



### OVERVIEW

The 'U' series pulsation dampers have been designed specifically for the dosing industry to meet the needs of dosing pump manufacturers, dosing system builders, and end users in providing a simple, inexpensive, and reliable means of stabilising flows and pressures in dosing systems and reducing pipework vibration. The dampers are available in a wide range of sizes from 0.04 to 20 litres to accommodate all but the very largest of dosing pump outputs and are manufactured in a range of engineering plastics, stainless steel, and exotic alloys to handle virtually any chemical. In addition to the 'U' series damper, Prochem is also able to offer series 'M' and 'F' PTFE membrane and bellows type dampers where operational considerations necessitate these types of unit.

### OPERATION

The Series 'U' damper consists of a vessel which is separated into two sections by an elastomeric bladder. The discharge from the dosing pump is connected directly to the damper via a tee piece with the flow to process via the branch of the tee. The damper on the other side of the bladder is precharged with Nitrogen (or air for low pressures) via the charging valve. This precharge pressure is governed by the working pressure of the system (normally around 80% of the working pressure). When the pump produces a pulsed flow some of the fluid enters the damper, partially compressing the Nitrogen, and some flows on to the delivery point. When the pump is on the return stroke and no flow is produced the compressed Nitrogen discharges the liquid from the damper into the line thus producing an almost constant flow pattern. On subsequent pump strokes the process is repeated thus producing a continuously smooth discharge flow. Pulsation dampers can also be used on the suction side of the pump, these are sized at twice the volume of a pulsation damper on the discharge side and are set at ZERO pressure by slight squeezing the bladder to introduce a slight vacuum.

## Applications

Smoothing of pressure pulses from reciprocating pumps. Prevention of cavitation on long suction lines to reciprocating pumps. Compensation of thermal expansion/ contraction in systems. Reducing water hammer caused by fast closing valves. Allows for smaller pipe sizes because with a dampener installed, from the point where it is mounted onwards, the maximum flow supplied to the circuit practically becomes the mean flow of the pump, which makes it possible to reduce the pipe diameter by approximately 40%. This is because the maximum instantaneous flow of the pump is 2.8 times superior to its medium flow. In some cases this reduction of pipe diameter alone will compensate for the cost of the dampener, this is in addition to the main advantage of stabilizing the circuit's pressure.

## Sizing and Selection

The sizing and selection of pulsation dampers is dependant upon several factors including overall flow rate, pump stroking speed, type of pump, pressures, and desired degree of damping. In order to simplify the selection process the chart below can be used to arrive at a damper size selection with a minimum of calculation. The chart is based upon the displacement per stroke of the pump in cc/stroke and provides figures for simplex (1 piston), duplex (2 piston), and triplex (3 piston) pump types along with a range of admisible residual pulsation.

### Example

A simplex pump (1 piston) running at 120 spm with a discharge capacity of 425 lph requires damping with approximate +/- 4% residual pulsation being acceptable.

To find pump capacity per head 
$$\frac{425 \times 1000}{1 \times 60 \times 120} = 59 \text{ cc/rev.}$$

Thus reading from the simplex pump column, selection would be a size U007 having a residual pulsation of +/- 3% for 45 cc/rev. and +/- 6% for 90 cc/rev. Material selection would then be made based upon operating pressures and materials being handled. +/- 5% is usually the accepted norm.

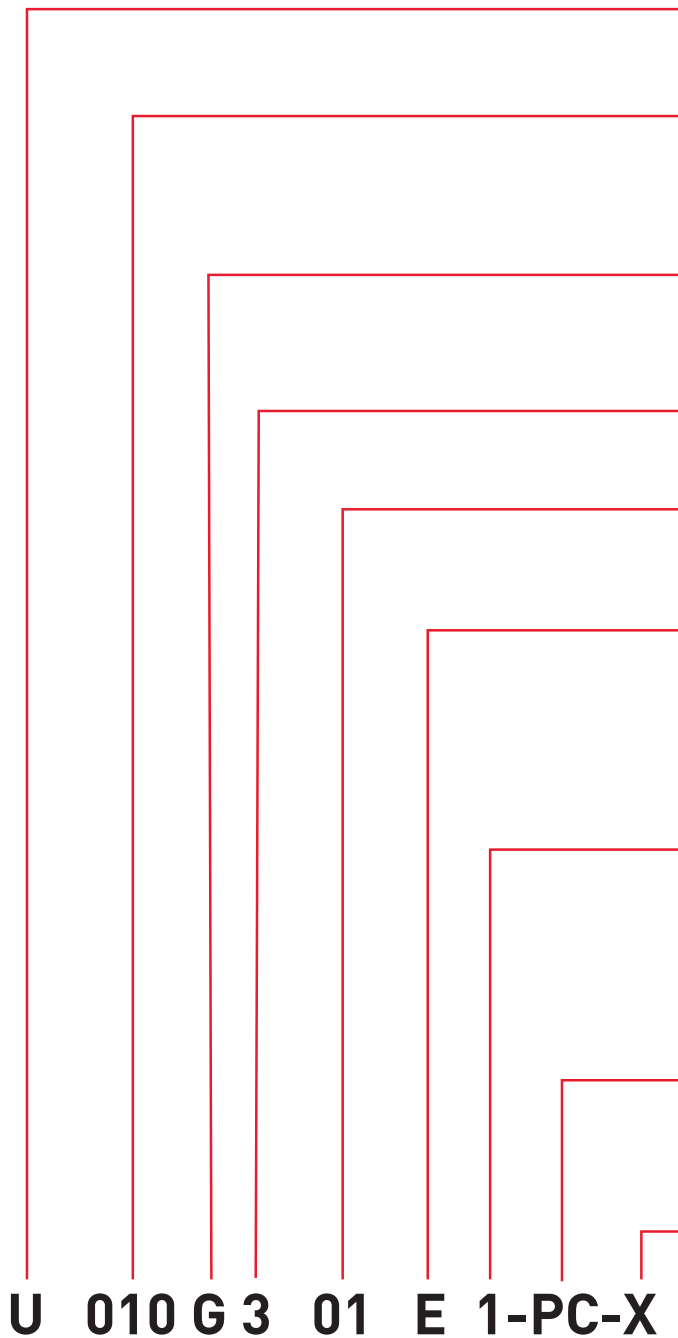
DAMPER TYPE (MODEL)			DAMPER VOLUME (LITRES)			1 PISTON PUMP		2 PISTON PUMP		3 PISTON PUMP	
						ADMISSIBLE RESIDUAL PULSATION (+/-%)					
BLADDER	MEMBRANE	BELLOWS	BLADDER	MEMBRANE	BELLOWS	3%	6%	3%	6%	3%	6%
						CAPACITY PER HEAD (in cc)					
U000			0.04			3	6	7	14	18	36
U001			0.09			7	14	16	32	40	80
U002	M002	F002	0.18	0.2	0.15	14	28	35	70	80	160
U003	M003	F003	0.36	0.4	0.3	25	50	60	120	150	300
U007	M008	F007	0.65	0.8	0.7	45	90	110	220	270	540
U010			0.95			70	140	175	350	420	840
U015	M012	F015	1.5	1.2	1.5	110	220	275	550	660	1320
U030	M030	F030	2.6	2.8	2.6	190	380	475	950	1140	2280
U040	M040	F040	3.8	4	3.8	280	560	700	1400	1680	3360
U060	M060	F050	5.6	5.6	5.6	430	860	1075	2150	2580	5160
U100	M100	F100	10.4	10	10	775	1550	1925	3850	4650	9300
U150		F150	15		15	1120	2240	2800	5600	6720	13440

Note: the table values are approximate and correspond to a constant temperature of the liquid and environment

### Pre-charge Pressure

The pre-charge pressure for pulsation dampers is 0.8 x the discharge pressure. Nitrogen is the preferred filling gas but compressed air can also be used via hand or foot pump. Never fill with oxygen. See our O & M for filling devices. It is recommended the damper is installed vertically with the filling valve on top.

## PULSATION DAMPER DESIGNATIONS



### DAMPER MODEL

U = BLADDER

### SIZE AND VOLUME [LITRES]

000 = 0.04 001 = 0.09 002 = 0.18 003 = 0.36  
 007 = 0.65 010 = 0.95 015 = 1.50 030 = 2.60  
 040 = 3.80 060 = 5.60 100 = 10.4 150 = 15.0  
 250 = 25.0

### CHARGING VALVE TYPE

A = AISI 316 1/4" BSP CHARGING VALVE [STD]  
 B = BRASS NICKEL COATED SCHRADER VALVE  
 F = FLYING GAUGE & VALVE ASSEMBLY [1.5m] \*  
 G = STANDARD GAUGE & VALVE ASSEMBLY \*

### GAUGE SCALE RANGE [BARG] TYPE F & G \*

2 = 0 - 4, 3 = 0 - 6, 4 = 0 - 10, 6 = 0 - 20, 7 = 0 - 40  
 8 = 0 - 60, 9 = 0 - 100, 10 = 0 - 150

### DESIGN PRESSURE X10 = BARG

01 = 10 BARG 18 = 180 BARG 26 = 260 BARG

### BLADDER MATERIAL

N = NITRILE (NBR)  
 E = EPDM  
 V = FPM  
 B = BUTYL

### CONNECTION

1 = SCREWED FEMALE PORT BSP (STANDARD)  
 2 = UNION WITH IMPERIAL PLAIN END  
 3 = UNION WITH METRIC PLAIN END  
 4 = FLANGED ANSI B16.5  
 5 = FLANGED EN 1092-1  
 6 = OVERSIZE UNION WITH IMPERIAL PLAIN END  
 7 = OVERSIZE UNION WITH METRIC PLAIN END  
 8 = TRI-CLAMP [SPECIFY TYPE]  
 9 = SPIGOT/BUTTWELD

### BODY & INSERT MATERIAL

PC = PVC-U  
 PP = POLYPROPYLENE  
 PD = PVDF  
 AI = 316L STAINLESS STEEL  
 AC = CARBON STEEL

### OTHER OPTIONS

S = SUCTION DAMPER  
 NPT = SCREWED FEMALE PORT NPT  
 TP = TWO CONNECTION PORTS  
 BB = BIG BORE SINGLE CONNECTION PORT  
 X = VARIATIONS OTHER THAN ABOVE

	U000	U001	U002	U003	U007	U010	U015	U030	U040	U060	U100	U150
PVC, PP & PVDF PORT SIZE	3/8"	3/8"	1/2"	3/4"	3/4"	1"	1"	1"	1"	1 1/2"	2"	2"
STAINLESS PORT SIZE	3/8"	3/8"	1/2"	1/2"	3/4"	3/4"	3/4"	1"	1"	1 1/2"	2"	2"
STAINLESS MWP BARG (LP)	260	260	180	180	50	40	40	30	30	40	30	30
STAINLESS MWP BARG (MP)	260	260	180	180	120	110	110	110	110	120	100	100

Plastic construction dampers have a maximum working pressure [MWP] of 10 BarG. 20 BarG versions are available on request.

Please see our technical drawings for dimensions, weights, full specification and technical details.

The dampers have been designed, manufactured, inspected and tested as required by the relevant provisions of the Pressure Equipment Directive 2014/68/EU. Other technical standards used: AD-2000 Code for pressure vessels.

SUBJECT TO CHANGE WITHOUT NOTICE