (85 LPM) (60 CFH)	\$543.07	\$498.74
66-616	50A-2-3*	Laminar Flow Meters 3 CFM (85 LPM) (180 CFH)	\$543.07	\$498.74
66-616	50A-2-10*	Laminar Flow Meters 10 CFM (285 LPM) (600 CFH)	\$543.07	\$498.74
66-616	50A-2-30*	Laminar Flow Meters 30 CFM (850 LPM) (1800 CFH)	\$543.07	\$498.74
66-616	50A-3-.01L*	Laminar Flow Meters 0.01 LPM (10 CCM) (0.00035 CFM)	\$518.39	\$476.07
66-616	50A-3-.03L*	Laminar Flow Meters 0.03 LPM (30 CCM) (0.001 CFM)	\$518.39	\$476.07
66-616	50A-3-.1L*	Laminar Flow Meters 0.1 LPM (100 CCM) (0.0035 CFM)	\$518.39	\$476.07
66-616	50A-3-.3L*	Laminar Flow Meters 0.3 LPM (300 CCM) (0.01 CFM)	\$518.39	\$476.07



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66-616	50A-3-3L*	Laminar Flow Meters 3.0 LPM (3000 CCM) (0.1 CFM)	\$518.39	\$476.07
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66-616	50A-3-10*	Laminar Flow Meters 10 CFM (285 LPM) (600 CFH)	\$518.39	\$476.07
66-616	50A-3-30*	Laminar Flow Meters 30 CFM (850 LPM) (1800 CFH)	\$518.39	\$476.07
66-616	50A-4-.01L*	Laminar Flow Meters 0.01 LPM (10 CCM) (0.00035 CFM)	\$518.39	\$476.07
66-616	50A-4-.03L*	Laminar Flow Meters 0.03 LPM (30 CCM) (0.001 CFM)	\$518.39	\$476.07
66-616	50A-4-.1L*	Laminar Flow Meters 0.1 LPM (100 CCM) (0.0035 CFM)	\$518.39	\$476.07
66-616	50A-4-.3L*	Laminar Flow Meters 0.3 LPM (300 CCM) (0.01 CFM)	\$518.39	\$476.07
66-616	50A-4-1L*	Laminar Flow Meters 1.0 LPM (1000 CCM) (0.035 CFM)	\$518.39	\$476.07
66-616	50A-4-3L*	Laminar Flow Meters 3.0 LPM (3000 CCM) (0.1 CFM)	\$518.39	\$476.07
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66-616	50A-4-1*	Laminar Flow Meters 1 CFM (85 LPM) (60 CFH)	\$518.39	\$476.07
66-616	50A-4-3*	Laminar Flow Meters 3 CFM (85 LPM) (180 CFH)	\$518.39	\$476.07
66-616	50A-4-10*	Laminar Flow Meters 10 CFM (285 LPM) (600 CFH)	\$518.39	\$476.07
66-616	50A-4-30*	Laminar Flow Meters 30 CFM (850 LPM) (1800 CFH)	\$518.39	\$476.07
Compensated Digital Flow Meter				
66-616	60B-75-.01G*	0.01 LPM (10 CCM) (0.00035 CFM)	\$3,455.92	\$3,173.80
66-616	60B-75-.03G*	0.03 LPM (30 CCM) (0.001 CFM)	\$3,455.92	\$3,173.80
66-616	60B-75-.1G*	0.1 LPM (100 CCM) (0.0035 CFM)	\$3,455.92	\$3,173.80
66-616	60B-75-.3G*	0.3 LPM (300 CCM) (0.01 CFM)	\$3,455.92	\$3,173.80
66-616	60B-75-1G*	1.0 LPM (1000 CCM) (0.035 CFM)	\$3,455.92	\$3,173.80
66-616	60B-75-3G*	3.0 LPM (3000 CCM) (0.1 CFM)	\$3,455.92	\$3,173.80
66-616	60B-75-10G*	10.0 LPM (0.35 CFM) (21.2 CFH)	\$3,455.92	\$3,173.80
66-616	60B-75-30G*	30.0 LPM (1.1 CFM) (64 CFH)	\$3,455.92	\$3,173.80
66-616	60B-75-100G*	100 LPM (3.5 CFM) (212 CFH)	\$3,455.92	\$3,173.80
66-616	60B-75-300G*	300 LPM (10.6 CFM) (636 CFH)	\$3,455.92	\$3,173.80
66-616	60B-75-1000G*	1000 LPM (35 CFM) (2120 CFH)	\$3,455.92	\$3,173.80
66-616	61B-1-.01G*	0.01 LPM (10 CCM) (0.00035 CFM)	\$2,369.77	\$2,176.32
66-616	61B-1-.03G*	0.03 LPM (30 CCM) (0.001 CFM)	\$2,369.77	\$2,176.32
66-616	61B-1-.1G*	0.1 LPM (100 CCM) (0.0035 CFM)	\$2,369.77	\$2,176.32
66-616	61B-1-.3G*	0.3 LPM (300 CCM) (0.01 CFM)	\$2,369.77	\$2,176.32
66-616	61B-1-1G*	1.0 LPM (1000 CCM) (0.035 CFM)	\$2,369.77	\$2,176.32
66-616	61B-1-3G*	3.0 LPM (3000 CCM) (0.1 CFM)	\$2,369.77	\$2,176.32
66-616	61B-1-10G*	10.0 LPM (0.35 CFM) (21.2 CFH)	\$2,369.77	\$2,176.32
66-616	61B-1-30G*	30.0 LPM (1.1 CFM) (64 CFH)	\$2,369.77	\$2,176.32
66-616	61B-1-100G*	100 LPM (3.5 CFM) (212 CFH)	\$2,369.77	\$2,176.32
66-616	61B-1-300G*	300 LPM (10.6 CFM) (636 CFH)	\$2,369.77	\$2,176.32
66-616	61B-1-1000G*	1000 LPM (35 CFM) (2120 CFH)	\$2,369.77	\$2,176.32
66-616	62B-1-.01G*	0.01 LPM (10 CCM) (0.00035 CFM)	\$2,369.77	\$2,176.32
66-616	62B-1-.03G*	0.03 LPM (30 CCM) (0.001 CFM)	\$2,369.77	\$2,176.32
66-616	62B-1-.1G*	0.1 LPM (100 CCM) (0.0035 CFM)	\$2,369.77	\$2,176.32



**SMART GAS FLOWMETERS
AND CALIBRATORS**

**The Originators Of
Gas Laminar Flowmeters**

66-616	62B-1-.3G*	0.3 LPM (300 CCM) (0.01 CFM)	\$2,369.77	\$2,176.32
66-616	62B-1-1G*	1.0 LPM (1000 CCM) (0.035 CFM)	\$2,369.77	\$2,176.32
66-616	62B-1-3G*	3.0 LPM (3000 CCM) (0.1 CFM)	\$2,369.77	\$2,176.32
66-616	62B-1-10G*	10.0 LPM (0.35 CFM) (21.2 CFH)	\$2,369.77	\$2,176.32
66-616	62B-1-30G*	30.0 LPM (1.1 CFM) (64 CFH)	\$2,369.77	\$2,176.32
66-616	62B-1-100G*	100 LPM (3.5 CFM) (212 CFH)	\$2,369.77	\$2,176.32
66-616	62B-1-300G*	300 LPM (10.6 CFM) (636 CFH)	\$2,369.77	\$2,176.32
66-616	62B-1-1000G*	1000 LPM (35 CFM) (2120 CFH)	\$2,369.77	\$2,176.32
Portable Flow Benches Standard Model Numbers (Upgrades)				
66-616	FCS-8-75	0.003 TO 330 LPM (0.001 TO 11.7 CFM)	\$9,775.31	\$8,977.33
66-616	FCS-8-75-C	0.003 TO 330 LPM (0.001 TO 11.7 CFM)	\$12,243.83	\$11,244.33
66-616	FCS-8A-75	0.001 TO 1000 LPM (0.0004 TO 35 CFM)	\$10,752.85	\$9,875.06
66-616	FCS-8A-75-C	0.001 TO 1000 LPM (0.0004 TO 35 CFM)	\$13,221.36	\$12,142.07
66-616	FCS-8-75 Upgrade	0.003 TO 330 LPM (0.001 TO 11.7 CFM) UPGRADE FCS-1-SS-C TO FCS-8-75	\$7,405.54	\$6,801.01
66-616	FCS-8-75-C Upgrade	0.003 TO 330 LPM (0.001 TO 11.7 CFM) UPGRADE FCS-1-SS-C TO FCS-8-75-C	\$9,380.35	\$8,614.61
66-616	FCS-8A-75 Upgrade	0.001 TO 1000 LPM (0.0004 TO 35 CFM) UPGRADE FCS-3A-SS TO FCS-8A-75	\$7,603.02	\$6,982.37
66-616	FCS-8A-75-C Upgrade	0.001 TO 1000 LPM (0.0004 TO 35 CFM) UPGRADE FCS-3A-SS TO FCS-8A-75-C	\$9,577.83	\$8,795.97
Recalibration Price list				
66-616	SM 10 Recal	Recalibration for the Laminar Flow Elements Standad Model 10. Price includes calibration with full Calibration Report and NIST traceable certification	\$207.36	\$190.43
66-616	SM 11 Recal	Recalibration for the Laminar Flow Elements Standad Model 11. Price includes calibration with full Calibration Report and NIST traceable certification	\$207.36	\$190.43
66-616	SM 12 Recal	Recalibration for the Laminar Flow Elements Standad Model 12. Price includes calibration with full Calibration Report and NIST traceable certification	\$207.36	\$190.43
66-616	SM 40 Recal	Recalibration for the Digital Flow Meter Standad Model 40. Price includes calibration with full Calibration Report and NIST traceable certification. Price includes both "AS RECEIVED" and "FINAL" data with NIST traceable certification	\$246.85	\$226.70
66-616	SM 41 Recal	Recalibration for the Digital Flow Meter Standad Model 41. Price includes calibration with full Calibration Report and NIST traceable certification. Price includes both "AS RECEIVED" and "FINAL" data with NIST traceable certification	\$246.85	\$226.70
66-616	SM 42 Recal	Recalibration for the Digital Flow Meter Standad Model 42. Price includes calibration with full Calibration Report and NIST traceable certification. Price includes both "AS RECEIVED" and "FINAL" data with NIST traceable certification	\$246.85	\$226.70
66-616	SM 50A Recal	Recalibration for the Laminar Flow Meter Standad Model 50A. Price includes calibration with full Calibration Report and NIST traceable certification. Price includes both "AS RECEIVED" and "FINAL" data with NIST traceable certification	\$222.17	\$204.03
66-616	SM 60 Recal	Recalibration for the Compensated Digital Flow Meter Standad Model 60. Price includes calibration with full Calibration Report and NIST traceable certification. Price includes both "AS RECEIVED" and "FINAL" data with NIST traceable certification.	\$444.33	\$408.06
66-616	SM 61A Recal	Recalibration for the Compensated Digital Flow Meter Standad Model 61A. Price includes calibration with full Calibration Report and NIST traceable certification. Price includes both "AS RECEIVED" and "FINAL" data with NIST traceable certification.	\$444.33	\$408.06



**SMART GAS FLOWMETERS
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66-616	SM 61B Recal	Recalibration for the Compensated Digital Flow Meter Standard Model 61B. Price includes calibration with full Calibration Report and NIST traceable certification. Price includes both "AS RECEIVED" and "FINAL" data with NIST traceable certification.	\$444.33	\$408.06
66-616	SM 62 Recal	Recalibration for the Compensated Digital Flow Meter Standard Model 62. Price includes calibration with full Calibration Report and NIST traceable certification. Price includes both "AS RECEIVED" and "FINAL" data with NIST traceable certification.	\$444.33	\$408.06
66-616	SM FCS-8A-75 Recal	Recalibration for the STANDARD FCS-8A-75. Price includes calibration with full Calibration Report and NIST traceable certification. This is the standard Air Force model with LFE ranges .01, .1, 1, 10, 100, 300, & 1000 LPM. Price includes both "AS RECEIVED" and "FINAL" data with NIST traceable certification	\$1,974.81	\$1,813.60
66-616	SM FCS-8A-75 Recal	Recalibration for the STANDARD FCS-8-75. Price includes calibration with full Calibration Report and NIST traceable certification. This is the standard Navy model with LFE ranges .01, .3, 3, 30, 100, & 330 LPM. Price includes both "AS RECEIVED" and "FINAL" data with NIST traceable certification	\$1,777.33	\$1,632.24
66-616	SM FCS-8 Recal	Recalibration for the Other FCS-8 models. Price includes calibration with full Calibration Report and NIST traceable certification. Price includes both "AS RECEIVED" and "FINAL" data with NIST traceable certification. Price plus \$200 per LFE: An FCS-8 with 5 LFE's would be \$600 + (5 * \$200) = \$1,600	\$592.44	\$544.08
66-616	SFB SFS-3-5	STANDARD FLOW BENCH SFS-3-5	\$4,788.92	\$4,397.98
Automated Portable Oxygen Components Test Stand				
66-616	OTS567B	The Model OTS567B is an Automatic Portable Regulator Test Stand used for performing acceptance tests on a variety of Aviator Oxygen System Breathing Regulators. Regulator types include all U.S. Navy (and other) breathing regulators, Combat Edge, 100% oxygen, diluter-demand, and positive pressure types. This fully capable test stand is as equally at home on an L-class Aircraft Carrier as it is in a shore based Repair Depot.	\$101,460.96	N/A
66-616	OTS570	The Model OTS570 is an Automatic Portable Test Stand used for performing acceptance tests on a variety of Aviator Oxygen System Components including Breathing Regulators (see following for component listing). Regulator types include all U.S. Navy (and other) breathing regulators, Combat Edge, 100% oxygen, diluter-demand, and positive pressure types. This fully capable test stand is as equally at home on an L-class Aircraft Carrier as it is in a shore based Repair Depot.	\$106,801.01	N/A



MODEL OTS567B AUTOMATIC PORTABLE OXYGEN REGULATOR TEST STAND



DESCRIPTION

The Model OTS567B is an Automatic Portable Regulator Test Stand used for performing acceptance tests on a variety of Aviator Oxygen System Breathing Regulators. Regulator types include all U.S. Navy (and other) breathing regulators, Combat Edge, 100% oxygen, diluter-demand, and positive pressure types. This fully capable test stand is as equally at home on an L-class Aircraft Carrier as it is in a shore based Repair Depot.

A laptop computer is programmed with all the necessary software to run component acceptance tests. Editing software can be utilized to revise/create component tests. Laminar flow elements (LFE's) and electronic pressure transducers are used to measure flow/leakage rates, altitude, and regulator inlet, outlet and anti-G pressures as applicable. For diluter regulators, per cent oxygen added is computed and displayed.

To test a regulator, the operator simply selects from on-screen menus, and detailed step by step instructions guide the operator through the test sequence. The operator is first prompted to configure the test stand for the type of regulator. Thereafter, computer commanded controllers automatically set flow rates while simultaneously maintaining the specified altitude and inlet pressure. Leak tests are also performed automatically. The percentage of oxygen added is automatically calculated using the outlet/make-up air flow ratio. At the end of the test, the user may store the Test Report to hard drive or send it to the optional printer.

The unit is housed in a rugged fiberglass container with carrying handles. A removable lid is provided to protect the unit during transport and storage. A vacuum pump, housed in a separate container, is provided. The computer contains all of the calibration information for the particular test stand. This includes flow equations that compensate for environmental conditions and the constants for the laminar flow elements and transducers.

FEATURES:

- Automatic compensation of flow rates for temperature and pressure altitude.
- Automatic calculation of oxygen flow and % O₂ added with nitrogen used as test gas.
- Uses a standard notebook computer– No obsolescence.
- Hard copy or electronic data storage. Test result data can be stored on site or uploaded to a central location for troubleshooting, or for archiving of historical trends.
- Test data sheets list unit and serial numbers, as well as operator and supervisor ID.
- As in existing test stands, it utilizes laminar flow elements (LFE). Built by LFE /regulator experts.
- Solid state: rugged, stable transducers. No water manometers, mercury barometers or analog gages (except the bottle gage for safety).
- Easy-to-read digital display of:

Altitude	Altitude set point
Outlet flow/leakage	Outlet flow set point
Regulator outlet pressure	Oxygen concentration (%O ₂ added)
Regulator Inlet Pressure	Inlet Pressure Set Point
Anti-G pressure	Acceptance Criteria
Prompts/instructions	
- Flutter dampener
- Remote controlled vacuum pump

ADVANTAGES

INCREASES PRODUCTIVITY

- Up to 3 times faster than manual stands.
- On-screen prompts/instructions dramatically reduce operator training.
- Reduces testing time by:
 - Automatically setting flow rate, altitude, and regulator inlet pressure from 0 to 150 psig (higher pressures are set manually).
 - Performing all leak tests automatically.
- Reduces opportunities for operator errors: no charts, conversions, or interpretation is required.
- More accurate, consistent test results.
- Built in acceptance criteria, no chance to mix up test requirements of different regulator types.
- Direct digital display of Flow, % O₂ added Outlet pressure, Altitude, Anti-G pressure and Inlet pressure.
- Portable: easy and quick setup and take down for rapid deployment.
- May be calibrated in the field–no chips to burn or special program modifications.

VERSATILE

- Runs all tests on all diluter/100%/positive pressure/combat edge regulators:

Aneroid closure	Main relief (high pressure)	Oxygen ratio
Blinker/flow indicator	Max pressure relief	Pressure breathing/altitude
Demand valve leakage	Outlet leakage	Pressure breathing/Gs
Emergency pressure	Outward leakage	Safety pressure
Flow suction	Overall leakage	Visual inspection
Gage scale and error	Overload	
Inward leakage	Oxygen inlet valve leakage	
- Additional test spreadsheets can be added as new regulators or other oxygen components are introduced.
- Qualified personnel can revise or modify existing test spreadsheets for revised settings or adding test points.

SPECIFICATIONS

- Inlet pressure 0-2000 psi
- Source pressure 3000 psi
- Altitude range: 0 to 50,000 feet. Precision: ± 250 feet or better
- Maximum flow rate: 240 alpm. Flow precision: ± 3 % F.S.
- Environmental operating conditions: Temperature: 0 to + 40°C. Operating, -30 to + 60°C. Exposure
- Ambient pressure: 12.2 - 15.2 psia
- Gas temperature range: 0 to + 40°C. Precision: within .5° C
- Outlet pressure: -50 to +50 inches H₂O. Precision: ± 0.05 inches H₂O
- Size: 34" W x 29" H x 15" D (+7" lid).
- Weight: Less than 190 lbs. (Test Stand) Less than 165 lbs. Vacuum Pump Assembly (Ready to ship)
- Test chamber: 13" W x 13" D x 13" H
- Electrical:

The Test Stand will automatically operate from 90-132 volts and 175-264 volts, 50-60 Hz (no adjustment needed, (requires proper cord only).

The Vacuum Pump must incorporate the proper motor for the voltage being used. The standard motor used by the US Navy is 115 VAC, single phase, 60 Hz. **

**** VACUUM PUMP POWER OPTIONS**

- 115/200-230 VAC Single-Phase 50/60 Hz. Field-tested with OTS567B on 50 & 60 Hz. Note: This optional motor fits the standard Vacuum Pump Carrying Case.
- 220-240 VAC Single Phase 50 Hz
- 230-240 VAC Single Phase 50/60 Hz
- 200-220 VAC Three Phase 50 Hz
- 200-230 VAC Three Phase 60 Hz
- 380-415 VAC Three Phase 50 Hz
- 460 VAC Three Phase 60 Hz

 Division of *Aerospace Control Products, Inc.* 

1314 W. 76th Street
Phone: 800-845-0927

Davenport, IA 52806 USA
e-mail: info@cmeflow.com fax: 563-391-9231

www.cmeflow.com



MODEL OTS570 AUTOMATED PORTABLE OXYGEN COMPONENTS TEST STAND



DESCRIPTION

The Model OTS570 is an Automatic Portable Test Stand used for performing acceptance tests on a variety of Aviator Oxygen System Components including Breathing Regulators (see following for component listing). Regulator types include all U.S. Navy (and other) breathing regulators, Combat Edge, 100% oxygen, diluter-demand, and positive pressure types. This fully capable test stand is as equally at home on an L-class Aircraft Carrier as it is in a shore based Repair Depot.*

OXYGEN COMPONENT TEST CAPABILITES LIST

- Breathing Regulators – various types (see above)
- Manifold and Check Valve Assembly
- Aneroid activated devices and other altitude controlled devices
- Oxygen Connectors
- Pressure Reducer devices
- Oxygen Hoses (leaks)
- Other capabilities upon customer request

* (Note: Additional pressure ports on front panel not pictured above, outward appearance is otherwise correct.)

A laptop computer is programmed with all the necessary software to run component acceptance tests. Editing software can be utilized to revise/create component tests. Laminar flow elements (LFE's) and electronic pressure transducers are used to measure flow/leakage rates, altitude, and regulator inlet, outlet and anti-G pressures as applicable. For diluter regulators, per cent oxygen added is computed and displayed.

To test a regulator, the operator simply selects from on-screen menus, and detailed step by step instructions guide the operator through the test sequence. The operator is first prompted to configure the test stand for the type of regulator. Thereafter, computer commanded controllers automatically set flow rates while simultaneously maintaining the specified altitude and inlet pressure. Leak tests are also performed automatically. The percentage of oxygen added is automatically calculated using the outlet/make-up air flow ratio. At the end of the test, the user may store the Test Report to hard drive or send it to the optional printer.

The unit is housed in a rugged fiberglass container with carrying handles. A removable lid is provided to protect the unit during transport and storage. A vacuum pump, housed in a separate container, is provided. The computer contains all of the calibration information for the particular test stand. This includes flow equations that compensate for environmental conditions and the constants for the laminar flow elements and transducers.

FEATURES:

- Automatic compensation of flow rates for temperature and pressure altitude.
- Automatic calculation of oxygen flow and % O₂ added with nitrogen used as test gas.
- Uses a standard notebook computer– No obsolescence.
- Hard copy or electronic data storage. Test result data can be stored on site or uploaded to a central location for troubleshooting, or for archiving of historical trends.
- Test data sheets list unit and serial numbers, as well as operator and supervisor ID.
- As in existing test stands, it utilizes laminar flow elements (LFE). Built by LFE /regulator experts.
- Solid state: rugged, stable transducers. No water manometers, mercury barometers or analog gages (except the bottle gage for safety).
- Easy-to-read digital display of:

Altitude	Altitude set point
Outlet flow/leakage	Outlet flow set point
Regulator outlet pressure	Oxygen concentration (%O ₂ added)
Regulator Inlet Pressure	Inlet Pressure Set Point
Anti-G pressure	Acceptance Criteria
Prompts/instructions	
- Flutter dampener
- Remote controlled vacuum pump

ADVANTAGES:

INCREASES PRODUCTIVITY

- Up to 3 times faster than manual stands.
- On-screen prompts/instructions dramatically reduce operator training.
- Reduces testing time by:
 - Automatically setting flow rate, altitude, and regulator inlet pressure from 0 to 150 psig (higher pressures are set manually).
 - Performing all leak tests automatically.
- Reduces opportunities for operator errors: no charts, conversions, or interpretation is required.
- More accurate, consistent test results.
- Built in acceptance criteria, no chance to mix up test requirements of different regulator types.
- Direct digital display of Flow, % O₂ added Outlet pressure, Altitude, Anti-G pressure and Inlet pressure.
- Portable: easy and quick setup and take down for rapid deployment.
- May be calibrated in the field–no chips to burn or special program modifications.

VERSATILE

- Runs all tests on all diluter/100%/positive pressure/combat edge regulators:

Aneroid closure	Main relief (high pressure)	Oxygen ratio
Blinker/flow indicator	Max pressure relief	Pressure breathing/altitude
Demand valve leakage	Outlet leakage	Pressure breathing/Gs
Emergency pressure	Outward leakage	Safety pressure
Flow suction	Overall leakage	Visual inspection
Gage scale and error	Overload	
Inward leakage	Oxygen inlet valve leakage	
- Additional test spreadsheets can be added as new regulators or other oxygen components are introduced.
- Qualified personnel can revise or modify existing test spreadsheets for revised settings or adding test points.

SPECIFICATIONS

- Inlet pressure 0-2000 psi
- Source pressure 3000 psi
- Altitude range: 0 to 50,000 feet. Precision: ± 250 feet or better
- Maximum flow rate: 240 alpm. Flow precision: ± 3 % F.S.
- Environmental operating conditions: Temperature: 0 to + 40°C. Operating, -30 to + 60°C. Exposure
- Ambient pressure: 12.2 - 15.2 psia
- Gas temperature range: 0 to + 40°C. Precision: within .5° C.
- Outlet pressure: -50 to +50 inches H₂O. Precision: ± 0.05 inches H₂O.
- Size: 34" W x 29" H x 15" D (+7" lid).
- Weight: Less than 190 lbs. (Test Stand) Less than 165 lbs. Vacuum Pump Assembly (Ready to ship)
- Test chamber: 13" W x 13" D x 13" H
- Electrical:
 - The Test Stand will automatically operate from 90-132 volts and 175-264 volts, 50-60 Hz (no adjustment needed, (requires proper cord only).
 - The Vacuum Pump must incorporate the proper motor for the voltage being used. The standard motor used by the US Navy is 115 VAC, single phase, 60 Hz. **

** VACUUM PUMP POWER OPTIONS

- 115/200-230 VAC Single-Phase 50/60 Hz. Field-tested with OTS567B on 50 & 60 Hz. Note: This optional motor fits the standard Vacuum Pump Carrying Case.
- 220-240 VAC Single Phase 50 Hz
- 230-240 VAC Single Phase 50/60 Hz
- 200-220 VAC Three Phase 50 Hz
- 200-230 VAC Three Phase 60 Hz
- 380-415 VAC Three Phase 50 Hz
- 460 VAC Three Phase 60 Hz

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09/06/2006



SERIES 60B COMPENSATED DIGITAL GAS FLOWMETER

SPECIAL FEATURES

- Standard, Volumetric, or Mass Flow Measurement
- High Accuracy
- Multiple Gas Calibration
- Multiple LFE Ranges
- Multiple Engineering Units
- Automatic Temperature Compensation
- Automatic Pressure Compensation
- Eliminates Manual Corrections
- Traceable to NIST
- RS-232C or Analog Output

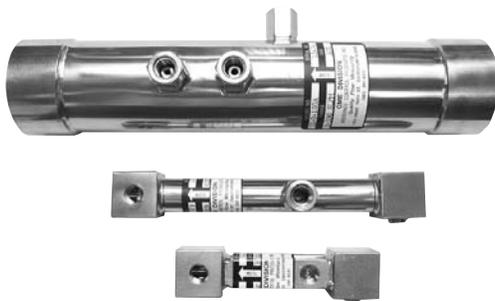


PRINCIPLES OF OPERATION

The Series 60B Flowmeter uses a Laminar Flow Element with a compensated digital display. High accuracy absolute and differential pressure transducers measure the signal generated by the flow element and atmospheric or line pressure. With the gas stream temperature measurement, the pressure data is processed by a dedicated single board computer to produce a compensated flow rate display. The computer is factory programmed with all required compensation equations and the constants for the flow elements and transducers utilized.

APPLICATIONS

Ideal for in-process monitoring of gas streams of changing temperature and pressures. Calibration of other flow devices.



Laminar Flow Elements

SPECIFICATIONS

MIN. FULL SCALE FLOW:	10 CCM
MAX. FULL SCALE FLOW:	
Standard	1000 LPM
Special	28000 LPM
ACCURACY:	
System:	±0.75% of Reading*
PRESSURE LOSS:	12 IN. H ₂ O
OPERATING TEMPERATURE:	
40°F. to 104°F.	
OPERATING PRESSURE:	
5 to 30 PSIA	
OPERATING VOLTAGE:	
115 VAC	

DISPLAY: BACKLIT LCD

DISPLAYED DATA:

(SELECTABLE BY FRONT PANEL BUTTONS)

1. COMPENSATED VOLUMETRIC FLOW RATE
(Inlet or Outlet Flow, Specify on order)

OR

2. COMPENSATED MASS FLOW RATE
(Specify Engineering Units on Order)

AUTOMATIC ZERO

OUTPUT: RS-232C

0-5 VDC (OPTIONAL)

*Factory Calibrated Accuracy for 10 to 100% of Flow Element Full Scale Flow.

The originators of gas laminar flowmeters

GME / Division of Aerospace Control Products, Inc.

1314 W. 76th Street • Davenport, IA 52806 • 1-800-845-0927 • FAX 563-391-9231

E-Mail: info@cmeflow.com • www.cmeflow.com

SERIES 60B COMPENSATED DIGITAL FLOWMETER

F.S. FLOW RANGE	MODEL 60B	MODEL 61B	MODEL 62B
0.01 LPM (10 CCM) (0.00035 CFM)	60B-75-.01G*	61B-1-.01G*	62B-1-.01G*
0.03 LPM (30 CCM) (0.001 CFM)	60B-75-.03G*	61B-1-.03G*	62B-1-.03G*
0.1 LPM (100 CCM) (0.0035 CFM)	60B-75-.1G*	61B-1-.1G*	62B-1-.1G*
0.3 LPM (300 CCM) (0.01 CFM)	60B-75-.3G*	61B-1-.3G*	62B-1-.3G*
1.0 LPM (1000 CCM) (0.035 CFM)	60B-75-1G*	61B-1-1G*	62B-1-1G*
3.0 LPM (3000 CCM) (0.1 CFM)	60B-75-3G*	61B-1-3G*	62B-1-3G*
10.0 LPM (0.35 CFM) (21.2 CFH)	60B-75-10G*	61B-1-10G*	62B-1-10G*
30.0 LPM (1.1 CFM) (64 CFH)	60B-75-30G*	61B-1-30G*	62B-1-30G*
100 LPM (3.5 CFM) (212 CFH)	60B-75-100G*	61B-1-100G*	62B-1-100G*
300 LPM (10.6 CFM) (636 CFH)	60B-75-300G*	61B-1-300G*	62B-1-300G*
1000 LPM (35 CFM) (2120 CFH)	60B-75-1000G*	61B-1-1000G*	62B-1-1000G*

THE SERIES 60B FLOWMETERS CONSIST OF A LAMINAR FLOW ELEMENT (LFE), WITH A TEMPERATURE PROBE, DIFFERENTIAL PRESSURE TRANSDUCER AND ABSOLUTE PRESSURE TRANSDUCER ENCLOSED IN A PORTABLE HOUSING. THE UNIT IS FULLY COMPENSATED FOR CHANGES IN TEMPERATURE AND PRESSURE. NO MANUAL CALCULATIONS ARE REQUIRED.

FEATURES:

- ACCURATE
- NIST TRACEABLE
- RELIABLE
- LARGE EASY TO READ BACKLIT DIGITAL DISPLAY
- VOLUMETRIC (ACTUAL) AND STANDARD (MASS) FLOW MEASUREMENT
- LFE MATERIAL 304/316 SS
- RS-232C OR ANALOG OUTPUT

OPTIONS:

- HIGHER ACCURACY (CONSULT FACTORY)
- 0-5 VDC ANALOG OUTPUT
- MULTIPLE GAS CALIBRATION
- MULTIPLE RANGE UNIT
- TOTALIZER
- HIGH PRESSURE UNIT

FLOWRATES TO 1000 CFM AVAILABLE: CONSULT FACTORY

MODEL	TOTAL SYSTEM UNCERTAINTY	F.S. DELTA P (NOMINAL)
60B	± 0.75% READING	10" H ₂ O
61B	± 1.0% F.S.	1" H ₂ O
62B	± 1.0% READING	2" H ₂ O

COMPENSATED PRESSURE RANGE:** 5-30 PSIA
COMPENSATED TEMPERATURE RANGE*:** 40-104°F.

*SPECIFY GAS: "A" (AIR), "ARG" (ARGON), "HE" (HELIUM), "N" (NITROGEN), "J" (OXYGEN), IN PLACE OF "G". CONSULT FACTORY FOR OTHER GASES OR MIXTURES.

**SPECIFY OPERATING PRESSURE WHEN ORDERING.

***SPECIFY OPERATING TEMPERATURE WHEN ORDERING.

The originators of gas laminar flowmeters

CMF / Division of Aerospace Control Products, Inc.

1314 W. 76th Street • Davenport, IA 52806 • 1-800-845-0927 • FAX 563-391-9231
 E-Mail: info@cmeflow.com • www.cmeflow.com



SERIES 40L VOLUMETRIC DIGITAL GAS FLOWMETER

**BULLETIN
200**

AFFORDABLE HIGH ACCURACY

SPECIAL FEATURES

- Individually Calibrated
- Traceable to N.I.S.T.
- High Accuracy with New Linearization Circuit
- Rugged and Reliable
- No Extra Pipe Lengths
- Wide Temperature Range
- Multiple Gas Applicability
- Portable
- AC or DC Operation
- Analog Output for Process Control

The Series 40L combines the more than 20 year proven high accuracy CME laminar flow element with improved transducer technology to produce a truly accurate digital readout flowmeter for gases.

PRINCIPLES OF OPERATION

The flow element itself consists of one or more thin, wide slots in metal through which the gas flows. For very small flows (6cc/Min. to 1 CFM), a single metering slot is used. For higher ranges, the gas flows through a series of stainless steel matrix of parallel slots. Since the geometry of the flow is such that laminar flow exists in each channel, the differential pressure developed is proportional to the rate of volume flow and to the viscosity of the gas in accordance with the 140 year old Hagen-Poiseuille law. The transducer used is an accurate, low range, ceramic, capacitive pressure transducer.

APPLICATIONS

- Continuous In-Line Monitoring of Gas Flow Streams for Process Control
- Calibration of Other Less Accurate Gas Flowmeters
- Accurate Testing of Flow Systems



DESIGN

The flow element is external to the electronic cabinet with the flow element connected by flexible tubing. The pressure transducer and all electronics are mounted in the enclosed, portable cabinet. A linearization circuit specific to each flow element and transducer is provided to improve the displayed flow rate accuracy without corrections. The readout is scaled in flow units and each unit is provided with flow calibration table traceable to N.I.S.T. A basic language computer program is also provided to facilitate all flow calculations and corrections to assure maximum accuracy.

SPECIFICATIONS

MIN. FLOW RANGE:	0-6 cc/Min.
MAX. FLOW RATE: Standard	0-1000 LPM
Special	0-28000 LPM
MAX. PRESSURE LOSS:	14.0 in. Water
OPERATING TEMPERATURE:	0 to 160° F.
OPERATING PRESSURE (MAX.):	15 PSIG
ACCURACY:	
System $\pm 2.0\%$ F.S. (Uncorrected)	
$\pm 0.5\%$ F.S. (Corrected)	
OUTPUT SIGNAL:	0 to 2 VDC
POWER REQUIREMENTS:	DC 9 volts
	AC 110-115V, 60 Hz, 200 Watts (Max)
CABINET DIMENSIONS:	6" x 4" x 2.5"

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PORTABLE COMPENSATED GAS FLOW BENCH FCS-8 & FCS-8A

BULLETIN
196E



Figure 1

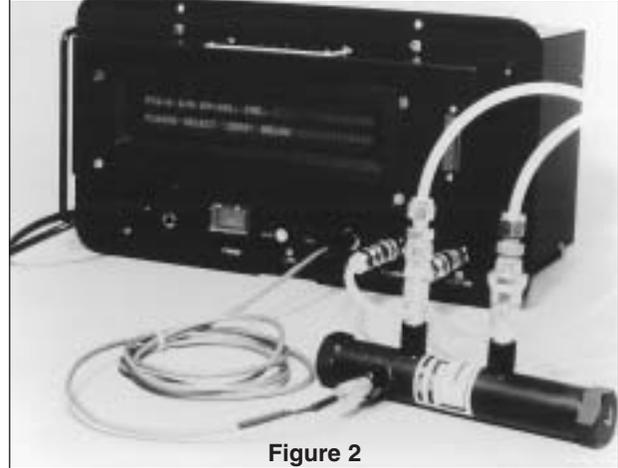


Figure 2

SPECIAL FEATURES

- High Accuracy
- Portability
- Wide Flow Range
- Automatic Fully Compensated Volumetric Flow Rate
Standard Flow Rate
- Low Pressure Loss
- Individually Calibrated
- Traceable to N.I.S.T.
- Eliminates Manual Calculations

PRINCIPLES OF OPERATION

The FCS-8 and FCS-8A utilize Series 10 Flow Elements, high accuracy pressure transducers, RTD's, and dedicated single board computer to produce flow measurements automatically compensated for changes in gas stream temperature and pressure. Bulletin 153 details the Series 10 laminar flow element operation and specifications.

APPLICATIONS

On-site monitoring of remote gas flow streams of widely varying flow rates.

Remote calibration of gas flow measuring devices of varying flow rates.

SPECIFICATIONS

FLOW RANGE AND ACCURACY:

FCS-8-75:
3 CCM TO 330 LPM AT $\pm .75\%$ OF READING

FCS-8A-75:
1 CCM TO 1000 LPM AT $\pm .75\%$ OF READING

TOTAL PRESSURE LOSS: 13 in. H₂O
OPERATING TEMPERATURE: 50°F. TO 104°F.
OPERATING PRESSURE: 7 TO 45 PSIA
DISPLAY: LED
DISPLAYED DATA:

INLET VOLUMETRIC FLOW RATE
OUTLET VOLUMETRIC FLOW RATE
STANDARD FLOW RATE
ABSOLUTE PRESSURE
TEMPERATURE

OPERATING POWER: 115 VAC
OUTPUT: RS 232 PORT
CARRYING CASE: 16"H X 16"W X 9"D

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To test a regulator, the operator simply selects from on-screen menus, and detailed step by step instructions guide the operator through the test sequence. The operator is instructed to configure the test stand manually, and then computer controlled valves automatically set flows while maintaining the specified altitude. Leak tests are also performed automatically. At the end of the test, the user may store the Test Report to hard drive or send it to the optional printer.

FEATURES

- Automatic compensation of flow rates for temperature and pressure altitude.
- Automatic calculation of oxygen flow and % O₂ concentration with nitrogen used as test gas.
- Uses a standard notebook computer-No obsolescence.
- Hard copy or electronic data storage. Spreadsheet compatible data can be uploaded to a central location for troubleshooting, or for archiving of historical trends.
- Test data sheets list unit and serial numbers, as well as operator and supervisor ID.
- Solid state: rugged, stable transducers. No water manometers.
- As in existing test stands, it utilizes laminar flow elements (LFE). Built by LFE/regulator experts.
- Solid state: rugged, stable transducers. No water manometers.
- Easy-to-read digital display of:

Altitude	Altitude set point
Outlet flow/leakage	Outlet flow set point
Regulator outlet pressure	Oxygen concentration (%O ₂ added)
Prompts/instructions	Acceptance criteria
- Anti-G pressure
- Flutter dampener.
- Remote controlled vacuum pump

ADVANTAGES

INCREASES PRODUCTIVITY

- Up to 3 times faster than manual stands.
- On-screen prompts/instructions dramatically reduce operator training.
- Reduces testing time via:
 - Automatically sets flow rate, altitude, and regulator inlet pressure from 0 to 150 psig.
 - Performs all leak tests automatically.
- Less error prone: Operator errors are reduced-no charts, conversions, or interpretation required.
- More accurate, consistent test results.
- Built in acceptance criteria, no chance to mix up test requirements of differing regulator types.
- Direct digital display of Flow, %O₂, Outlet pressure, Altitude, and Inlet pressure.
- Portable: easy and quick setup and take down for rapid deployment.
- May be calibrated in the field-no chips to burn or special program modifications.

VERSATILE

- Runs all tests on all diluter/100%/positive pressure/combate edge regulators:

Aneroid closure	Outward leakage
Blinker/flow indicator	Overall leakage
Demand valve leakage	Overload
Emergency pressure	Oxygen inlet valve leakage
Flow suction	Oxygen ratio
Gage scale and error	Pressure breathing/altitude
Inward leakage	Pressure breathing/Gs
Main relief (high pressure)	Safety pressure
Max pressure relief	Visual inspection
Outlet leakage	
- Can be programmed for additional regulators.
- Qualified personnel can revise existing programs.
- New programs can be added as new regulators are introduced.

SPECIFICATIONS

- Inlet pressure 0-2000 psi
- Source pressure 3000 psi
- Altitude range: 0 to 50,000 feet. Precision: ± 250 feet or better
- Maximum flow rate: 240 alpm. Flow precision: ± 0.5 % F.S.
- Environmental operating conditions: Temperature: 60 to 100°F. Ambient pressure: 10-15 psia
- Gas temperature range: 60 to 100°F. Precision: within 0.5° F.
- Outlet pressure: -50 to +50 inches H₂O. Precision: ± 0.05 inches H₂O.
- Size: 34" W x 29" H x 15" D (+7" lid).
- Weight: Less than 190 lbs.
- Test chamber: 13" W x 13" D x 13" H
- Electrical:

The Test Stand will automatically operate from 90-132 volts and 175-264 volts, 50-60 Hz (no adjustment needed, requires proper cord only).

The Vacuum Pump must incorporate the proper motor for the voltage being used. The standard motor used by the U.S. Navy is 115 VAC, single phase, 60 HZ.*

*VACUUM PUMP POWER OPTIONS

- 115/200-230 VAC Single Phase 50/60 Hz (new option). Now tested with OTS567B on 50 & 60 Hz. Note: This optional motor fits the standard PORTS Vacuum Pump Carrying Case.
- 220-240 VAC Single Phase 50 Hz
- 230-240 VAC Single Phase 50/60 Hz
- 200-220 VAC Three Phase 50 Hz
- 200-230 VAC Three Phase 60 Hz
- 380-415 VAC Three Phase 50 Hz
- 460 VAC Three Phase 60 Hz



SERIES 10 GAS FLOW ELEMENTS

HIGH PRECISION AT LOW COST

Patent Nos. 3,071,001 and 3,071,160.

SPECIAL FEATURES

- Low pressure drop
- Rugged
- Reliable
- High Accuracy
- Non-Clogging and Cleanable
- Wide Temperature Range
- Excellent Linearity
- Multiple Gas Applicability
- No Extra Pipe Runs
- Not Directional Sensitive
- Individually Calibrated
- Traceable to N.I.S.T.

Series 10 flow elements are high accuracy laminar flow elements that are used with differential pressure devices which accurately measure 10 inches of water differential.

PRINCIPLES OF OPERATION

Laminar flow elements are supplied for a variety of ranges and pressures requiring different sizes and construction. The element consists of one or more thin, wide slots in metal through which the gas flows. For very small flows (6 cc/min. to 1 CFM), a single metering slot is used. For higher ranges, the gas flows through a stainless steel matrix of parallel slots (as shown in Figure 1).

Since the geometry of the flow element is such that laminar flow exists in each channel, the differential pressure developed is proportional to the rate of volume flow and to the viscosity of the gas in accordance with the 140-year old Hagen-Poiseuille law.

APPLICATIONS

Transfer Standards for Calibration
Process Monitoring
Lab & Process testing

FOUR BASIC VERSIONS

Model 10—Element Only
Model 20—Element with Single Tube Manometer
Model 40—Element with Digital Display
Model 60—Element with Compensated Digital Display

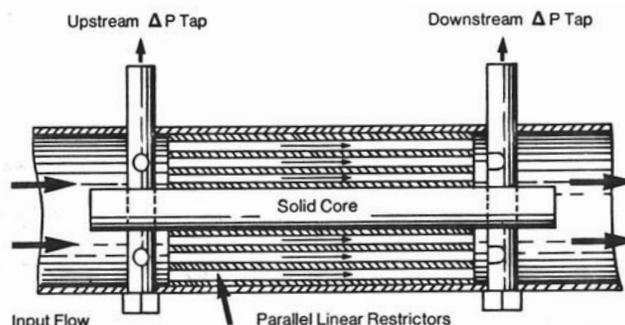


Figure 1 - Large Flowmeter Cut-Away

SPECIFICATIONS

MINIMUM FLOW RANGE:	0-6 cc/Min.
MAXIMUM FLOW RANGE:	
Standard	0-1000 LPM
Special	0-28000 LPM
ACCURACY-% FULL SCALE:	
Standard	0.5%
Special	0.25%
FULL SCALE DELTA-P:	
Standard	10 ± 1 in. H ₂ O
Special	10 +0 in. H ₂ O -1 in. H ₂ O

MAXIMUM PRESSURE LOSS: 13.0 in. H₂O
MIN. OPERATING PRESSURE: 0.5 PSIA
MAXIMUM TEMPERATURE: 750°F.
MATERIALS OF CONSTRUCTION:
304 and/or 316 Stainless



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The Model 40 combines the Model 10 flow element with a digital display to provide high accuracy, low pressure loss with a digital readout and optional analog output for process monitoring and control. See Bulletin 200 for specifications and options for the Model 40.

The Model 60B combines the Model 10 flow element with an automatically compensated digital display to provide high accuracy displayed flow readings over a wide range of temperatures and pressures without cumbersome manual calculations. See Bulletin 201 for specifications and options for the Model 60.

CALIBRATIONS

Elements and systems are normally supplied with a calibration for a particular gas at a specified pressure and temperature traceable to N.I.S.T. Without additional calibration, the instrument may be used over a temperature range of $\pm 10^{\circ}\text{F}$ and at absolute pressure to 20% lower than the specified pressure to an accuracy of $\pm 0.5\%$ Full Scale by applying small corrections. Each instrument has instructions on the application of temperature and pressure corrections. Instructions on how to convert readings when it is used with other gases can also be supplied.

SEMI-REMOTE USE

Since there is no flow through the two tubes connecting the flow element to the P device, it is possible to mount the device 50 feet or more from the flow element when required. The only limitations on such semi-remote uses are: (1) that the connections be made leak-tight; (2) that reasonable care be taken to insure that the temperature of both lines connecting the element and device is the same if the tubing runs vertically for 10 feet or more; and (3) that high speed of response is not a factor. The situating of the P device semi-remotely often eliminates the need for running large pipe a long distance.



Model 60B



FCS-9003 PORTABLE GAS FLOW CALIBRATOR



CME Division, Aerospace Control Products, Inc., has announced the launch of a new Portable Flow Calibration System that allows in-plant quality control personnel, for the first time, to assure the accuracy of production flowmeters in-place. The new system combines a high accuracy portable gas flow calibrator with the convenience of a Notebook computer. Efficiency and accuracy are increased by the full range of useful conversions and other automatic features available through the use of the Windows®-based software program.

The combined system allows the operator to automatically acquire flow data data, and com-

pensate for test conditions and flowmeter type. The portability of the system saves test time and the software prevents errors by eliminating manual calculations, and any need for graphs and tables. An easy to use point and click graphic display allows users to retrieve test setups, select engineering units, other test parameters and more. This versatile system may be taken to any area of a plant, accepts manual and electronic flowmeter inputs and will then effortlessly store and print out the NIST traceable compliance data. Contact CME Division, or your area CME Rep, for more information and a free copy of the FCS-9003 demo software.

The originators of gas laminar flowmeters

CME/Division of Aerospace Control Products, Inc.

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This document describes in detail the features, principle of operation, application, and specifications of the CME FCS 9003 Portable Gas Flowmeter Calibrator. (Specifications subject to change without notice – contact CME for the latest specifications.)

DESCRIPTION

The CME FCS-9003 links a portable gas flow Calibrator to a notebook computer. Notebook-resident SURECAL[®] software allows quality control personnel to perform high accuracy, on-site calibrations of production flowmeters. Down time is reduced, and manual data collection and reduction is eliminated- the system provides automatic data acquisition, and compensates for environmental test conditions, as well as many flowmeter types. Errors from manual calculations, or from interpreting graphs or conversion charts, are eliminated. The Windows[®]-based, easy to use software allows the operator to select engineering units, test points, etc. Test setups can be saved for later retrieval. The computer accepts manually entered readings, or electronic inputs. Audit compliance data can be stored and a hard copy of the data may be printed. The system uses a set of laminar flow elements (LFE's), absolute and differential pressure transducers, and a temperature probe to measure volumetric or mass flow.

***Note:** Factory Upgrade Kits are available to convert an existing FCS-8 to the FCS-9003 configuration: consult the factory.

EQUIPMENT PROVIDED

- Notebook computer.
- Note:** The software can be loaded onto any existing computer. Minimum* requirements: IBM Pentium computer; 128 Mbytes of RAM; Windows[®] 9x/2000/ME/XP; 14.1" TFT Active Matrix Display. (*Contact CME for recommended specifications.)
- Connecting serial cable.
- SURECAL[®] software program.
- The FCS-9003 portable Calibrator.
- A set of laminar flow elements (LFE's).
- LFE Standards quick connect hoses.
- LFE Test Flowmeter mini-hose/quick connect assemblies.
- Aluminum carrying case.
- Temperature probe.

FEATURES

The Calibration Due Date is saved in the program. When the recommended calibration is due, the program alerts the operator.

TEST SETUP OPTIONS (Operator Selectable)

- Seven (7) Test Flowmeter Types can be tested:
 - Nozzle
 - Turbine
 - Orifice
 - Thermal mass
 - Rotameter
 - Laminar flowmeter
 - Laminar flow element (STANDARD).

The Calibrator is equipped with differential pressure ports for DP inputs from the LFE Test Flowmeter
- Note:** The FCS-9003 can be programmed for use with other flowmeter types- consult the factory.
- Six (6) "Rated" Gases for which the Test Flowmeter is calibrated can be specified: (This is the gas that the UUT is Rated for, and not necessarily the "Test (calibration) Gas".)
 - Air
 - Argon
 - Nitrogen
 - Helium
 - Oxygen
 - Hydrogen

Note: The FCS-9003 can be programmed for other gases – consult the factory.

- The Calibrator is equipped with binding posts for Electrical Inputs from the Test Flowmeter. Six (6) Test Flowmeter output types are provided for:

- Sight (manual)
- Frequency
- 0-10 volt
- 0-5 volt
- 4-20 mA
- 0-20 mA

Note: The FCS-9003 can be programmed for use with other output types – consult the factory.

- Four (4) calibrator Test Gases can be used: (This is the actual gas that will be used during calibration.)

- Air
- Oxygen
- Nitrogen
- Helium

Note: The FCS-9003 can be programmed for use with other test gases – consult the factory.

- † A choice of eight (8) Flow Units is offered:

- LPM
- CFH
- LPH
- CCM
- LPS
- lbm/hr
- CFM
- gm/min

Note: The FCS-9003 can be programmed for other units of flow measurement – consult the factory.

- A choice of four (4) Temperature Units is offered:

- deg C
- deg K
- deg F
- deg R

- A choice of seven (7) Pressure Units is offered:

- PSIA
- mm Hg
- in. H₂O
- mBar
- in. Hg
- kPa
- cm H₂O

Note: The FCS-9003 can be programmed for other units of pressure measurement – consult the factory.

- Pressurized or Atmospheric testing can be specified.
- Volumetric or Standard (mass) flow can be specified.
- The Test Flowmeter Full Scale Flow can be set, or any portion of its range can be tested.
- The Test Flowmeter Calibration Temperature can be specified.
- The Test Flowmeter Calibration Pressure can be specified.
- Auto or User Entered Set Points can be selected. When Auto is selected, the SURECAL[®] program automatically divides the chosen flow range into equal increments, based on the number of setpoints entered. When User Entered is selected, the operator specifies the desired set point(s).
- Operator, Model, and Serial Number information may be entered.
- An existing (customer-defined) Test Setup can be run, or a Default Setup can be used. Existing test setups can be copied, modified, and saved for future use.

RUNNING A TEST (The Test Run Screen)

The following Real Time Information is displayed on the Test Run Screen:

- The Current Setpoint number
- The Gas Temperature
- The Absolute Pressure
- The Standard Serial Number
- The Test Flowmeter electronic Output
- The Test Flowmeter Setpoint value
- The Standard Number.
- The Set Point Flow and Actual Flow are displayed graphically and digitally.
- All Test Setup information

The following Run Time Controls are available on the Test Run Screen:

- The Band Width Slide Control is used to adjust how closely the setpoint and actual flow rates must match before the In Band Light comes on. (This adjustment has no effect on the calibration accuracy.)
- The Band Width Setpoint Time Slide Control is used to adjust the time the flow is In Band before the In Band For Time Light comes on.

Note: The In Band and In Band For Time lights are for operator reference only. They are intended to assist in making consistent readings. Readings can be taken at any time, whether the lights are on or off.

- The Take Point button is used to take a reading. Data is acquired automatically or manually.

Note: If the entry is not within the expected range, a pop up window asks if the reading should be reentered.

- Graph Scaling is set automatically, but can be adjusted manually if desired.
- After data is entered, the SURECAL[®] program displays the next setpoint, and (when necessary) prompts the operator for a Flow Standard change.
- After the last set point data entry is made, the SURECAL[®] program automatically proceeds to the Calibration Results screen.
- The Stop button cancels the test.

THE CALIBRATION RESULTS SCREEN

The following information is displayed on the screen:

- The Operator , Model # , and S/N (entered during setup).
- The Curve Fit Results: A second order curve fit of the data is calculated, and the (3) Calibration Constants are displayed. The Curve Fit Equation is used to find a "true/actual" value from an "indicated" flowmeter reading, or vice versa.
- The SEE is the standard estimate of the error, a measure of how well the curve fit matches the data. It is similar to the standard deviation, and can be used for establishing the uncertainty of the flowmeter measurements.
- The calibration results Graph, showing the Test Flowmeter Indicated Readings versus the Actual, compensated and corrected Flow.
- A Hard Copy of the Graph may be obtained.
- The Save Report feature saves the test results to a new (ASCII) file, or appends the results to an existing file.
*A Hard Copy of the Calibration Report may be obtained. The report lists all of the test setup parameters, the environmental conditions, and the test data. In addition, the deviation and the % of reading deviation of the curve fit from the true flow is tabulated.
- The Quit button allows the operator to quit or to run another test.

SPECIAL NOTE: LIFE STANDARD CALIBRATIONS

The Laminar Flow Element (STD) selection on the FCS-9003 Notebook Computer is used to calculate the LFE's Flow Equation Constants, which are programmed into various CME products (e.g., the Model 60A, the FCS-8).

The Laminar Flow Element (STD) selection returns a DP vs Standard Flow, and calculates the Flow Equation Constants. It differs from the Laminar Flowmeter selection in that the Laminar Flowmeter selection returns an Indicated vs Actual Flow, and calculates the Curve Fit Equation Constants. Thus, to check the accuracy of a Model 60A, the Laminar Flowmeter selection is used, but to reprogram a Model 60A so the displayed flow is the "true" flow, the Laminar Flow Element (STD) selection is used. (Contact the factory for technical assistance on reprogramming these devices.)

The LFE Test Flowmeter output (DP) is connected to the Calibrator LFE UUT HIGH/LOW ports.

When Take Point is clicked, the data is acquired automatically.

The Curve Fit calculates the (3) Flow Equation Constants.

The Calibration Report shows a table of Flow vs Mean DP/ Inlet DP/ Outlet DP.