# WATER HAMMER ARRESTORS

## INTRODUCTION

This instruction manual includes sizing and installation information for FNW water hammer arrestors. The detail presented here is interpreted from The Plumbing and Drainage Institute's *Water Hammer Arrestors* standard PDI-WH 201, revision 1992. It is recommended that this document be reviewed for further sizing, placement and reference data on water hammer arrestors.

## CAUTION

1. Verify that the application does not exceed the pressure or temperature rating of the water hammer arrestor.
2. To ensure safety and to maintain warranty, never modify the water hammer arrestor in any way.
3. Always verify installation, sizing, and use requirements with local plumbing codes.

## STORAGE

**ATTENTION:** If the water hammer arrestors will not be used immediately, the following precautions should be taken:

1. Storage should include protection for threaded or sweat ends so that they are not damaged prior to use.
2. Water hammer arrestors should be protected to safeguard against humidity, moisture, dust, dirt, sand, mud, salt spray, sea water, or other forms of corrosive and erosive environments.

## SIZING

**NOTE:** Sizing recommendations are based on an average flow velocity not exceeding 10 FPS. Ideally, the line pressure in a branch should not exceed 55 PSIG. To maintain proper branch pressure, a water pressure reducing valve, such as the FNW 1201, should be installed. If, however, branch pressures exceed 65 PSIG, the next larger size water hammer arrestor is recommended.

SINGLE AND MULTIPLE FIXTURE BRANCH RUNS 20 FT. AND SHORTER

1. Review the number and type of plumbing fixtures to be protected on a given branch.
2. Using Table 1, determine the total number of fixture-units required by that branch. Note that there may be varying fixture-unit weights depending on whether the branch is a hot water (H.W.) or cold water (C.W.) supply. In addition, be sure to select from the correct application type, either Public or Private Use.
3. Use the total fixture-units to determine the correct size water hammer arrestor in Table 2. In the case of fractional fixture-units, always round up to the nearest whole number.

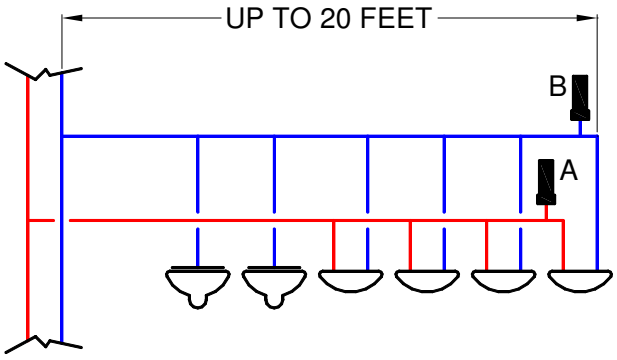
Example 1:

**Cold Water Branch**
2 Flush Valve Water Closets at 10 F.U. ea. ..... 20
4 Lavatories at 1-1/2 F.U. ea. ..... 6
Total C.W. Branch Fixture Units ..... 26

Select P.D.I. "B" Unit

**Hot Water Branch**
4 Lavatories at 1-1/2 F.U. ea. ..... 6
Total H.W. Branch Fixture-Units ..... 6

Select P.D.I. "A" Unit

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MULTIPLE FIXTURE BRANCH RUNS OVER 20 FT.

1. Use the same procedures as above to determine the total fixture-units for a given branch using Table 1.
2. Select two water hammer arrestors from Table 2 whose fixture-unit ratings, when added, are equal to or greater than the demand on the branch. In the case of fractional fixture-units, always round up to the nearest whole number.

Example 2:

**Cold Water Branch**
4 Flush Valve Water Closets at 10 F.U. ea...40
8 Lavatories at 1-1/2 F.U. ea. .....12
Total C.W. Branch Fixture Units .....52

Select Two P.D.I. "B" Units

**Hot Water Branch**
8 Lavatories at 1-1/2 F.U. ea. .....12
Total H.W. Branch Fixture-Units .....12

Select Two P.D.I. "A" Units

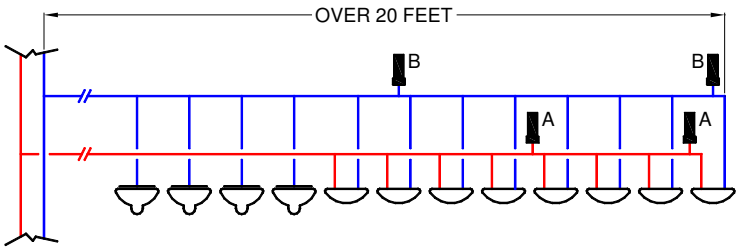



Table 1

| Fixture | Type of Supply Control | Weight in Fixture-Units | | | | | |
|---|---|---|---|---|---|---|---|
| | | Public | | | Private | | |
| | | Total | C.W. | H.W. | Total | C.W. | H.W. |
| Water Closet | Flush Valve | 10 | 10 | - | 6 | 6 | - |
| Water Closet | Flush Tank | 5 | 5 | - | 3 | 3 | - |
| Pedestal Urinal | Flush Valve | 10 | 10 | - | - | - | - |
| Stall or Water Urinal | Flush Valve | 5 | 5 | - | - | - | - |
| Stall or Water Urinal | Flush Tank | 3 | 3 | - | - | - | - |
| Lavatory | Faucet | 2 | 1-1/2 | 1-1/2 | 1 | 1 | 1 |
| Bathtub | Faucet | 4 | 2 | 3 | 2 | 1-1/2 | 1-1/2 |
| Shower Head | Mixing Valve | 4 | 2 | 3 | 2 | 1 | 2 |
| Bathroon Group | Flush Valve Closet | - | - | - | 8 | 8 | 3 |
| Bathroon 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 |

Table 2

| FNW Size | PDI Size Code | | PDI Fixture Units |
|---|---|---|---|
| | SC | SWA | |
| 1/2" | A | A | 1 to 11 |
| 3/4" | B | B | 12 to 32 |
| 1" | C | C | 33 to 60 |
| 1-1/4" | D | D | 61 to 113 |
| 1-1/2" | E | - | 114 - 154 |
| 2" | F | - | 155 - 330 |

LONG PIPING RUNS (25 FT. to 150 Ft.) TO REMOTE EQUIPMENT

1. For branch line pressures under 65 PSIG, select the appropriate water hammer arrestor from Table 3 based on the nominal pipe size and overall length of pipe to the quick shut-off device.
2. For branch line pressures between 65 PSIG and 85 PSIG, select the appropriate water hammer arrestor from Table 4 based on the nominal pipe size and overall length of pipe to the quick shut-off device.

Example 3:

A 2" pipe leads from the main to a process tank that is isolated by a quick closing valve. The overall pipe run to the valve is 98 feet. The line pressure is 60 PSIG and the velocity is 10 FPS.
According to Table 3, two P.D.I "F" units should be installed.
Had the line pressure been 70 PSIG, two P.D.I. "F" units and one P.D.I. "E" units should have been selected.

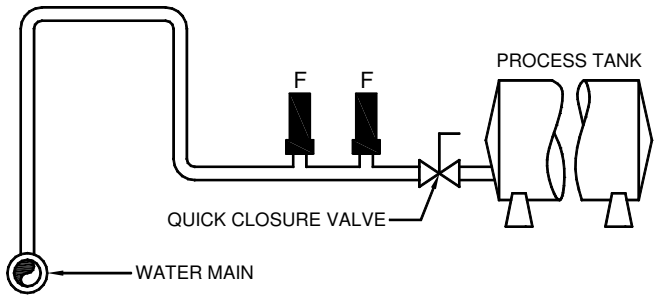



Table 3

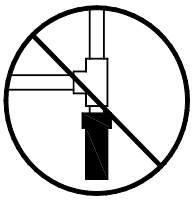
| Water Pressure Up to 65 PSIG | | | | | | |
|---|---|---|---|---|---|---|
| Length of Pipe | Nominal Pipe Diameter | | | | | |
| | 1/2" | 3/4" | 1" | 1-1/4" | 1-1/2" | 2" |
| 25' | A | A | B | C | D | E |
| 50' | A | B | C | D | E | F |
| 70' | B | C | D | AE | F | EF |
| 100' | C | D | E | F | CF | FF |
| 125' | C | D | F | AF | EF | EFF |
| 150' | D | E | F | DF | FF | FFF |

Table4

| Water Pressure 65 PSIG to 85 PSIG | | | | | | |
|---|---|---|---|---|---|---|
| Length of Pipe | Nominal Pipe Diameter | | | | | |
| | 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 |
| 70' | 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 | DFF | FFFF |

## INSTALLATION

**PLACEMENT:** Water hammer arrestors should be placed as close to the source of shock as possible. Both hot and cold water branches should have arrestors. There should be an unobstructed path from the shock source to the water hammer arrestor. In figure 1, two shock waves are allowed at points A and B. Figure 2 shows the proper vertical installation, and figure 3 shows the proper horizontal installation. Water hammer arrestors should not be installed in the inverted position.



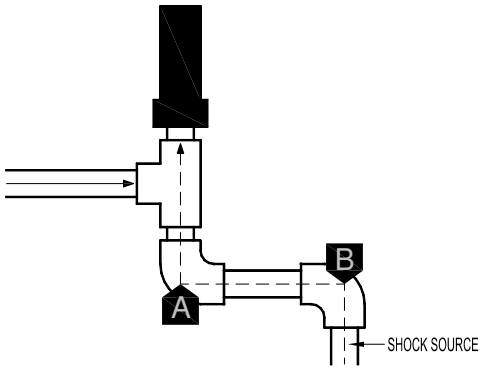



Fig. 1

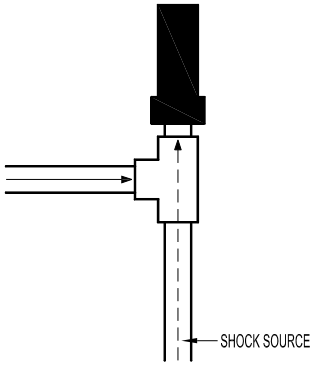



Fig. 2

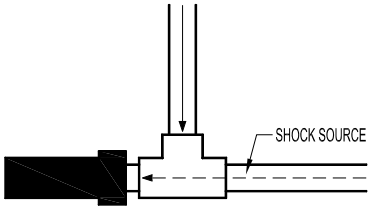



Fig.3

In multiple fixture lines, the water hammer arrestor should be installed between the last two fixtures of the branch (as in example 1). On multiple fixture lines requiring two arrestors, one unit should be installed at the mid position of the branch, and the second arrestor should be installed between the last two fixtures of the branch (as in example 2).

## WARRANTY

1. **LIMITED LIFETIME WARRANTY:** FNW water hammer arrestors are guaranteed for the life of the system they are installed. This warranty is limited to residential and commercial applications and subject to proper sizing and installation. ANY MODIFICATION OR TAMPERING OF THE PRODUCT WILL RESULT IN THIS WARRANTY BEING NULL AND VOID.

2. **REMEDIES:** Seller shall repair or replace, at its option, any non-conforming or otherwise defective product, upon receipt of notice from Buyer during the Manufacturer's warranty period at no additional charge. SELLER HEREBY DISCLAIMS ALL OTHER EXPRESSED OR IMPLIED WARRANTIES, INCLUDING, WITHOUT LIMITATION, ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS OR FITNESS FOR A PARTICULAR PURPOSE.

3. **LIMITATION OF LIABILITY:** UNDER NO CIRCUMSTANCES SHALL EITHER PARTY BE LIABLE TO THE OTHER FOR INCIDENTAL, PUNITIVE, SPECIAL OR CONSEQUENTIAL DAMAGES OF ANY KIND. BUYER HEREBY ACKNOWLEDGES AND AGREES THAT UNDER NO CIRCUMSTANCES, AND IN NO EVENT, SHALL SELLER'S LIABILITY, IF ANY, EXCEED THE NET SALES PRICE OF THE DEFECTIVE PRODUCT(S) PURCHASED DURING THE PREVIOUS CONTRACT YEAR.

4. **LABOR ALLOWANCE:** Seller makes NO ADDITIONAL ALLOWANCE FOR THE LABOR OR EXPENSE OF REPAIRING OR REPLACING DEFECTIVE PRODUCTS OR WORKMANSHIP OR DAMAGE RESULTING FROM THE SAME.

5. **RECOMMENDATIONS BY SELLER:** Seller may assist Buyer in selection decisions by providing information regarding products that it manufacturers and those manufactured by others. However, Buyer acknowledges that Buyer ultimately chooses the product's suitability for its particular use, as normally signified by the signature of Buyer's technical representative. Any recommendations made by Seller concerning the use, design, application or operation of the products shall not be construed as representations or warranties, expressed or implied. Failure by Seller to make recommendations or give advice to Buyer shall not impose any liability upon Seller.

6. **EXCUSED PERFORMANCE:** Seller will make a good faith effort to complete delivery of the products as indicated by Seller in writing, but Seller assumes no responsibility or liability and will accept no back-charge for loss or damage due to delay or inability to deliver, caused by acts of God, war, labor difficulties, accidents, inability to obtain materials, delays of carriers, contractors or suppliers or any other causes of any kind whatever beyond the control of Seller. Under no circumstances shall Seller be liable for any special, consequential, incidental, or indirect damages, losses, or expense (whether or not based on negligence) arising directly or indirectly from delays or failure to give notice of delay.