



DATA SHEET
#NPR130

BALANCED PRESSURE PROPORTIONING SYSTEMS

Description

Balanced Pressure (BP) Proportioning Systems are the most common type of foam proportioning systems because of their versatility and accuracy. National Foam BP systems are skid mounted fixed units which are capable of providing foam protection to all types of hazards on land and are also excellent for various marine applications. Skid mounting allows the complete proportioning system to be assembled on a common base ready for installation into the customers water supply main.

BP Proportioning Systems automatically and accurately proportion foam concentrate over entire flow range of the ratio controller, regardless of pressure and without manual adjustments. Proper proportioning is achieved automatically by maintaining identical water and foam concentrate pressures at the respective inlets of the ratio controller. Foam concentrate is supplied to the ratio controller by a positive displacement type foam concentrate pump and a diaphragm balancing valve that automatically adjusts the foam concentrate pressure to correspond to the water pressure. A duplex gauge monitors balancing of the foam concentrate and water pressures at the ratio controller. The duplex gauge also allows the system to be manually balanced in the event of diaphragm valve failure by utilizing a manually operated valve in the foam concentrate by-pass piping.

Features

- May be used with either fresh or salt water.
- Direction of flow through proportioner can easily be changed in the field prior to installation of field piping.
- Compact design provides a small foot print.
- Can add most options except standby pump without changing foot print.
- Designed to easily accept a variety of options for custom configuration.
- Assembled with grooved fittings and flush-in/flush-out connections for ease of service.
- Accurate foam concentrate proportioning over flow range regardless of pressure.
- All foam concentrate valves, pipe and fittings are brass for compatibility with all types of foam concentrates, and superior corrosion resistance.
- All manual valves are brass or bronze full port ball valves, which provide low friction loss characteristics.
- All manual valves are the locking type, in accordance with NFPA requirements for valve supervision, and have identification labels on the handles.
- Foam concentrate supply can be replenished while the system is in operation.
- Pump valving designed to provide the ability to test relief valves and pump output with external equipment.

Applications

- Tank Farms
- Loading Racks
- Hangers
- Warehouses, Drum Storage Facilities
- Tankers, Chemical Carriers
- Fireboats
- Helipads, Helidecks
- Offshore Drilling Rigs
- Docks, Piers
- High Expansion Systems

Specification

Skid-mounted balanced pressure proportioning system shall be a complete self-contained unit designed to proportion foam concentrate with fresh or salt water at the required percentage of concentration over the entire flow range of the ratio controller. All foam proportioning components and piping shall be securely mounted on a steel epoxy coated base complete with foundation anchor bolt holes and provision for handling with a fork lift. Skid shall include all necessary piping, valves and fittings to comprise a complete foam proportioning unit and shall be designed to provide a compact unit with a small foot print.

The proportioning package shall have a positive displacement, vane type foam concentrate pump with integral relief valve, gear reducer (if required) and 3/60/460V ODP motor mounted on a structural steel base. Pump shall have a cast iron body and rotor with Duravane vanes, carbon steel shaft, lip type seals and metalized carbon bearings. Motor shall be sized with sufficient horsepower to provide rated output, with relief valve full open, without overloading the motor. Each motor driven pump shall be provided with a UL Listed or FM Approved, NFPA 20 fire pump controller, mounted in a NEMA 2 enclosure. Pumps with motors up to and including 30 HP shall have a limited service type fire pump controller as standard. Pumps with motors above 30 HP shall have a full voltage across the line start fire pump controller as standard. Controller shall be prewired to pump. All foam concentrate piping shall be brass for compatibility with all types of foam concentrates, superior corrosion resistance and reduction of sedimentation due to corrosion. The suction piping shall contain a Y-type or basket strainer with stainless steel screen with 1/8" perforations. Also a compound gauge shall be provided in the suction line, downstream of the strainer, to monitor potential blockage during operation, as well as, pressure during flushing procedures. All manual valves shall be brass or bronze full port ball valves, (which provide low friction loss characteristics) and shall have locking handles in accordance with NFPA requirements for valve supervision. All manual valves shall have function identification labels on the handles. A check valve shall be installed in the foam concentrate discharge line to the ratio controller for backflow prevention.

A bronze, wafer style ratio controller (modified venturi proportioner), which is designed to fit inside schedule 40 pipe and between (2) 150 Lb. flat face flanges of the same nominal pipe size as the proportioner, shall be provided. A back pressure control type diaphragm valve shall be provided to automatically adjust the foam concentrate pressure to correspond to the water pressure. Balancing is accomplished by sensing the water and foam concentrate pressures at the inlet to the ratio controller and adjusting the diaphragm valve opening to control the excess foam concentrate flow back to the concentrate storage tank. Pressure sensing lines from the (water supply line) and the (foam concentrate sensing connection) to the diaphragm valve (monitor) both the water and the foam concentrate pressures. The diaphragm valve shall be provided with a block valve and a bypass loop with manually operated valve which can be used to manually adjust the pressure in the event of diaphragm valve failure. A duplex gauge shall be provided to verify proper balance of the foam concentrate and water pressures at the ratio controller and also to allow the system to be manually balanced. Flush-in/flush-out connections (1-1/2" NH) shall be provided for ease of service. All field connections, with the exception of the water supply and foam solution discharge, shall be 150 lb. F.F. flanged flush with the edge of the skid base.

Direction of flow through the proportioner shall be simple to change in the field without piping modifications, prior to installation of field piping. Also, the skid unit design shall allow for close proximity remote mounting of the ratio controller. Skid unit design shall allow a variety of options to be added for custom configuration without changing foot print of the package. This would include additional ratio

controllers, actuated discharge valves, etc. The only (standard) options which would change the foot print is an additional foam concentrate pump or a special pump driver such as a diesel engine or a water motor. See Options Chart below.

Technical Data with Approvals and Listings

- Base: Epoxy Coated Carbon Steel.
- Piping: Brass, Schedule 40, Screwed and Grooved fittings.
- Ratio Controller: UL Listed. FM Approved. USCG Approved. Brass body with stainless steel hardware.
- Manual Valves: Ball valve with locking handle, bronze body, & brass or chrome plated brass ball, 400# WOG.
- Pump: Positive displacement, vane type, with integral relief valve, cast iron body with Duravane vanes, carbon steel shaft, lip type seals and metalized carbon bearings.
- Motor: UL Listed. ODP, 3/60/460V.
- Controller: UL Listed. FM Approved. NFPA 20 controller, full voltage across the line start, NEMA 2 enclosure, limited service type up to 30 HP.
- Diaphragm Valve: UL Listed. FM Approved. USCG Approved. Brass body with Stainless steel internals, Reinforced Buna-N diaphragm.
- Working Pressure: .. 200 PSI (13.8 bars).
- Finish: Red high solids epoxy finish.

Options Chart

Category	Standard	Optional Selection
Working Pressure	200 psi	250 psi
Special Finishes	Epoxy Coated - Red	Epoxy Marine Finish, All Colors
Piping Materials	Brass	Stainless Steel 304 or 316, Carbon Steel, 90/10 CuNI
Customer Connection Points	All Flanged	Flanged/Grooved, Threaded
Pumps - Positive Displacement	Ductile Iron Vane w/Internal Relief Valve	Ductile Iron Bronze Lined Gear Pump, Bronze UL Listed Gear Pump
Pump Drivers	Electric Motor	Diesel Engine w/ Fuel Tank, Water Motor
Electric Motor Enclosures	ODP	TEFC, EX Proof, IEEE
Electric Motor Voltages	3/60/460 VAC	3/60/230 VAC, 3/50/380 VAC, 3/50/415 VAC
Pump Controller Types	Limited Service 10-30 HP, Full Voltage 30 HP and Up	Full Voltage, Industrial Starter
Pump Controller Accessories	None	Transfer Switches, Purge Systems, Releasing Panels
Pump Controller Enclosures	Nema 2	Nema 4, Nema 4X, Ex Proof (Industrial Starters Only)
Reserve Pump - Any Style	No	Yes
Ratio Controller	Wafer Style	Flanged Style
Ratio Controller Size (2",3",4",6",8")	Any Based on Pump Size	-
Ratio Controller Proportioning %	3%	6%, 2%, 1%-6% Metering Valve
Additional Ratio Controllers	No	Yes
Valve Types	Full Port Ball Valves w/ Lockable Handles	Globe, Gate, Butterfly
Valve Actuation	Manual	Electric, Pneumatic, Water Powered
Valve Supervision	Visual/Lockable	Tamper Switches
Performance Supervision	Yes (NFPA)	Pressure Switches, Flow Meters, Transducers
Inlet and Discharge Piping Spools	No	Yes
Integral Foam Concentrate Tank	No	Yes
Custom Designs to Customer Specs	No	Yes
Additional Pumps	No	Yes
Additional Motor Controllers	No	Yes-w/Automatic Transfer and Lockout

NOTE: Available options may change skid dimensions and weights.

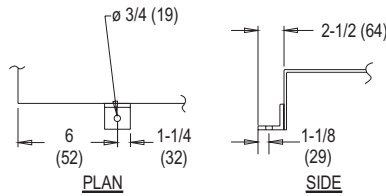
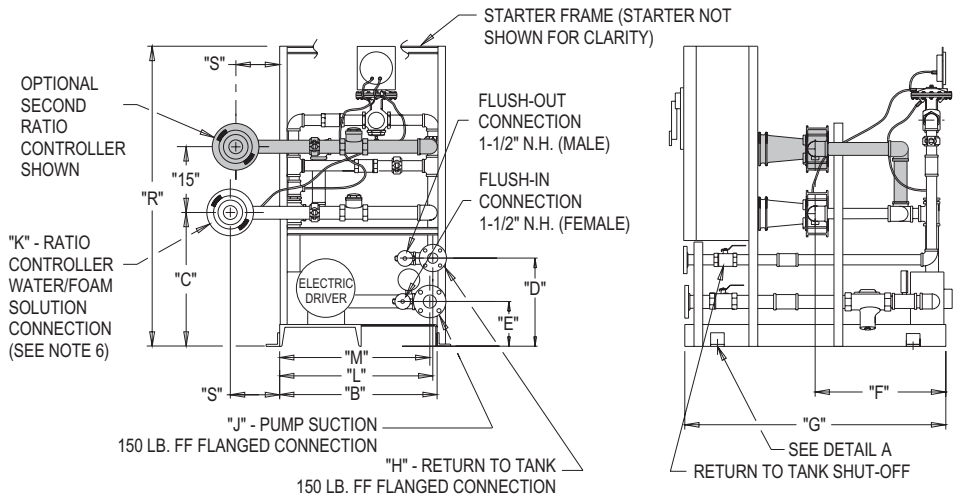
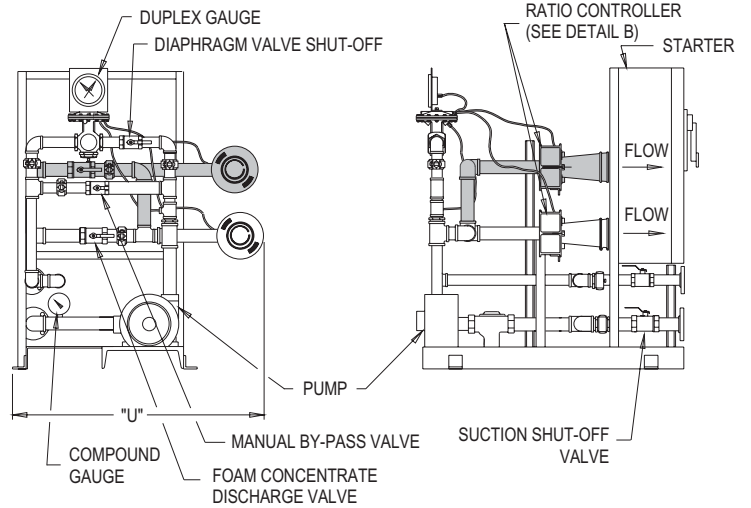
NOTES:

1. All field connections, with the exception of the water/foam solution connection at the ratio controller, shall be flush with the edge of the base plate.
2. NF recommends a clear distance of 2 ft. on the pump end and 3 ft. on the drive end be allowed by the installer, to facilitate service/removal of the pump and motor.
3. A minimum of five pipe diameters of straight unobstructed pipe is required upstream and downstream of each ratio controller.
4. To facilitate future service/removal of RCW ratio controller, installer should provide a spool piece upstream of the controller. See below for minimum spool piece lengths. (See Detail B)

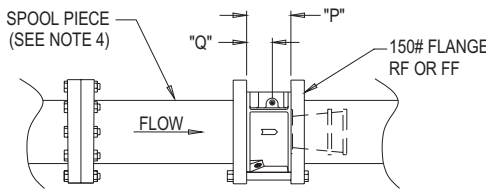
Ratio Controller	Minimum Spool Length	
3"	8"	(203)
4"	10"	(254)
6"	12"	(305)
8"	14"	(356)

5. Module size is based on largest RCW.
6. Drawing dimensions, pump and motor capacities noted are for 3% systems. Contact National Foam Engineering Dept. for details on 6% systems and options.
7. Charts 1 & 2:
 (M) - Proportioning to Mid Range,
 (F) - Proportioning over Full Range.

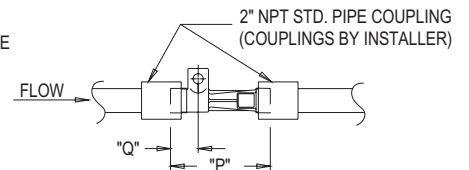
NOTE: Shaded areas on drawing indicate optional equipment.



DETAIL A
TYPICAL ANCHORING LUG
(TYPICAL 4 PLACES)



DETAIL B
RATIO CONTROLLER INSTALLATION 3" - 8"

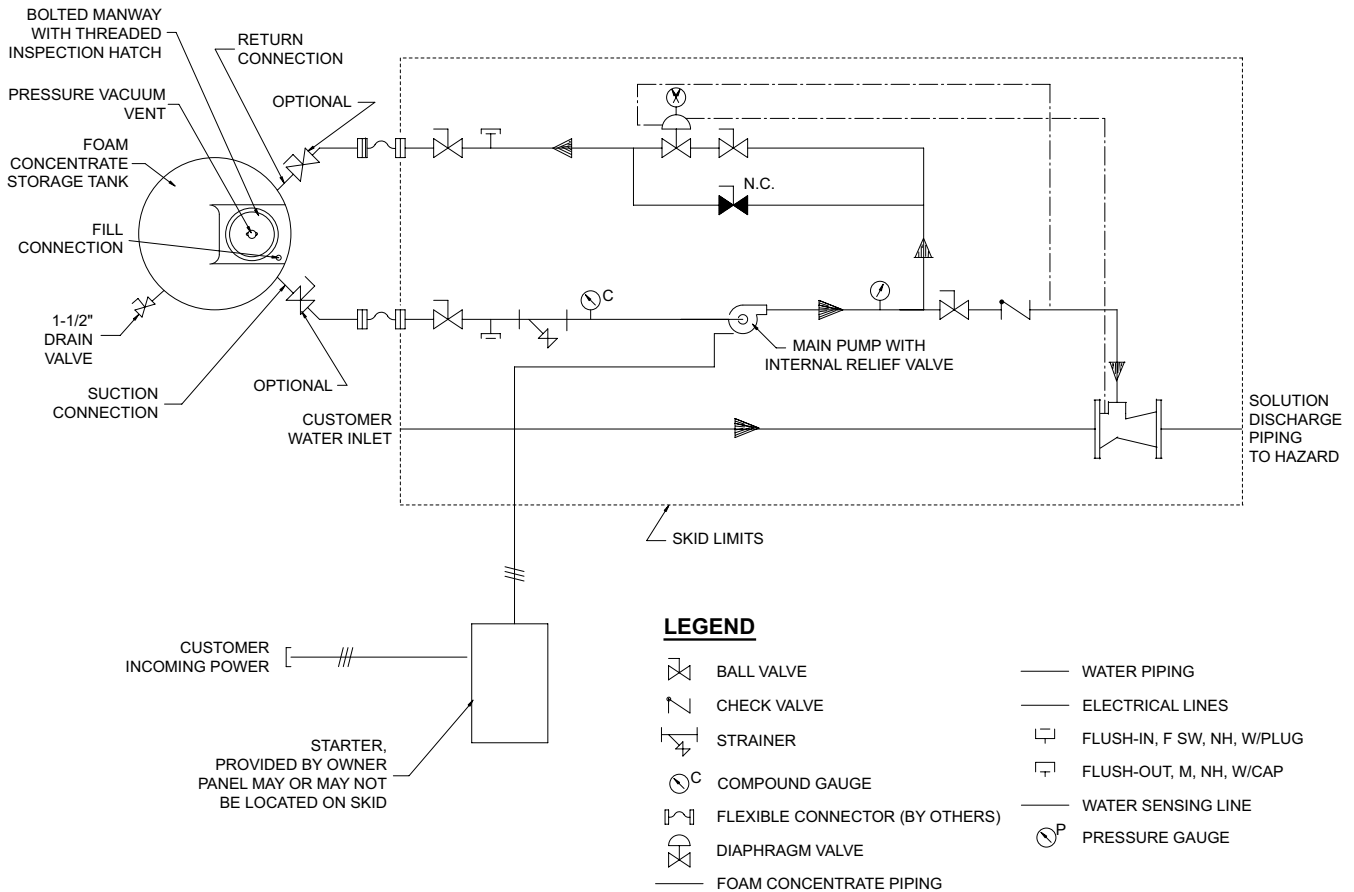


DETAIL C
2" RCT RATIO CONTROLLER
2" MALE NPT X 2" MALE NPT

CHART 1 - BALANCED PRESSURE PROPORTIONING SKID DIMENSIONAL CHART - 3% PROPORTIONING (SEE NOTES 6 & 7)																
R. C. Size	"B"	"C"	"D"	"E"	"F"	"G"	"H"	"J"	"K"	"L"	"M"	"P"	"Q"	"R"	"S"	"U"
2 (51)	35 (889)	25 (635)	18 (457)	8-3/4 (222)	22 (559)	44 (1118)	1-1/2 (38)	2 (51)	2 (51)	34-1/16 (865)	33-13/16 (859)	9 (229)	2-1/4 (57)	75 (1905)	4-1/2 (114)	43 (1092)
3 (76)	35 (889)	25 (635)	18 (457)	8-3/4 (222)	22 (559)	44 (1118)	1-1/2 (38)	2 (51)	3 (89)	34-1/16 (865)	33-13/16 (859)	2-7/8 (73)	1-11/16 (43)	75 (1905)	4-1/2 (114)	43 (1092)
4 (102)	35 (889)	25 (635)	18 (457)	8-1/4 (210)	24 (610)	48 (1219)	1-1/2 (38)	2 (51)	4 (102)	34-1/16 (865)	33-13/16 (859)	3-3/16 (81)	1-31/32 (50)	75 (1905)	5-1/2 (140)	46-1/2 (1181)
6 (M) (152)	35 (889)	25 (635)	18 (457)	8-1/4 (210)	24 (610)	48 (1219)	1-1/2 (38)	2 (51)	6 (152)	34-1/16 (865)	33-13/16 (859)	4 (102)	2-3/8 (60)	75 (1905)	6-1/2 (165)	48 (1219)
6 (F) (152)	47 (1194)	29 (737)	18 (457)	9-1/8 (232)	24 (610)	52 (1321)	1-1/2 (38)	2-1/2 (64)	6 (152)	46-1/16 (1170)	45-9/16 (859)	4 (102)	2-3/8 (60)	75 (1905)	6-1/2 (165)	50 (1524)
8 (M) (203)	47 (1194)	29 (737)	18 (457)	9-1/8 (232)	24 (610)	52 (1321)	1-1/2 (38)	2-1/2 (64)	8 (203)	46-1/16 (1170)	45-9/16 (859)	4-1/4 (108)	2-1/2 (64)	75 (1905)	7-1/2 (191)	62-5/16 (1583)
8 (F) (203)	50 (1270)	34 (864)	21 (533)	11-1/4 (28+6)	29-1/2 (749)	60 (1524)	2 (51)	3 (89)	8 (203)	49-1/16 (1246)	48-1/4 (1226)	4-1/4 (108)	2-1/2 (64)	76 (1930)	7-1/2 (191)	62-5/16 (1583)

CHART 2 - (3%) RATIO CONTROLLER/PUMP/MOTOR CHART (SEE NOTES 6 & 7)			
Ratio Controller Size	(3%) Ratio Controller Solution Flow GPM (LPM)	Pump Capacity @ 200 PSI GPM (LPM)	Motor Horsepower
2 (51)	30 - 180 (114 - 681)	20 (76)	7-1/2
3 (76)	70 - 450 (265 - 1703)	20 (76)	7-1/2
4 (102)	150 - 1200 (568 - 4542)	50 (189)	15
6 (M) (152)	300 - 1200 (1136 - 4542)	50 (189)	15
6 (F) (152)	300 - 2500 (1136 - 9464)	90 (341)	25
8 (M) (203)	850 - 2500 (3218 - 9464)	90 (341)	25
8 (F) (203)	850 - 5000 (3218 - 18927)	175 (662)	40

VALVE DESCRIPTION		
Ref.	Description	Normal Position
A	Fm. Conc. Tank Return	Open
B	Fm. Conc. Tank Suction	Open
C	Manual Fm. Conc. Bypass Valve	Closed
D	Fm. Conc. Discharge Valve	Open
L	Fm. Conc. Discharge to Diaphragm Valve	Open
S	Flush-In Connection	Closed
T	Flush-Out Connection	Closed
U	Strainer Flush-Out	Closed



NOTE:

PIPING, VALVES, AND FLEXIBLE CONNECTIONS BETWEEN TANK AND SKID ARE BY OTHERS.

P & ID FOR BALANCED PRESSURE PROPORTIONING PUMP SKID

This information is only a general guideline, and each installation may require modifications to meet the applications or requirements of that situation. The company reserves the right to change any portion of this information without notice. Terms and conditions of sale apply and are available on request. 10/05 (Rev B) Printed in U.S.A. (NPR130.PMD)

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