

CLIF MOCK™

Model 5030 Orifice Fitting

User Manual



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Introduction

Principle of Operation

The Clif Mock™ Model 5030 Orifice Fitting secures an orifice plate in the proper position for measuring flow within a pipe or tube. When correctly positioned in the orifice fitting, an orifice plate will produce a differential pressure by constricting the flow of fluid passing through it. The differential pressure is measured across the plate through two taps located on the fitting near the constriction.

The single chamber design allows the user to inspect and replace orifice plates without removing the fitting from the flow line.

Components

Within the Model 5030 Orifice Fitting is an assembly that includes the sealing bar and orifice plate carrier (Figure 1.1). This assembly allows maintenance personnel to remove the sealing bar, orifice plate carrier, the orifice plate, and plate seal in a single step.

The Model 5030 Orifice Fitting is a weld-by-weld fitting available in 2 in. and 3 in. diameters and in two pipe thicknesses (Schedule 40 and Schedule 80). The orifice fitting is rated for ANSI Class 600 with a maximum working pressure of 1480 psi at 100°F per ASME B16.5.

Warning Always relieve system pressure before attempting to disassemble the orifice fitting.



The orifice plate fitted with a seal is positioned inside the carrier, which is attached to the sealing bar by two cap screws. To remove the carrier/sealing bar assembly, the user simply loosens the four clamping screws at the top of the fitting, slides the clamping bar out, and lifts the assembly from the body of the orifice fitting.

Dimensions for a 2-in. orifice fitting are shown in Figures 1.2 and 1.3. Dimensions for a 3-in. orifice fitting are shown in Figures 1.4 and 1.5.

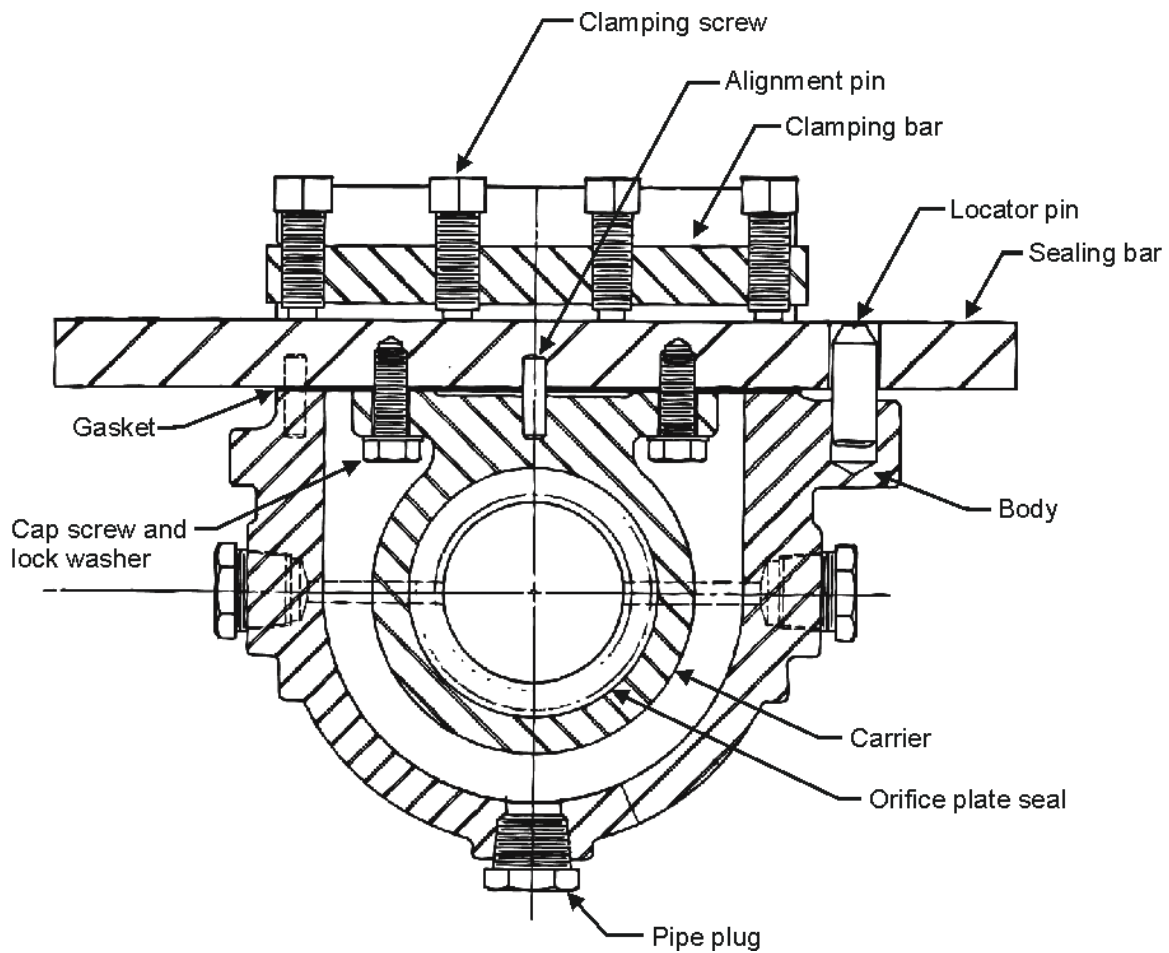


Figure 1.1—Nomenclature for the Model 5030 single-chamber orifice fitting

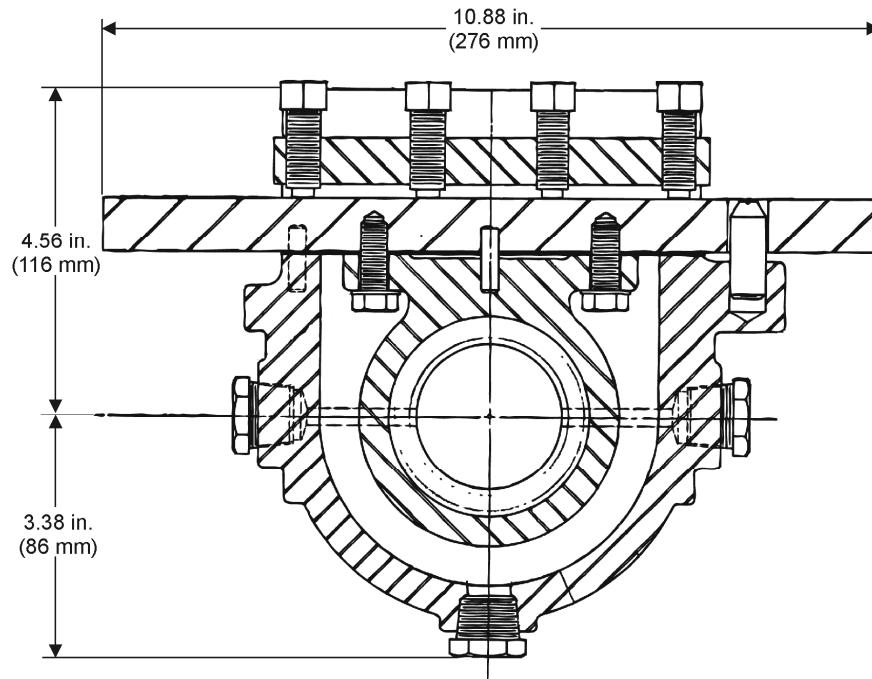


Figure 1.2—Dimensions for a 2-in. orifice fitting (flow line view)

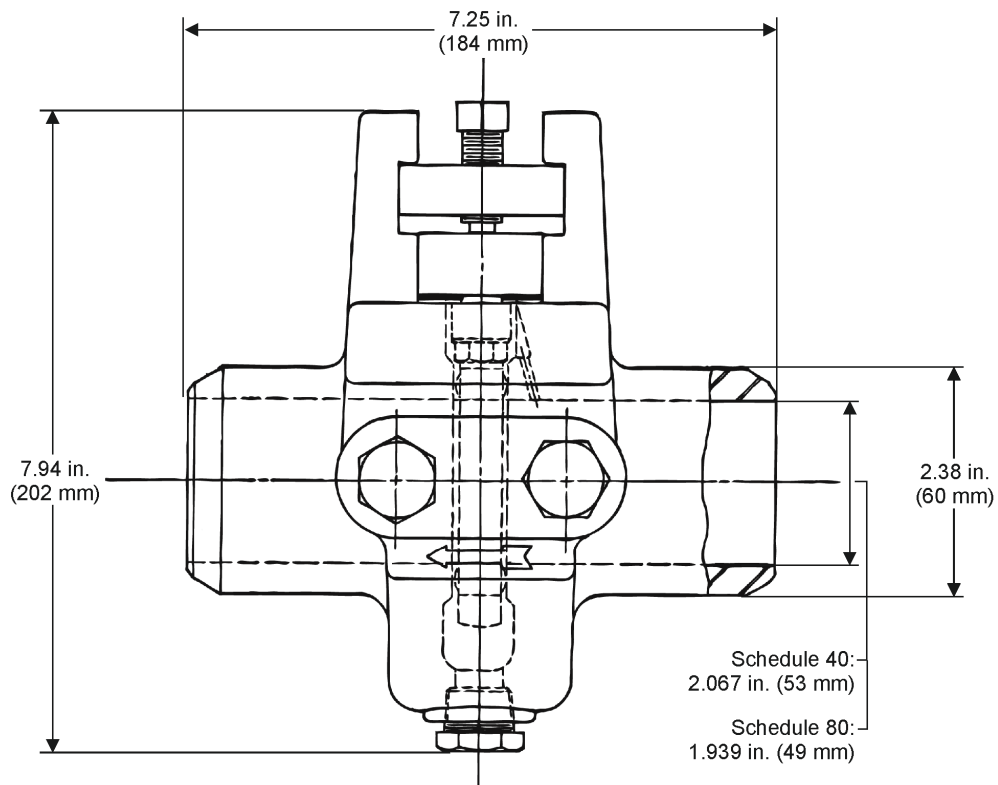


Figure 1.3—Dimensions for a 2-in. orifice fitting (side view)

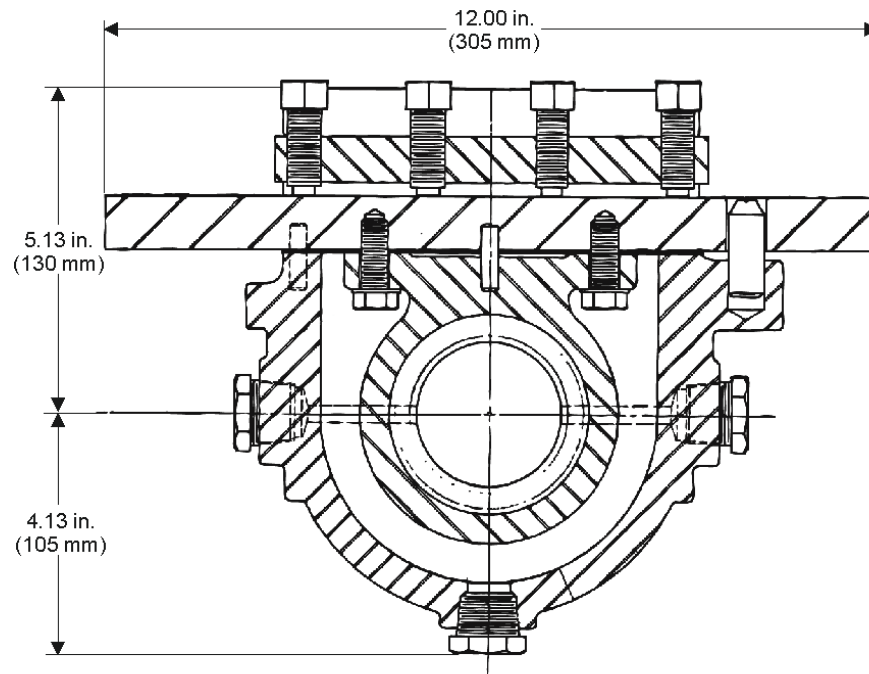


Figure 1.4—Dimensions for a 3-in. orifice fitting (flow line view)

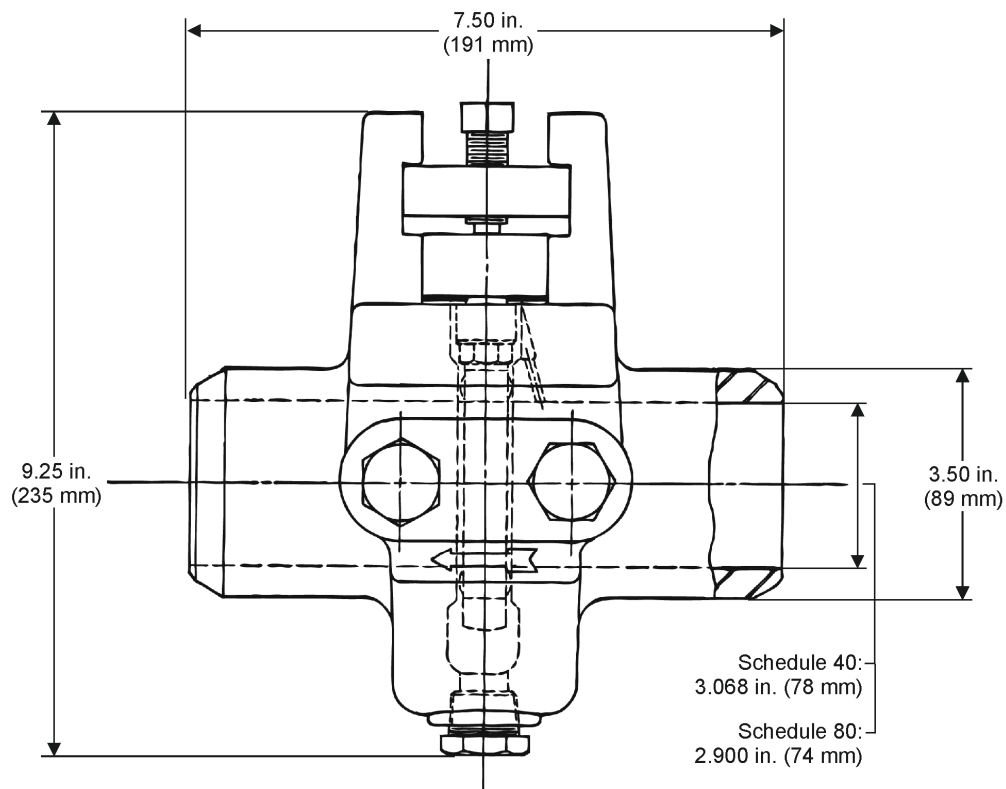


Figure 1.5—Dimensions for a 3-in. orifice fitting (side view)

Installation

Preparation

Before installing the fitting into the line, perform the following steps:

1. Clean piping of all foreign material such as welding chips, scale, oil, grease, and dirt.
2. Remove all foreign matter such as scale, oil, grease, and dirt from the fitting line connections and internal cavities of the fitting.
3. Record the fitting's plate data for future reference. Always provide the serial number and model number of the fitting when ordering spare parts.



Figure 2.1—Data plate showing serial number and model number

4. Verify that the piping system in which the orifice fitting will be installed has been adequately designed with respect to the following:
 - Internal/external pressure
 - Ambient and operational temperatures
 - Static pressure in operating and test conditions
 - Corrosion, erosion, fatigue, etc.
 - Fluid decomposition
 - Loading from traffic, wind and earth
 - Reaction forces and moments resulting from supports, attachments, piping, etc.

Orifice Fitting Installation

Warning The orifice fitting may contain fluid under high pressure. Failure to comply with the instructions in this document can result in serious injury or death.



The Model 5030 Orifice Fitting is an important part of an orifice metering system. To complete the unit, a meter tube must be attached. If the fitting is received without a meter tube, see code AGA-3-1985 for details.

Before installing the meter tube containing the orifice fitting, perform the following steps:

1. Clean the meter tube interior as well as the piping sections where the meter tube will be installed.
2. Remove all foreign materials such as welding debris, scale, oil, grease or dirt.
3. If end flanges are used, select and install the proper gaskets and tighten all bolting to the required tightness. If welded connections are used, use proper procedures for the materials being joined.

Warning The gasket seal, sealing bar, and clamping bar must be installed so that a pressure barrier is created between the line pressure and atmospheric pressure. Failure to properly install these components can result in serious injury or death.



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4. After the meter tube is in place and all connections are made and any holes plugged, pressure-test the meter tube as follows:
 - a. Tighten the orifice fitting clamping bar screws to 40 ft-lb of torque.
 - b. Hydrostatically pressure test in accordance with applicable piping code ASME B31.3. Before initiating the test, verify that there is no orifice plate in the fitting.
 - c. Check for leaks at the sealing bar gasket and at all threaded connections on the orifice fitting.

Installing and Removing Orifice Plates

The Model 5030 Orifice Fitting design allows an operator to install or remove the orifice plate while minimizing line shutdown time.

Within the orifice fitting is an assembly that includes the sealing bar and orifice plate carrier. This sealing bar/orifice plate carrier assembly allows maintenance personnel to remove the sealing bar, orifice plate, and plate seal at one time.

The design of the Model 5030 Orifice Fitting prevents spillage in liquid service applications.

Removing an Orifice Plate

1. Depressurize or shut in the line supporting the orifice fitting.
2. Once pressure in the plate holder is reduced to ambient pressure, remove the sealing bar/orifice plate carrier assembly, containing the orifice plate, from the fitting.
3. Loosen the fasteners on the clamping bar two turns.
4. Lightly tap the sealing bar to break the gasket seal.
5. Slide out the clamping bar.
6. Lift out the sealing bar/orifice plate carrier from the orifice fitting body.
7. Remove the sealing bar gasket.
8. Remove the orifice plate and orifice plate seal from the sealing bar/orifice plate carrier.
9. Remove the orifice plate seal from the orifice plate.

Inserting an Orifice Plate

To insert an orifice plate into the orifice fitting without removing the fitting from the line, perform the following steps.

1. Remove the sealing bar and clamping bar from the body.
2. Install a new sealing bar gasket onto the orifice fitting body.
3. Install a new orifice seal onto the orifice plate.
4. Install the orifice plate and seal assembly into the plate carrier, taking into account the flow direction of the line. This can be done using the dowel pin located in the sealing bar as a reference.

Caution

Failure to install the orifice plate and orifice gasket assembly in a direction properly oriented with the direction of flow will result in measurement error and a possible loss of revenue.

5. Lower the plate carrier assembly into the orifice fitting, while aligning the dowel pin hole with the dowel pin, until the sealing bar/plate holder comes in full contact with the sealing bar gasket.
6. Install the clamping bar.
7. Tighten each of the clamping bar fasteners to 40 ft-lb of torque.

The Model 5030 Orifice Fitting is now ready for final pressurization and operation.

Maintenance

Under normal measurement conditions, the Model 5030 Orifice Fitting will require no maintenance. However, Cameron recommends a periodic inspection of the orifice fitting at an interval established by the measurement supervisor.

The inspection should include a check of the plate holder for vandalism, or other inadvertent damage and well as a check for tightness of fasteners and connectors to ensure that the corrosion and tolerance dimensions of the fitting are not exceeded.

Spare Parts

Tables 4.1 through 4.4 provide recommended spare parts for 2 in. and 3 in. fittings in Schedule 40 and Schedule 80 pipe.

Important Always provide the serial number and model number of the fitting when ordering spare parts.

Table 4.1—2-in. Model 5030 Fitting. Schedule 40, Weld-by-Weld (Part No. 50306000440)

Qty.	Part No.	Description	Notes
1	50306000442	Body, Mach., 2-in. Schedule 40, Weld-by-Weld	
1	50316000438	Pin, Sealing Bar Locator	
1	50316000439	Pin, Carrier Alignment	
1	50316000444	Carrier, Mach , 2" Orifice Fitting	
1	50316000445	Bar, Clamping	
1	50316000446	Bar, Sealing	
1	50316000447	Gasket, Sealing Bar	
1	9910100	Seal Ring, Nitrile, 2", Schedule 40	Other materials available on request. See Orifice Plates data sheet at www.c-a-m.com/flo .
1	TBD	2-in. Universal Orifice Plate	See Orifice Plate data sheet at www.c-a-m.com/flo .
2	50025400759	Rivet	Common to all fittings
2	50316000437	Bolt, Hex HD, 3/8-16 x 1 SS	
4	50316000448	Screw, Clamping, 1/2-13 x 1 1/4 SQ HD Half-Dog	
2	50316000465	Washer, Split Lock, 3/8 SS	
3	0199-0192C	Plug, Pipe, 1/2 " MNPT ST	

For information on orifice plates, see the *Orifice Plates and Orifice Plate Sealing Units* data sheet on the Cameron (Measurement Systems Division) website, www.c-a-m.com/flo.

Table 4.2—2-in. Model 5030 Fitting, Schedule 80, Weld-by-Weld (Part No. 50306000461)

Qty.	Part No.	Description	Notes
1	50306000459	Body, Mach., 2-in. Schedule 80, Weld-by-Weld	
1	50316000438	Pin, Sealing Bar Locator	
1	50316000439	Pin, Carrier Alignment	
1	50316000444	Carrier, Mach, 2" Orifice Fitting	
1	50316000445	Bar, Clamping	
1	50316000446	Bar, Sealing	
1	50316000447	Gasket, Sealing Bar	
1	9910101	Seal Ring, Nitrile, 2", Schedule 80	Other materials available on request. See Orifice Plates data sheet at www.c-a-m.com/flo .
1	TBD	2-in. Universal Orifice Plate	See Orifice Plates data sheet at www.c-a-m.com/flo .
2	50025400759	Rivet	Common to all fittings
2	50316000437	Bolt, Hex HD, 3/8-16 x 1 SS	
4	50316000448	Screw, 1/2-13 x 1 1/4 SQ HD Half-Dog	
2	50316000465	Washer, Split Lock, 3/8 SS	
3	0199-0192C	Plug, Pipe, 1/2 " MNPT ST	

For information on orifice plates, see the *Orifice Plates and Orifice Plate Sealing Units* data sheet on the Cameron (Measurement Systems Division) website, www.c-a-m.com/flo.

Table 4.3—3-in. Model 5030 Fitting, Schedule 40, Weld-by-Weld (Part No. 50306000450)

Qty.	Part No.	Description	Notes
1	50306000452	Body, Mach., 3-in. Schedule 40, Weld-by-Weld	
1	50316000438	Pin, Sealing Bar Locator	
1	50316000439	Pin, Carrier Alignment	
1	50316000454	Carrier, Mach, 3" Orifice Fitting	
1	50316000455	Bar, Clamping	
1	50316000456	Bar, Sealing	
1	50316000457	Gasket, Sealing Bar	
1	9910102	Seal Ring, Nitrile, 3", Schedule 40	Other materials available on request. See Orifice Plates data sheet at www.c-a-m.com/flo .
1	TBD	3-in. Universal Orifice Plate	See Orifice Plate data sheet at www.c-a-m.com/flo .
2	50025400759	Rivet	Common to all fittings
2	50316000437	Bolt, Hex HD, 3/8-16 x 1 SS	
4	50316000448	Screw, 1/2-13 x 1 1/4 SQ HD Half-Dog	
2	50316000465	Washer, Split Lock, 3/8 SS	
3	0199-0192C	Plug, Pipe, 1/2 " MNPT ST	

For information on orifice plates, see the *Orifice Plates and Orifice Plate Sealing Units* data sheet on the Cameron (Measurement Systems Division) website, www.c-a-m.com/flo.

Table 4.4—3-in. Model 5030 Fitting, Schedule 80, Weld-by-Weld (Part No. 50306000462)

Qty.	Part No.	Description	Notes
1	50306000460	Body, Mach., 3-in. Schedule 80, Weld-by-Weld	
1	50316000438	Pin, Sealing Bar Locator	
1	50316000439	Pin, Carrier Alignment	
1	50316000454	Carrier, Mach, 3" Orifice Fitting	
1	50316000455	Bar, Clamping	
1	50316000456	Bar, Sealing	
1	50316000457	Gasket, Sealing Bar	
1	9910103	Seal Ring, Nitrile, 3", Schedule 80	Other materials available on request. See Orifice Plates data sheet at www.c-a-m.com/flo .
1	TBD	3-in. Universal Orifice Plate	See Orifice Plate data sheet at www.c-a-m.com/flo .
2	50025400759	Rivet	Common to all fittings
2	50316000437	Bolt, Hex HD, 3/8-16 x 1 SS	
4	50316000448	Screw, 1/2-13 x 1 1/4 SQ HD Half-Dog	
2	50316000465	Washer, Split Lock, 3/8 SS	
3	0199-0192C	Plug, Pipe, 1/2 " MNPT ST	

For information on orifice plates, see the *Orifice Plates and Orifice Plate Sealing Units* data sheet on the Cameron (Measurement Systems Division) website, www.c-a-m.com/flo.

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