

DUNCON

THE RIGHT PRODUCT FOR YOUR APPLICATION



40 years

AUTOMATIC RECIRCULATION CONTROL VALVE FOR CENTRIFUGAL PUMP PROTECTION - MODEL NVM

BENEFITS:

- The protection of centrifugal pumps that saves millions in maintenance
- Maximize the availability of the plant;
- Save on maintenance of the pump;
- Save the installation (smaller pump);
- Save in energy consumption (smaller driver).

FEATURES:

complete system with FIVE functions

- 1 - Check valve in the main stream;
- 2 - Measurement of pump to process flow
- 3 - MODULATING control of recirculation flow
- 4 - Recirculation multiple stage pressure reduction with anti-cavitation system
- 5 - Auto operated and compact

Sizes: 1" to 30"

Pressure class: 150# to 600#

Construction standard: ASME B16.34

Connections: Flanges ANSI, DIN, BS and JIS



BENEFITS

- **Stabilizes pump and process operating conditions.** The modulating control of the recirculation flow system avoids large shift in the flow through the pump.
- **Operational economy and Energy conservation.** When the process demand is larger than minimum flow required by centrifugal pump, recirculation flow is cut off automatically. This will result in thousands of dollars savings in power loss when recirculation is continuous. It also reduces the need for oversized pump, base and driver.
- **Saves Installation costs.** Compact, self-contained, tamper, shock and vibration proof. With only three pipe connections, simplifies system design and reduces installation costs. Need for power source, electrical wiring and instrumentation signals are eliminated.
- **Environmentally safe.** Zero emission, no dynamic seals, no packing box, make our **DURCON** model **NVM** an ideal and reliable product for today's low emission valves. Extremely reliable for operation even with environmentally dangerous fluids.
- **Low Maintenance.** **DURCON** model **NVM** is self-powered and totally mechanical. No need for linkage, actuator or pilot valve. Less sensitive to clogging because of solids in fluids. Operates without continuous need for supervision, adjustments or maintenance.

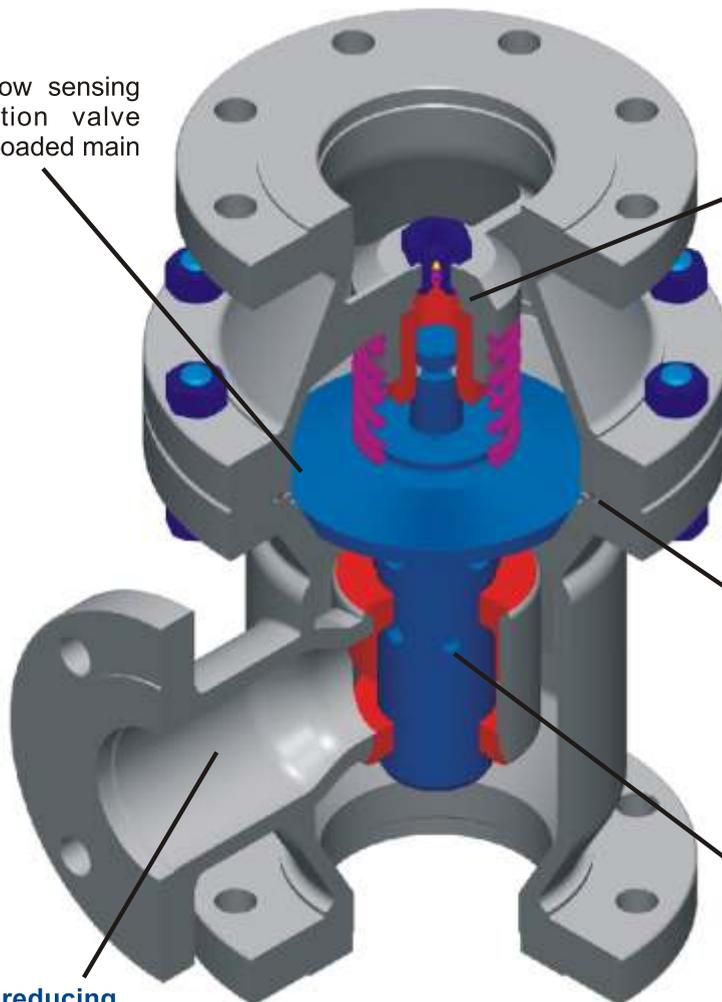
Disc is the main flow sensing element, recirculation valve actuator and spring loaded main flow check valve.

Top and Bottom guide of Disc-Piston prevents vibration and dampens movement.

Environmentally safe. No dynamic seals or packing box. Safe for dangerous fluids.

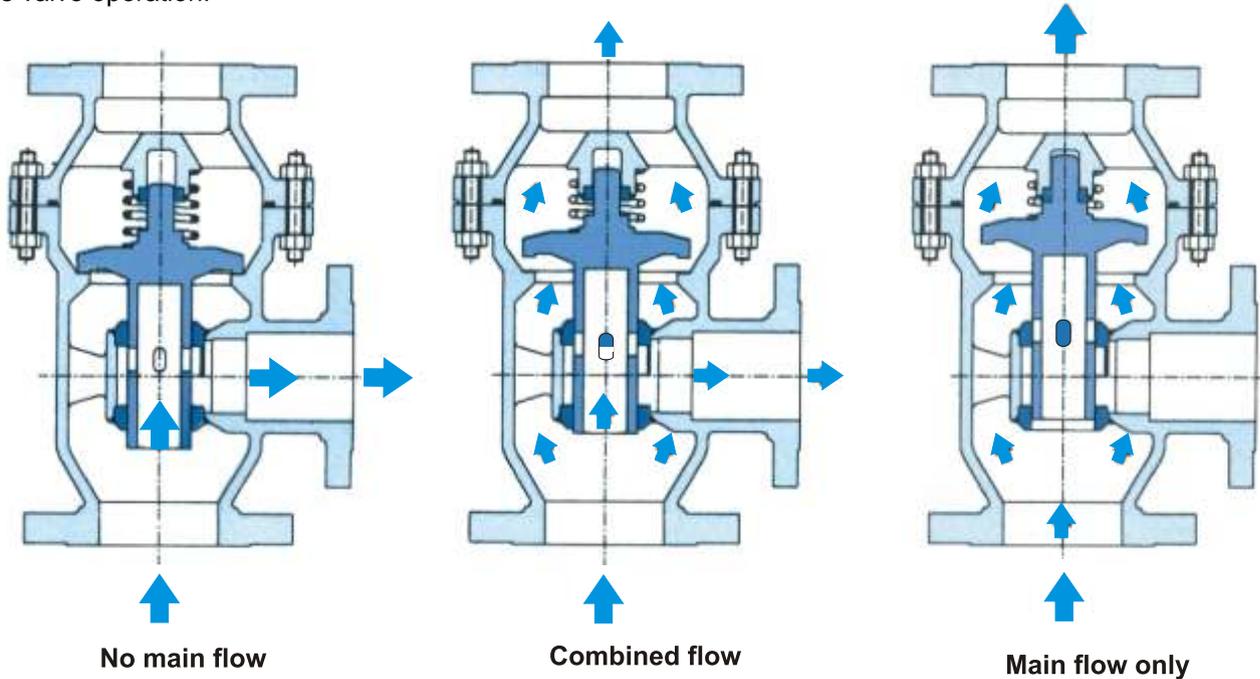
Recirculation control valve, with calibrated orifices, provides modulating control for precise pump protection.

Bypass **pressure reducing element** designed for quiet and safe operation.



OPERATION

The **Disc-Piston** assembly not only functions as a main flow check valve, it is also the main flow sensing element. The disc is designed to operate in accordance with the main flow fluctuations in order to provide mechanical signals for by-pass valve operation.



TYPICAL APPLICATIONS

DURCON NVM valves are designed to handle a wide range of applications as follows:

Aviation fuel pumps
Boiler feed water pumps
Condensate pumps
Crude oil loading pumps

Dessulphurization systems
Fire fighting systems
Injection systems
Loading platforms

Seawater injection systems
Steel works descaling
LPG; Ethylene; Propane and
Butane Pumping Systems

DURCON NVM valves are also ideal candidates for a wide range of fluids handled by centrifugal pumps as shown below:

Boiler feed water
Brackish water
Condensate
Demin. water
Desalinated water
Drinking water
Hot & cold water
Produced water
Seawater
Raw water

Treated water
Waste water
Alcohol
Ammonia
Aromatics
Benzene
Butadine
Butane
Bunker "C" oil
Carbon tetrachloride

Chloroform
Crude oil
Cutting oils
Diesel
Ethane
Ethylene
Gasohol
Gasoline
Glycol 30%
HC condensate

Hydrazine
HC distillate
Isobutylene
Jet fuels
Kerosene
Light oils
LPG
Methanol
Mixed chemicals
MTBE

Naphtha
Orthoxylylene
Propane
Propylene
Raffinate
Vinyl chloride

SIZES AND CONNECTIONS

DURCON NVM is available in sizes from 1" to 14"
For larger size (up to size 30") consult factory.

Temperature Range: - 250°F to + 600°F. (-150°C to 316°C)

Connections: Flanged ANSI Class 150, 300 and 600 Lbs RF.
Other connections such as RTJ, BW and DIN are available upon request.

Optionals include:

- Valves conforming to NACE MR-01-75.
- External Back Pressure Regulator (when required)
- Sea water service
- Duplex and Super Duplex Stainless Steel construction

■ Other valve models for smaller or higher pressures: model NVL and VRM.

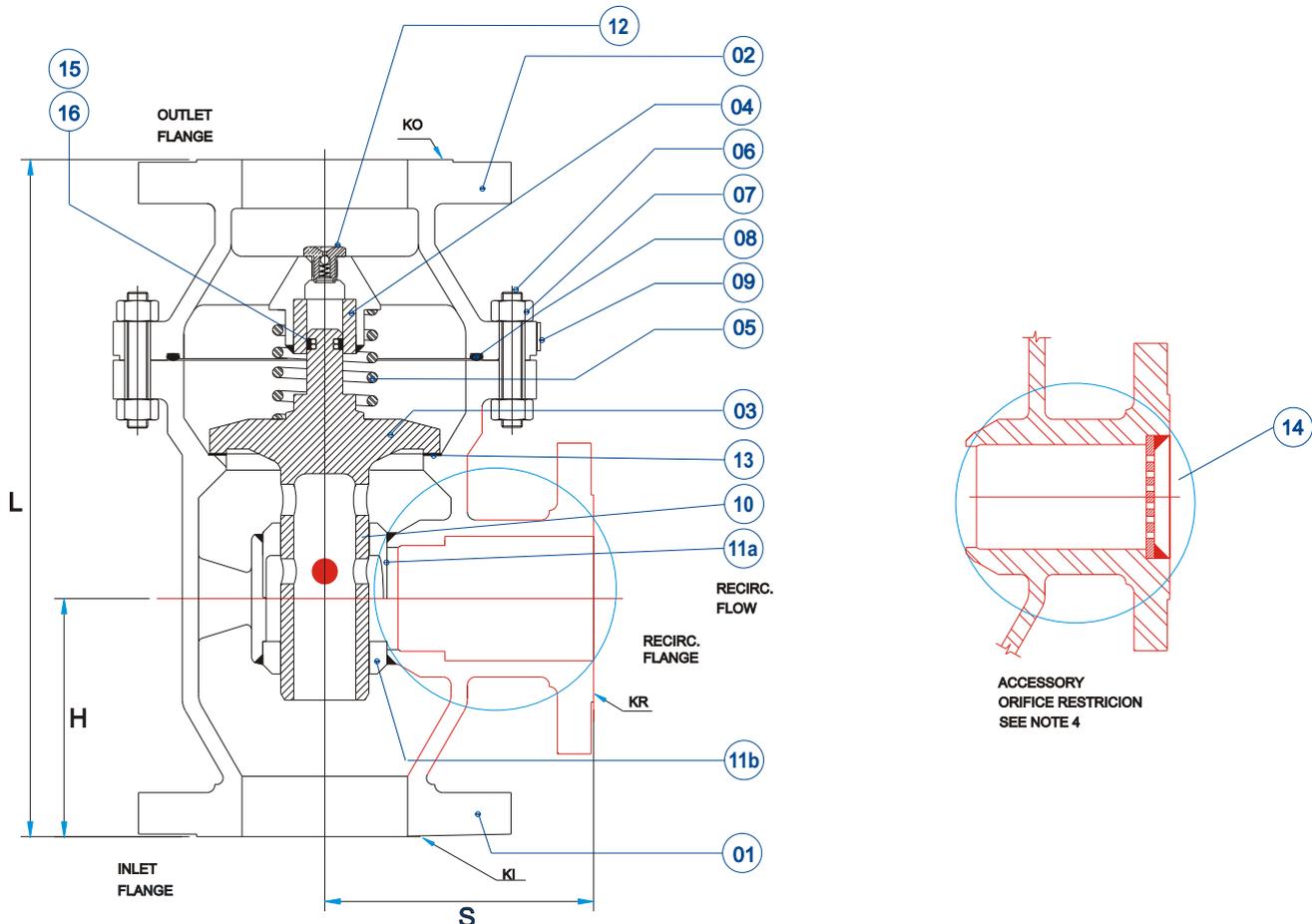
SELECTION

The nominal size of the valve is selected on the basis of the required main flow, the acceptable pressure drop in the main flow and the required bypass Cv and flow

Main	Inlet-Outlet Size		1"	1.5"	2"	3"	4"	6"	8"	10"	12"	14"
	Max Flow	GPM	65	126	250	613	1082	2434	4327	8473	10456	14422
		m ³ /h	15	29	57	139	246	553	983	1924	2375	3275

Bypass	Size		0.75"	0.75"	1"	2"	3"	4"	6"	8"	8"	10"
	Max Cv		6.1	6.1	8.6	17	36	90	170	424	565	790
	Max Flow	GPM	60	62	84	166	318	648	1300	2450	3750	5000
m ³ /h		14	14	19	38	72	147	295	556	852	1136	

Flow values indicated above are for fluids with specific gravity 1. For fluids with different specific gravity the flows must be corrected.



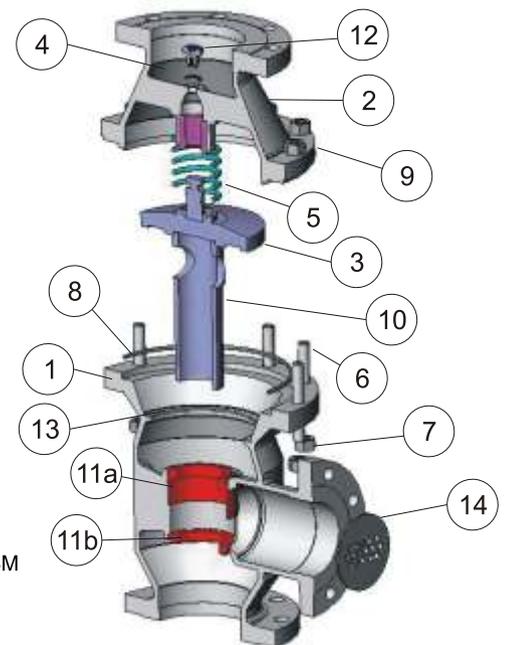
DIMENSIONS AND WEIGHTS

Nom. Sizes Inch		Press. Class	Dimensions inch (mm)			Weights	
Main	Bypass		Lbs	L	H	S	Lb(Kg)
1	0.75	150	9.6 (244)	3.4 (87)	4.3 (108)	22 (10)	
		300	9.6 (244)	3.4 (87)	4.3 (108)	33 (15)	
		600	10.2 (258)	3.7 (94)	4.5 (114)	48 (22)	
1.5	0.75	150	9.6 (244)	3.4 (87)	4.3 (108)	26 (12)	
		300	9.6 (244)	3.4 (87)	4.3 (108)	37 (17)	
		600	10.2 (258)	3.7 (94)	4.5 (114)	48 (22)	
2	1	150	10.9 (278)	4.0 (101)	4.9 (125)	40 (18)	
		300	10.9 (278)	4.0 (101)	4.9 (125)	48 (22)	
		600	11.6 (294)	4.3 (109)	5.1 (130)	57 (26)	
3	2	150	14.1 (358)	4.6 (118)	5.6 (142)	66 (30)	
		300	15.5 (393)	5.1 (130)	6.0 (153)	92 (42)	
		600	16.3 (414)	5.3 (135)	6.6 (167)	119 (54)	
4	3	150	15.8 (401)	5.4 (137)	6.8 (172)	108 (49)	
		300	18.2 (462)	6.2 (158)	7.3 (185)	158 (72)	
		600	19.6 (499)	6.6 (168)	8.1 (205)	220 (100)	
6	4	150	21.0 (534)	6.9 (175)	8.4 (214)	220 (100)	
		300	22.8 (578)	7.5 (190)	9.3 (237)	315 (143)	
		600	25.0 (636)	8.1 (206)	10.2 (259)	453 (206)	
8	6	150	29.5 (750)	9.6 (245)	10.8 (275)	438 (199)	
		300	31.3 (796)	10.2 (258)	11.6 (295)	598 (272)	
		600	33.7 (856)	10.8 (275)	12.6 (320)	779 (354)	
10	8	150	35.4 (900)	11.8 (300)	13.4 (340)	946 (430)	
		300	37.4 (950)	12.6 (320)	14.2 (360)	1342 (610)	
		600	43.3 (1100)	14.4 (365)	16.3 (414)	1925 (875)	
12	8	150	36.2 (920)	12.0 (305)	14.6 (370)	1144 (520)	
		300	40.0 (1015)	13.4 (340)	15.7 (400)	1738 (790)	
		600	40.6 (1050)	14.6 (375)	17.7 (450)	2865 (1300)	
14	10	150	52.4 (1330)	15.7 (400)	16.1 (410)	2100 (955)	
		300	53.1 (1350)	16.5 (420)	17.7 (450)	2925 (1330)	
		600	Consult DURCON				

For sizes 16" to 30" , consult **DURCON**

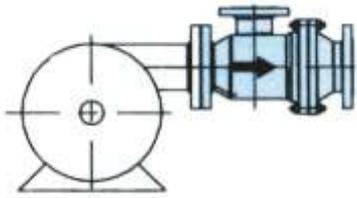
PART LIST

Item	Qty.	Description	Materials	Specification
1	1	Body	●	●
2	1	Bonnet	●	●
3	1	Disc	Stainless Steel	304 St. St. with S.T.
4	1	Slide ring	Stainless Steel	17-4 PH
5	1	Spring	Stainless Steel	AISI 302
6	xx	Stud bolt	Alloy Steel	ASTM A193 B7
7	xx	Nut	Alloy Steel	ASTM A194 2H
8	1	Seal ring	Buna-N (#)	#
9	1	Nameplate	Stainless Steel	304 St. St.
10	1	Piston	Stainless Steel	304 St. St. with S.T.
11a	1	Bypass ring	Stainless Steel	17-4 PH
11b	1	Bypass ring	Stainless Steel	17-4 PH
12	1	Danpening Valve	Stainless Steel	304 St. St.
13	1	Seat	Stainless Steel	AWS E 309
14 x	1	Orifice restriction	Stainless Steel	304 St. St.



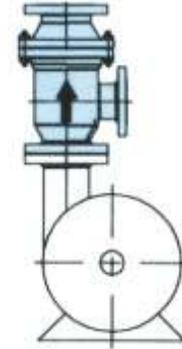
- Notes:** ● Standard Options: Carbon Steel - ASTM A216 WCB; Stainless Steel - ASTM A351 CF8M
▲ Recommended Spares.
x Orifice restriction installed in valve (only when required).
xx Quantity depends on valve size.
Other seal ring available including metal.
■ Only on size 4" and above.

INSTALLATION



Horizontal

Installation of the **NVM** valve may be Vertical (preferred) or Horizontal. The by-pass flow direction may be any, except down when installation is horizontal



Vertical

TYPICAL INSTALLATION AND DESIGN CONSIDERATIONS

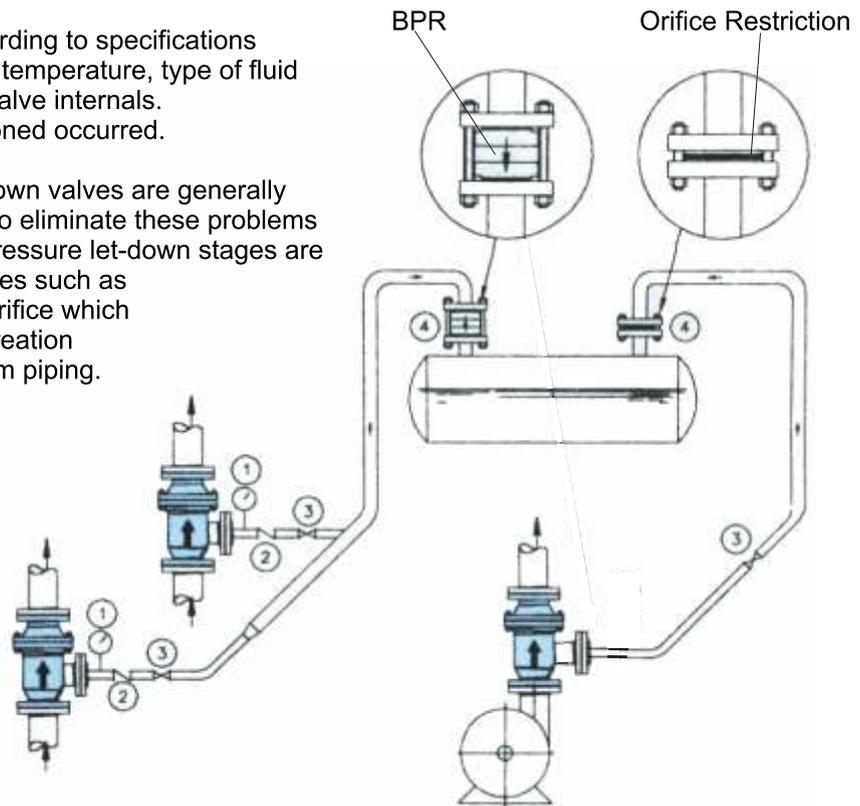
DURCON NVM valve is normally installed near or on the discharge flange of the centrifugal pump. Flow direction must be as indicated by the arrow stamped into the body.

The valve and its components are selected according to specifications supplied by customers. Any change in pressure, temperature, type of fluid and flow condition, may require modification of valve internals. Please consult with the factory if the aforementioned occurred.

Cavitation, vibration, and noise in pressure let-down valves are generally caused by uncontrolled fluid velocities. In order to eliminate these problems in the body or in the by-pass recirculation line, pressure let-down stages are incorporated inside the valve or in external devices such as Back Pressure Regulator (BPR) or Restriction Orifice which are utilized to further eliminate two phase fluid creation (flashing) inside the valve and in the down-stream piping.

Legend:

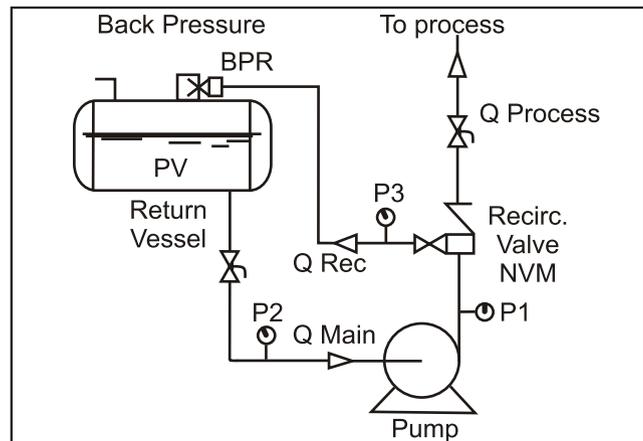
- ①- Pressure Gage (optional).
- ②- Check valve
- ③- Shut off valve (optional)
- ④- Location of Orifice Restriction or BPR when line installation is recommend.



APPLICATION DATA

When inquiring please complete the following information:

Company _____ Contact: _____
 Quantity: _____ Pump discharge, Size and ANSI class: _____
 Service: _____
 Main flow max. GPM m³/h@ _____ Psi Bar
 Main flow normal GPM m³/h@ _____ Psi Bar
 Recirculation flow GPM m³/h@ _____ Psi Bar
 Fluid: _____ @ _____ °F °C
 Fluid Specific Gravity (@ oper. Temp.): _____
 Fluid Vapor Pressure (@ oper. Temp.):(PV) : _____ Psi Bar
 Viscosity: _____ Centipoise
 Pump suction pressure (P2): _____ Psi Bar
 Back pressure (P3): _____ Psi Bar
 Installation:(V) Vertical or (H) Horizontal: _____
 Seals material: _____ (If you have preference)



BACK-PRESSURE REGULATOR DURCON model BPR

FLASHING:

Vapor pressure of fluid is function of temperature and as the temperature increases, vapor pressure also increases. If fluid pressure is dropped below vapor pressure, part of the fluid will vaporize. This is referred to as 'FLASHING'. However, if pressure is high enough, fluid remains liquid even at elevated temperatures.

Flashing is not a function of valve size, design, or configuration. Flashing is a state in which fluids are subject to thermodynamics changes. Flashing can cause vibration, noise and premature erosion. It will cause cavitation in pressure reducing systems where pressure recovery is present, therefore flashing must be avoided by designing the proper back pressure into the system.

This becomes especially important in modulating systems. Proper system design should be used to optimize valve pressure reduction and consider all fluid dynamic effects down-stream of any pressure reducing device. A fixed orifice may not provide the proper back pressure at all flow conditions since the orifice becomes less effective as the flow in the bypass is reduced by the modulating control system.

DURCON BPR - Back-Pressure-Regulator, is the ideal device to eliminate the risk of flashing and cavitation in the Automatic Recirculation Valve and in the By-pass line.

DURCON BPR is modulating, self-contained and medium driven. It operates automatically over the entire range of the flow rates, from zero to the maximum.

FEATURES:

- Simple to install with no external power source.
- Top and bottom guided piston.
- Self adjusted to flow and pressure requirements.
- Compact, self-contained, tamper proof and tailored to installation requirements.
- Adjustable for various pressure ranges.

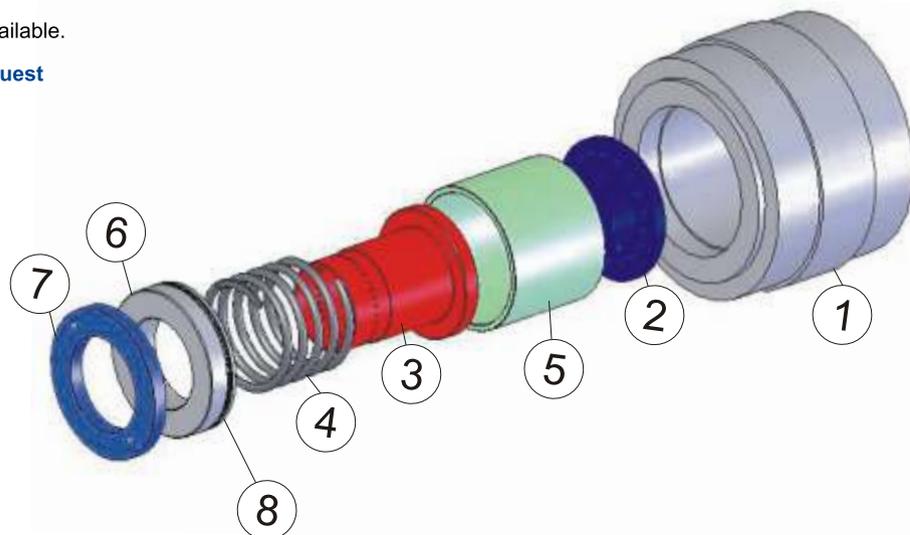
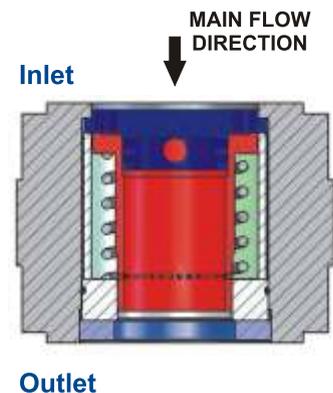
OPERATION:

The balance of hydraulic forces and the spring, positions the PISTON to maintain the required differential pressure, between inlet and outlet.

Item	Qty.	Description	Materials	Specification
01	1	Body	●	●
02	1	Piston guide	Stainless Steel	17-4 PH
03	1	Piston	Stainless Steel	304 St. St. with S.T.
04	1	Spring	Stainless Steel	AISI 302
05	1	Compression Sleeve	Carbon Steel	
06	1	Lower guide	Stainless Steel	17-4 PH
07	1	Fastening Ring	Carbon Steel	
08	1	O-ring	Buna-N #	#

Notes: ● Standard Options: Carbon Steel to ASTM A105; Stainless Steel to ASTM A182 F316
 ▲ Recommended Spares
 # Other seal ring materials available.

Alternate materials available on request



HOW TO SPECIFY AND BUY

The centrifugal pump shall be protected against low flow operating conditions by the **DURCON** Automatic Recirculation Valve model **NVM** which is self contained and fully self actuated by sensing "flow to process". The valve must also prevent reverse flow from process to pump.

Operation of the valve by-pass will be modulating such that the sum of the main flow to the process and the by-pass low will never be less than the required minimum flow of the centrifugal pump.

The pressure reducing elements of the valve will be designed to operate without flashing or cavitation during bypass operation. Any accessories such as multi-hole Orifice Plate or Back Pressure Regulator necessary to prevent flashing or cavitation in the bypass piping will be provided by the valve supplier.

Valve design will incorporate a radial split body, spring assisted check valve and directly actuated modulating bypass control valve. Body will be cast carbon steel to ASTM A216 WCB (or cast stainless steel to ASTM A351 CF8M), internals in stainless steel.

VALVE CODE

Valve model NVM 17: ____ (1) ____ (2) ____ (3) ____ (4) ____ (5) ____ (6)

Housing (1)		Press. Class (2)		Construction (3)		Installation (4)		Size (5)		Trim (6)	
1	Carbon Steel	0	150#	A	ANSI Flanges	V	Vertical	1"	8"	A	High
2	Stainless Steel	1	300#	D	DIN Flanges	H	Horizontal	1,5"	10"	M	Medium
3	Low Temp. Steel	2	600#	S	Special			2"	12"	B	Low
4	Special	3	PN 10/16					3"	14"		
		4	PN 25/40					4"			
		5	PN 64/100					6"			

For other Automatic Recirculation Valves of **DURCON-VICE** line. Consult factory.



AUTOMATIC RECIRCULATION CONTROL VALVE FOR HIGH PRESSURE CENTRIFUGAL PUMPS PROTECTION MODEL VRM/HPM

- The best solution to control the MINIMUM FLOW in medium and high pressure centrifugal pumps.
- Self contained with 8 functions - Benefits:
 - Main flow check valves - Simply installation
 - Bypass flow check valves - Simple
 - Spring process flow sensing - Simple
 - Precise pump protection - Simple
 - Modulating bypass flow control - Avoids large flow shifts
 - Orifice plate
 - Multi stages pressure reduction - 21 stages
 - Avoids cavitation
 - Self actuated
 - Avoids external power supply
- Sizes: 1" to 12"
- Pressure Class: 600# to 2500#
- Construction standard: ANSI B16.34
- Connections: Flanges ANSI, DIN, BS and JIS





Mod. VRM - HPM
1" to 12" - 600# to 2500#



Mod. NVL
2" to 30" - 150# and 300#



AUTOMATIC RECIRCULATION CONTROL VALVE FOR CENTRIFUGAL PUMPS PROTECTION MODEL NVL

- The best solution to control the MINIMUM FLOW in low pressure centrifugal pumps.
- Self contained with 5 functions - Benefits:
 - Main flow check valves - Simply installation
 - Bypass flow check valves - Simple
 - Spring process flow sensing - Simple
 - Precise pump protection - Simple
 - Modulating bypass flow control - Avoids large flow shifts
 - Orifice plate
 - Multi stages pressure reduction of bypass flow - 21 stages
 - Avoids cavitation
 - Self actuated
 - Avoids external power supply
- Sizes: 1" to 30"
- Pressure Class: 150# to 300#
- Construction standard: ANSI B16.34
- Connections: Flanges ANSI, DIN, BS and JIS



The right product for your application.

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