

# ONICON Insertion Turbine Flow Meters

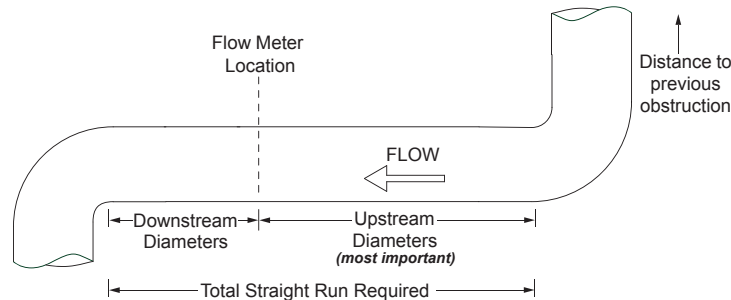
## Single Turbine vs. Dual Turbine Selection Criteria



The purpose of this guide is to provide customers and specifying engineers with information about how to choose between ONICON's F-1100 Series Single Turbine Meters vs. F-1200 Series Dual Turbine Meters.



**How to choose between F-1100 and F-1200 Series Meters:**  
Choosing between the F-1100 or F-1200 Series is primarily related to the amount of straight pipe run available. The straight pipe run requirement for any flow meter refers to the number of "pipe diameters" required before and after the meter. Pipe size, types of upstream obstructions and application type can also be factors in the choice\*.



In a location with enough straight run to provide fully conditioned flow, the F-1100 and F-1200 Series Meters will provide the same level of accuracy. The F-1200 Series Meters maintain accuracy in shorter pipe runs by using two contra-rotating turbines to cancel out the effects of swirl in the flow profile, as well as doubling the velocity sampling area.

**Selection Criteria:** Consider the selection criteria below when choosing between the single and dual turbine configuration. Please note that ONICON's recommendations on straight pipe requirements are conservative to provide accurate results with "real world" piping conditions. Contact ONICON to discuss applications with less than the recommended straight pipe run.

<b>F-1100 Series Single Turbine Flow Meter</b>	<ul style="list-style-type: none"> <li>• Pipe sizes: Carbon steel - 1.25 inch and larger Copper - 1 inch and larger</li> <li>• Straight pipe runs of 25 or more pipe diameters</li> <li>• May be suitable with 15 to 25 pipe diameters*</li> </ul>
<b>F-1200 Series Dual Turbine Flow Meter</b>	<ul style="list-style-type: none"> <li>• Pipe sizes: 2½" and larger</li> <li>• Straight pipe less than 25 pipe diameters*</li> </ul>
<b>FB-1200 Series Bi-directional Flow Meter</b>	<ul style="list-style-type: none"> <li>• Bi-directional flow application such as a CHW decoupler</li> <li>• Pipe sizes: 2½" and larger</li> </ul>

### How to determine the available straight pipe diameters:

For each application, locate the longest straight, unobstructed section of pipe (no bends, tees, valves, other insertion probes, size transitions).

The longest straight pipe run in inches divided by nominal pipe size in inches equals "diameters of straight pipe."

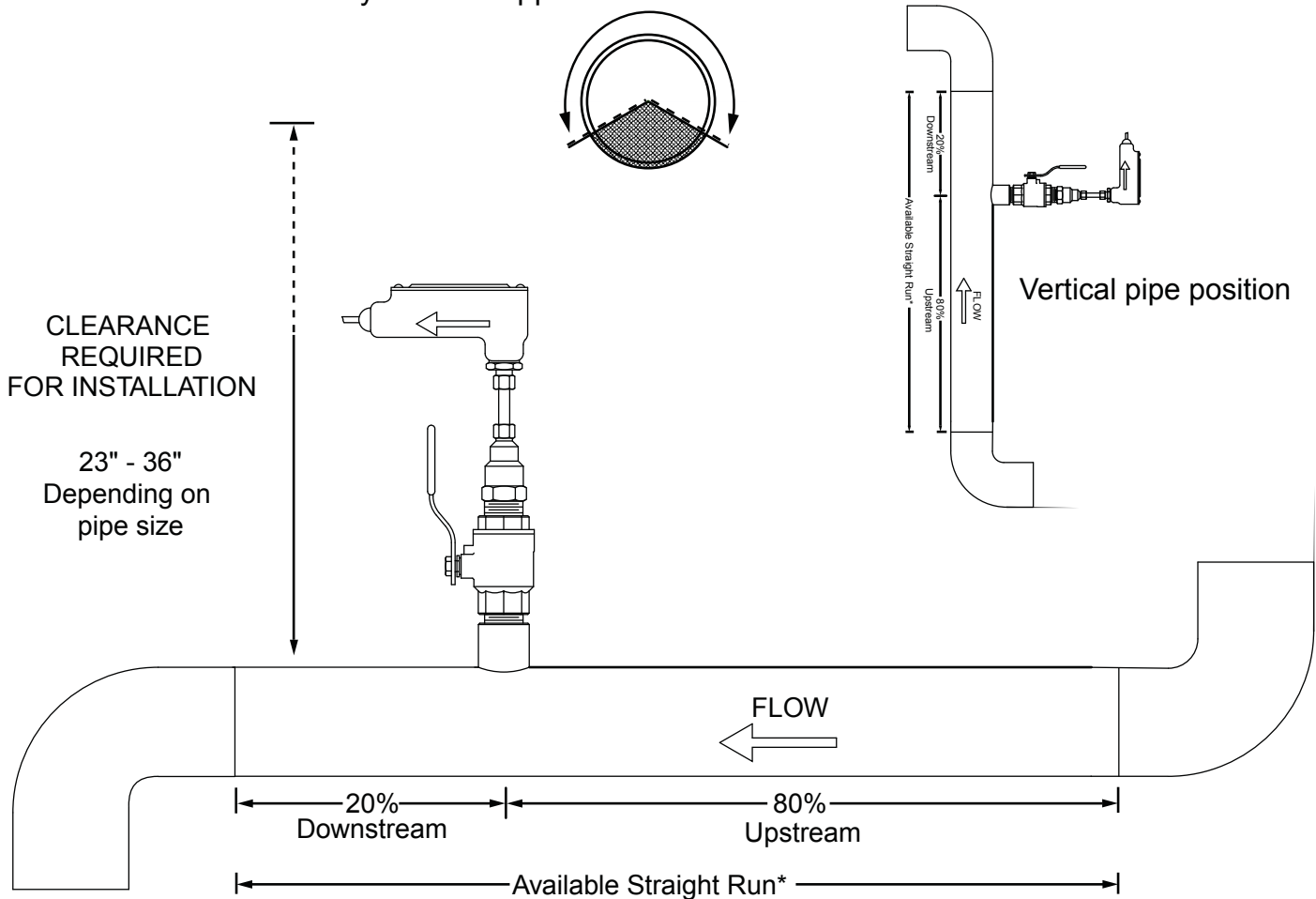
For closed loop applications, consider both the supply and return lines as possible locations.

\* Refer to the following pages for additional information about straight pipe recommendations and site selection guidelines:  
Discussion on Straight Pipe Run Recommendations and/or Flow Meter Site Selection Guidelines

# FLOW METER SITE SELECTION GENERAL GUIDELINES



- **Install in vertical or horizontal pipe.**
- For horizontal pipe position meter anywhere in upper 240°.



\*See following pages for model specific straight run requirements.

## EVALUATING UPSTREAM PIPING CONDITIONS

Better ↑ ↓ Worse	Straight Pipe
	Single Bend
	Pipe Reduction or Enlargement
	Outflowing Tees
	Multiple Bends in Same Plane
	Multiple Bends Out of Plane
	Inflowing Tees
	Control Valves

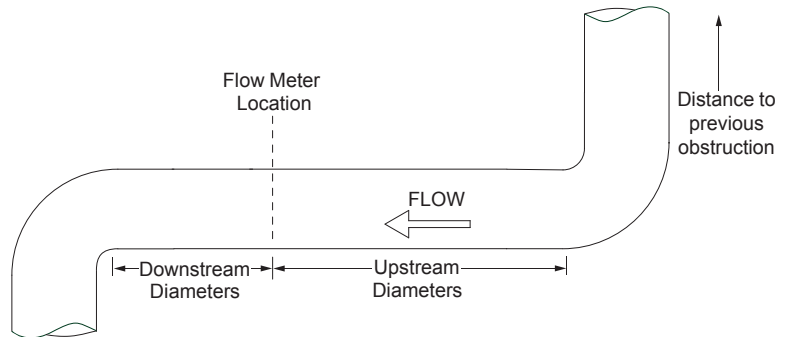
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For each application, locate the longest straight, unobstructed section of pipe (no bends, tees, valves, other insertion probes, size transitions). The longest straight pipe run in inches divided by nominal pipe size in inches equals "diameters of straight pipe." For closed loop applications, consider both the supply and return lines as possible locations.

# Discussion on Straight Pipe Run Recommendations



All flow meter types have a requirement for straight pipe runs upstream and downstream of the meter location to maintain the specified accuracy. This is typically expressed as a number of pipe diameters. There is a standard "10 up / 5 down" rule in the industry that many manufacturers refer to as the "typical" installation. This is a little misleading, due to the fact that this "typical" installation allows for only a single 90 degree bend upstream of the meter location, with 9 or more pipe diameters upstream of the elbow! In reality, these conditions rarely exist in a mechanical room. With multiple obstructions upstream, the "10 up / 5 down" rule simply doesn't work for most insertion meter types.



## ONICON Recommendations

ONICON has chosen to make conservative recommendations for straight pipe runs that address the majority of piping conditions encountered in typical HVAC applications. Following are ONICON's recommendations, along with a discussion on applications where insufficient straight pipe runs exist:

ONICON Single Turbine Meter	Recommendation to maintain specified accuracies:	20 pipe diameters upstream, 5 diameters downstream, for the majority of pipe materials and upstream conditions. Will ONICON's single turbine meter perform well using the industry's standard "10 up/ 5 down" rule? YES, as long as it really is the defined "typical" installation with only a single bend upstream and 9 diameters of straight pipe upstream of the bend.
	What happens in shorter pipe runs?	The error caused by short pipe runs depends on the pipe size, the the specific type/quantity of obstructions, and their proximity to each other. Contact ONICON for installation recommendations on specific applications.
ONICON Dual Turbine Meter	Recommendation to maintain specified accuracies:	<b>10 pipe diameters upstream, 5 diameters downstream, for the majority of pipe materials and upstream conditions.</b>
	What happens in shorter pipe runs?	With ONICON's patented contra-rotating dual turbines, error caused by swirl is virtually canceled out, allowing significantly improved accuracy when compared to other meter types. For most installations with less than 10 pipe diameters upstream, our experience has shown that the dual turbine meter provides accurate, repeatable results. Contact ONICON for installation recommendations on specific applications.

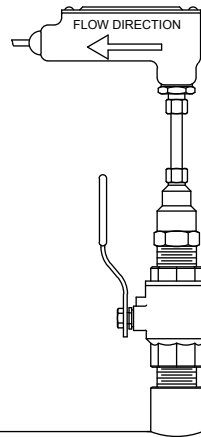
## Series F-1100 Single Turbine Flow Meters

### GENERAL PRACTICES

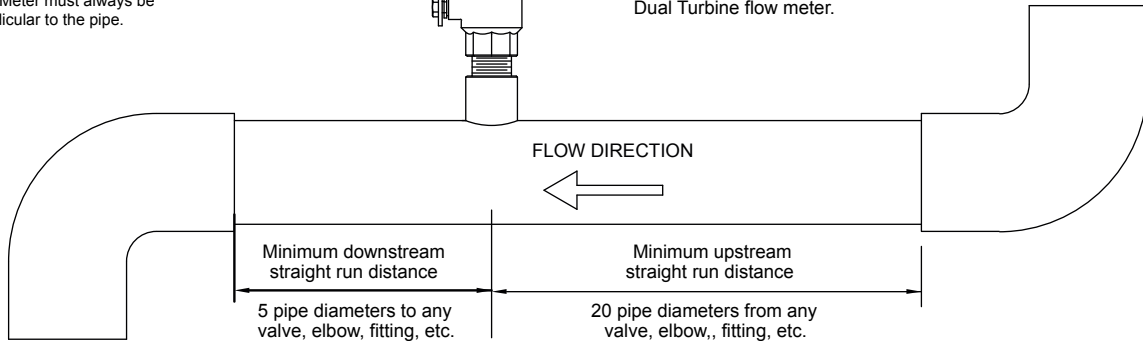


Horizontal Run Pipe

Installation in vertical run pipes is also acceptable. Meter must always be perpendicular to the pipe.



- 1) For best results, install the flow meter in a straight run of pipe, free of bends, tees, valves, transitions, and obstructions for a distance of 20 pipe diameters upstream and 5 diameters downstream.
- 2) Longer straight runs may be required in applications where the meter is placed downstream from devices which cause unusual flow profile disruption or swirl; for example, modulating valves or two elbows in close proximity and out of plane, etc.
- 3) If there is insufficient straight run, allow 80% of the run upstream and 20% of the run downstream. If the total length of straight run is less than 20 diameters, performance may seriously degrade and consideration should be given to changing to the series F-1200 Dual Turbine flow meter.



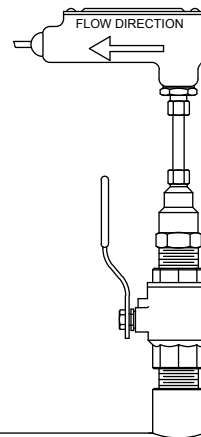
## Series F-1200 Dual Turbine Flow Meters

### GENERAL PRACTICES



Horizontal Run Pipe

Installation in vertical run pipes is also acceptable. Meter must always be perpendicular to the pipe.



- 1) For best results, install the flow meter in a straight run of pipe, free of bends, tees, valves, transitions, and obstructions for a distance of 10 pipe diameters upstream and 5 diameters downstream.
- 2) Longer straight runs may be required in applications where the meter is placed downstream from devices which cause unusual flow profile disruption or swirl; for example, modulating valves or two elbows in close proximity and out of plane, etc.
- 3) If there is insufficient straight run, allow 80% of the run upstream and 20% of the run downstream. If the total length of straight run is less than 12 diameters, performance may seriously degrade.

