



Water Hammer Arrestors

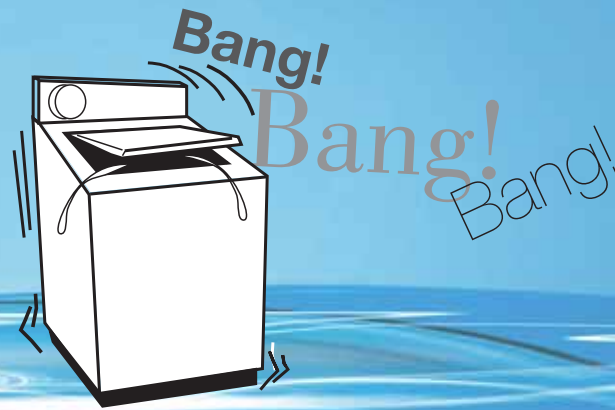
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What is Water Hammer?



The noise from banging pipes is caused by shocks of high speed water flowing in the piping system when a fixture is suddenly closed. Sudden stoppage of the water (a non-compressible liquid) flowing at a given pressure and velocity causes a surge or spike of pressure and is called water hammer. When this occurs a pressure wave travels back through the piping until it finds a point of relief.

Dishwashers, clothes washers, fast closing positive shutoff valves incorporated in the system, all contribute to creating water shock which is not only annoying but damaging to pipes and appliances. Watts Water Hammer Arrestors incorporate a permanent pre-charged sealed air chamber to absorb the shock. The sealed chamber prevents the loss of air to the water and ensures long and trouble-free life. All potential leak points are permanently sealed.

Sizing and Placement

The fixture unit valve shown in the cold and hot water columns of Table A below are utilized in the sizing of water hammer arrestors.

Once the total number of fixture units has been calculated for the hot and cold water branch lines serving a group of fixtures, this number can be applied to the sizing and selection Table B below to determine the appropriate size water hammer arrestor for the hot and cold branch lines.

Table A — Fixture Units Sizing Information

FIXTURE	TYPE OF SUPPLY CONTROL	WEIGHT IN FIXTURE-UNITS					
		PUBLIC			PRIVATE		
		TOTAL	C.W.	H.W.	TOTAL	C.W.	H.W.
Water Closet 1.66 PF	Flush Valve	8	8	—	5	5	—
Water Closet 1.66 PF	Flush Tank	5	5	—	2.5	2.5	—
Pedestal Urinal 1.06 PF	Flush Valve	4	4	—	—	—	—
Stall or Wall Urinal	Flush Valve 1.06 PF	4	4	—	—	—	—
Stall or Wall Urinal	Flush Tank 1.06 PF	2	2	—	—	—	—
Lavatory	Faucet	2	1½	1½	1	1	1
Bathtub	Faucet	4	2	3	2	1½	1½
Shower Head	Mixing Valve	4	2	3	2	1	2
Bathroom Group	Flush Valve Closet	—	—	—	8	8	3
Bathroom Group	Flush Tank Closet	—	—	—	6	6	3
Separate Shower	Mixing Valve	—	—	—	2	1	2
Service Sink	Faucet	3	3	3	—	—	—
Laundry Tubs (1-3)	Faucet	—	—	—	3	3	3
Combination Fixture	Faucet	—	—	—	3	3	3

For additional information, send for ES-15M2.

Table B — Series 15M2 Sizing and Selection

SIZE (DN)		CROSS FIXTURE UNITS	REF. PDI STANDARD
In.	mm		
½	15	1-11	A
¾	20	12-32	B
1	25	33-60	C
1¼	32	61-113	D
1½	40	114-154	E
2	50	155-330	F

2006 Plumbing Code Requirements

UPC-Uniform Plumbing Code

609.10 Water Hammer. All building water supply systems in which quick-acting valves are installed shall be provided with devices to absorb the hammer caused by high pressures resulting from the quick closing of these valves. These pressure-absorbing devices shall be approved mechanical devices. Water pressure-absorbing devices shall be installed as close as possible to quick-acting valves.

IPC-International Plumbing Code

604.9 Water Hammer. The flow velocity of the water distribution system shall be controlled to reduce the possibility of water hammer. A water hammer arrestor shall be installed where quick-closing valves are utilized. Water hammer arrestors shall be installed in accordance with the manufacturer's specifications. Water hammer arrestors shall conform to ASSE 1010.

Series 05

For Light Commercial/Residential Systems



Model 05H-M1
3/4" (20mm) Hose Type
specially designed for
in-line use with
washing machines

Features

- Economical and effective single fixture protection against water pressure shock
- May be installed in concealed locations without access panels
- Factory air charged and not rechargeable
- May be installed in new or existing plumbing systems vertically, horizontally or at any angle

Pressure & Temperature

Operating Pressure: Designed especially for use in light commercial or residential applications on lines up to 150psi (10.6 bar) working pressure.

Temperature Range: 33°F to 180°F (0.5°C - 82°C)

Air Preload: 60psi (4.2 bar)

Standards

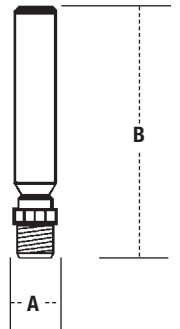


Certified to ASSE 1010 and listed by IAPMO.

Dimensions - Weight

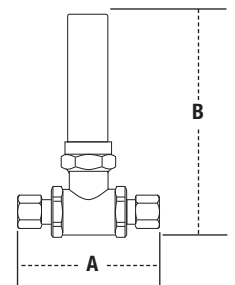
Straight Models

MODEL	SIZE (DN)		CONNECTION TYPE	DIMENSION				WEIGHT	
	in	mm		A		B		lbs.	kgs.
05	3/8	10	NPT	1 1/4	32	5 1/4	133	0.34	0.15
05	1/2	15	NPT	1 1/4	32	5 1/2	140	0.36	0.16
05-CPVC	1/2	15	CPVC	1 1/8	29	4 11/16	118	0.10	0.05
05-H	3/4	20	Hose	2	50	6 3/8	162	0.48	0.20
05H-M1	3/4	20	Hose	3 3/16	81	6 11/16	170	0.60	0.27
05-S	1/2	15	Sweat	1	25	5 1/2	140	0.30	0.14
05-S	3/4	20	Sweat	1	25	4 7/8	124	0.08	0.04
05-C	5/8	16	OD Comp.	1 1/4	32	5 5/8	143	0.40	0.18



Tee Models

MODEL	SIZE (DN)		CONNECTION TYPE	DIMENSION				WEIGHT	
	in	mm		A		B		lbs.	kgs.
05-C-T	1/4	8	OD Comp.	2 3/4	70	4 13/16	122	0.17	0.07
05-C-T	3/8	10	OD Comp.	3	77	4 13/16	122	0.17	0.07
05-CXT	3/8	10	OD Comp. x Reverse Comp. Nut	2 13/16	72	4 13/16	122	0.17	0.07
05-CXT	5/8	16	OD Comp. x Reverse Comp. Nut	3 1/16	78	4 13/16	122	0.18	0.08
05-PEX-T	3/8	10	PEX	2 1/4	58	4 11/16	119	0.12	0.05
05-PEX-T	1/2	15	PEX	2 1/4	58	4 11/16	119	0.12	0.05
05-QC	1/2	15	Quick-Connect	3 5/8	93	7 7/8	187	0.4	0.18
05-QC	3/4	20	Quick-Connect	3 3/2	104	9 3/4	247	0.57	0.26



Models

05 For NPT threaded applications

05-C For compression installation on 1/2" CTS new or retrofit

05-QC Arrestor offered with Quick-Connect Tee

05H-M1 For inline use with washing machines

05-C-T For either 1/4" icemaker or 3/8" lav supply tube installation

05-CXT For direct installation on supply stop either between stub out and stop or between stop and supply tube

05-PEX-T For either 3/8" or 1/2" inline PEX installation

For complete list of models, send for ES-05.

Series 150A

For Residential Systems Only

Features

- Pre-charged air chamber
- Sealed in diaphragm
- Rechargeable
- Stainless steel chamber construction

Operating Pressure: Designed for residential/domestic water systems on lines up to 150psi (10.6 bar) working pressure.

Temperature Range: 33°F to 180°F (0.5°C-82°C)

Maximum Velocity: 10 fps (.93 mps)

Maximum Shock Pressure: 200psi (13.8 bar)

Models

MODEL	DESCRIPTION	SIZE		CONNECTION TYPE
		in.	mm	
150A	Water Hammer Arrestor Only	½"	15	NPT
150A-HA	Water Hammer Arrestor and Fitting	¾"	20	Hose
150HA	Fitting Only	¾"	20	Hose



150A



150A-HA

Dimensions

NOMINAL		LENGTH		FLOW PRESSURE - PSI														
Pipe Size in.	mm	Pipe Up to ft.	m	and Number of 150A valves to install														
				psi 30	bar 2.11	psi 40	bar 2.81	psi 50	bar 3.52	psi 60	bar 4.22	psi 70	bar 4.92	psi 80	bar 5.62	psi 90	bar 6.33	psi 100
½	15	50	15.2	150A	>	>	>	>	>	>	>	>	>	>	2-150A	>	>	>
		75	22.9	150A	>	>	>	>	>	2-150A	>	>	>	>	>	>	>	>
		100	30.5	150A	>	>	>	>	>	2-150A	>	>	>	>	>	>	>	>
¾	20	25	7.6	150A	>	>	>	>	>	>	>	>	>	>	2-150A	>†	>	>
		50	15.2	150A	>	>	>	>	>	2-150A	>	>	>	>	>	>	>	>
		75	22.9	150A	>	>	>	>	>	>	>	>	>	>	>	>	>	>
1	25	25	7.6	150A	>	>	>	>	>	>	>	>	>	>	2-150A	>	>	>
		50	15.2	2-150A	>	>	>	>	>	>	>	>	>	>	>	>	>	>
		75	22.9	2-150A	>	>	>	>	>	>	>	>	>	>	>	>	>	>
1¼	32	25	7.6	2-150A	>	>	>	>	>	>	>	>	>	>	>	>	>	

For additional information, send for ES-150A.

Series 15M2

For Commercial/Residential Systems

Features

- NPT solid hex brass adapter or solder end connection for easy installation
- Approved for installation with no access panel required
- May be installed in new or existing plumbing systems with a standard pipe tee vertically, horizontally or at any angle
- PDI Listed (PDI WH201)
- Maintenance free – unit piston is the only moving part
- Air pre-load is 60 psi (4.2 bar)
- Factory air charged and permanently sealed

Pressure – Temperature

Operating Pressure: Designed to operate on all domestic and commercial lines @150psi (10.6 bar) working pressure.

Temperature Range: 33°F to 180°F (0.5°C to 82°C).

Materials

Bodies: Copper tubing

Pistons: Polypropylene

O-Ring: EPDM

Adapter: Brass

Standards



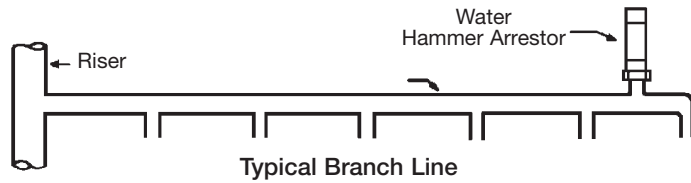
Listed by IAPMO, ASSE 1010 approved, ANSI A112.261M approved, PDI WH201 approved and certified.

Dimensions – Weight

SIZE (DN)		DIMENSIONS				WEIGHT (lbs.)		(kgs.)
		A		B				
		<i>in.</i>	<i>mm</i>	<i>in.</i>	<i>mm</i>			
Threaded								
1/2"	15M2-A	1 1/8"	28.5	5 15/16"	150.9	0.5	0.2	
3/4"	15M2-B	1 3/8"	34.9	8 9/16"	218.0	0.9	0.4	
1"	15M2-C	1 5/8"	41.3	8 13/16"	223.5	1.3	0.6	
1"	15M2-D	2 1/8"	54.0	9 15/16"	252.5	2.0	0.9	
1"	15M2-E	2 1/8"	54.0	12 1/16"	322.5	2.3	1.1	
1"	15M2-F	2 5/8"	66.7	11 5/32"	283.5	2.7	1.2	
Solder								
1/2"	15M2-AS	1 1/8"	210.0	8 1/4"	28.5	0.44	0.2	
3/4"	15M2-BS	1 1/8"	254.0	10	28.5	0.54	0.2	
1"	15M2-CS	1 3/8"	317.5	12 1/2"	34.9	0.92	0.4	
1"	15M2-DS	2 1/8"	280.0	11	54.0	1.63	0.7	
1"	15M2-ES	2 1/8"	343.0	13 1/2"	54.0	1.98	0.9	
1"	15M2-FS	2 1/8"	406.5	16	54.0	2.32	1.1	



Sizing and Placement

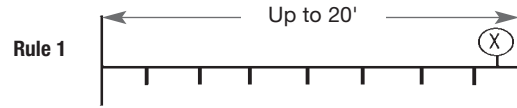


As shown above, it has been established that the preferred location for the water hammer arrestor is at the end of the branch line between the last two fixtures served.

The location of the water hammer arrestor shown above applies to branch lines that do not exceed 20 feet in length, from the start of the horizontal branch line to the last fixture supply on this branch line. When the branch line exceeds the 20 foot length, an additional water hammer arrestor should be used. This practice is best defined by two rules which have been established to cover the placement of water hammer arrestors.

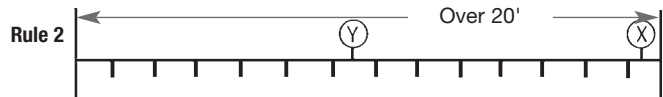
Rule 1 covers multiple fixture branch lines which do not exceed 20 feet length.

Explanation - Fixture unit sizing and selection table is used to select the required PDI unit (water hammer arrestor).



Rule 2 covers multiple fixture branch lines which exceed 20 feet in length.

Explanation - Fixture unit sizing and selection table is used to select the required PDI unit (water hammer arrestor). The sum of the fixture unit rating of units X and Y shall be equal to or greater than the demand of the branches.



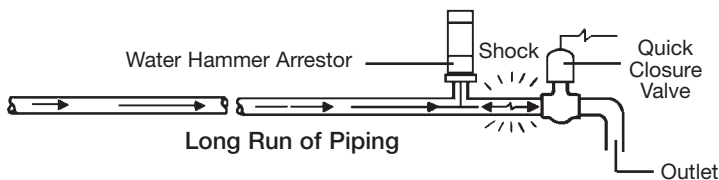
Selection for Long Piping Runs

The majority of sizing and selection applications will involve single and multiple fixture branch lines. These are easily handled with the sizing and selection table. The remainder of the applications involve individual runs of piping to a remote item of equipment. The properly sized water hammer arrestor for such applications can be determined by the tables below.

Ideally, the flow pressure in branch lines serving fixtures should never exceed 55psi. Pressure reducing valves should be installed to maintain proper pressure. When flow pressures are 65 to 85psi the next size water hammer arrestor should be selected. Refer to sizing table for water pressure over 65psi.

All sizing data in this section is based on flow velocities of 10 fps or less. The certification testing was conducted with a velocity of 10 fps to offer assurance that PDI approved units were capable of handling shock of maximum intensity that may be encountered.

When long runs of piping are employed to serve a remote item of equipment, the water hammer arrestor should be located as close as possible to the point of quick closure. At this location, the water hammer arrestor will control the developed energy and prevent the shock wave from surging through the piping system. A typical example of placement is as shown.



Sizing Table

For Water Pressures up to 65psi

LENGTH OF PIPE (ft)	NOMINAL PIPE DIAMETER - IN.					
	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"
25'	A	A	B	C	D	E
50'	A	B	C	D	E	F
75'	B	C	D	AE	F	EF
100'	C	D	E	F	CF	FF
125'	C	D	F	AF	EF	EFF
150'	D	E	F	DF	FF	FFF

Over 65 psi and up to 85psi

LENGTH OF PIPE (ft)	NOMINAL PIPE DIAMETER - IN.						
	of Pipe	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"
25'		B	B	C	D	E	F
50'		B	C	D	E	F	CF
75'		C	D	E	F	CF	FF
100'		D	E	F	CF	EF	EFF
125'		D	E	CF	DF	FF	BFFF
150'		E	F	CF	FF	DF	FFFF

Sizing and Selection Table

SIZE (DN)	MODEL	ORDER CODE	MODEL	ORDER CODE	GROSS FIXTURE UNITS	REF. PDI STANDARD
in. mm	Threaded		Solder			
1/2" 15	15M2-A	0750140	15M2-AS	0750150	1-11	A
3/4" 20	15M2-B	0750141	15M2-BS	0750151	12-32	B
1" 25	15M2-C	0750142	15M2-CS	0750152	33-60	C
1" 25	15M2-D	0750143	15M2-DS	0750153	61-113	D
1" 25	15M2-E	0750144	15M2-ES	0750154	114-154	E
1" 25	15M2-F	0750145	15M2-FS	0750155	155-330	F



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