

PMT-CI

TECHbrief

Wyatt Badger Lo-Loss® Flow Tubes
Cast Iron Primary Elements



FEATURES:

- **Lowest Pressure Loss**
- **Short Laying Length**
- **Economical Design**
- **Best Documented Flow Tube on the Market**

Description

The cast iron Wyatt Engineering Lo-Loss® meter is a differential-producing flow tube that maintains its accuracy over a wide range of flow rates. The hydraulic shape of the **PMT-CI** Lo-Loss® meter incurs a lower permanent pressure loss than any other differential producing flow device. The **PMT-CI** can be provided with 125-lb flanges. The ductile iron **PMT-DI** can be provided with either 125-lb or 250-lb flanges.

Application

The cast iron PMT series of Lo-Loss® meters is designed to accurately and reliably measure the flow rates of water, wastewater, sludge, clean fluids, and gases in full pipe conditions. The PMT series of meters is ideally suited to applications where permanent pressure loss must be kept to a minimum, such as in gravity-fed systems, or where a savings due to lower pumping costs can be realized. The model **PMT-C** is designed for rate-of-flow control applications, while the **PMT-S** incorporates a rugged design for cleaning the pressure taps for solids-bearing fluids. The **PMT-SC** is a flow controller for use with contaminated fluids.

Flow Measurement Accuracy

For pipe Reynolds numbers greater than 100 000 and a normalized piping configuration, Wyatt's Badger **PMT-CI** Lo-Loss® meter provides a flow measurement accuracy of $\pm 0.25\%$ with independent flow calibration and $\pm 1.00\%$ without flow calibration.

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Technical Specifications

Accuracy

For pipe Reynolds numbers greater than 75 000 and normalized piping, the Lo-Loss® flow meter provides a flow measurement uncertainty of:

- ± 1.00% for standard QS9001 calibrated meters and
- ± 0.25% for flow calibrated meters.

Pressure Loss

The permanent pressure loss of the Lo-Loss®, expressed as a percentage of the differential pressure, is the lowest of any differential producing primary element.

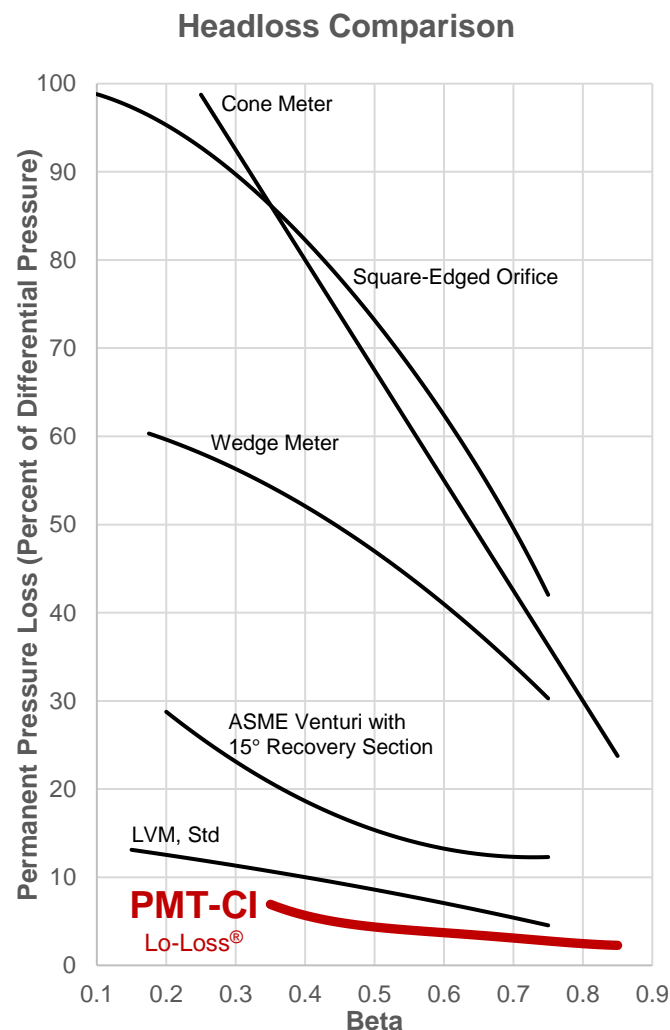


Figure 1

Beta Ratio

Wyatt Engineering can furnish the Lo-Loss® meter with a wide range of diameter ratios (d/D). By custom designing a Lo-Loss® meter for your application's flow conditions, Wyatt can provide an accurate and reliable primary element with low permanent pressure loss.

Temperature Range

The cast iron series of Lo-Loss® meters can handle process temperatures between -20 °F and +400 °F (-28 °C and +200 °C).

Pressure Range / End Connections

Flanged end connections per ANSI B16.1 for 125 PSIG and 250 PSIG service are available. A variety of other end connections is also available including, mechanical joint ends per AWWA C110 or C111, flexible joints, and plain-end designs. Inquire about other options to meet your needs.

Piping Requirements

Designed for full-pipe flow, Lo-Loss® meters may be mounted either horizontally, inclined, or vertically. For recommended upstream piping, refer to the Wyatt Engineering Technical Manual for the Lo-Loss® Meter for recommended upstream piping.

Energy Considerations

Figure 1 compares the permanent pressure loss of the Lo-Loss® design with that of other primary flow elements. Figure 2 illustrates the reduced pumping costs that are realized when using a Lo-Loss® Meter in a typical example. The pressure recovery of the Wyatt Lo-Loss® Meter leads to reduced pumping costs. High beta ratio Lo-Loss® Meters will recover up to 97.5% of the differential pressure produced. This is two to four times better than classical Venturi devices, as well as most modified Venturi meters.

Using Venturi tubes instead of orifice plates yields significant savings, and using the Lo-Loss® meter instead of Venturi tubes can realize further savings. For over 60 years, engineers have given their clients the benefits of efficiency and accuracy by doing just that.

Annual Pumping Cost Savings

Comparison of Differential Producers

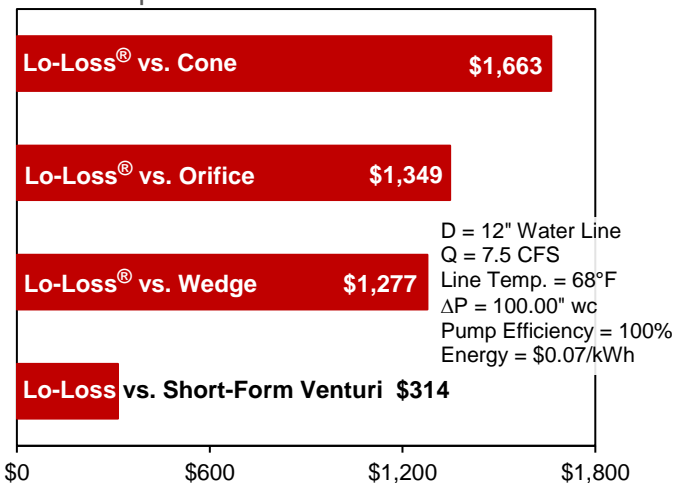


Figure 2, Using the Lo-Loss® Meter Saves in Pumping Costs

PMT-CI Sizing Table



Inlet Diameter		Throat Diameter		Beta Ratio	Overall Length		Outlet Diameter		ΔP = Differential Pressure of 100" wc (24.864 kPaD)						
									Water Flow at 60 °F (16 °C)				ΔH = Headloss		
(inches)	(mm)	(inches)	(mm)		(inches)	(mm)	(inches)	(mm)	US GPM	US MGD	LPS	m ³ /d	R ₉₀ (10 ⁻³)	in. wc	kPa
3.00	76	1.609	40.87	0.5363	7.35	187	2.50	64	128.00	0.184	8.076	697.73	120	4.1	1.02
3.00	76	1.798	45.67	0.5993	6.65	169	2.55	65	160.13	0.231	10.102	872.85	150	3.7	0.92
3.00	76	2.171	55.14	0.7237	5.25	133	2.70	69	239.60	0.345	15.116	1306.1	225	2.9	0.73
4.00	102	1.750	44.45	0.4375	11.35	288	3.30	84	152.55	0.220	9.624	831.53	107	5.0	1.25
4.00	102	2.203	55.96	0.5508	9.15	232	3.35	85	239.94	0.346	15.138	1307.9	169	4.0	0.99
4.00	102	2.814	71.48	0.7035	6.80	173	3.60	91	399.71	0.576	25.218	2178.8	282	3.1	0.76
6.00	152	2.529	64.24	0.4215	16.25	413	4.85	123	319.31	0.460	20.145	1740.5	150	5.3	1.31
6.00	152	3.114	79.10	0.5190	14.00	356	5.00	127	479.66	0.691	30.262	2614.6	225	4.2	1.05
6.00	152	4.000	101.60	0.6667	9.75	248	5.20	132	799.94	1.152	50.468	4360.5	376	3.3	0.82
6.00	152	4.428	112.47	0.7380	9.25	235	5.60	142	1002.7	1.444	63.261	5465.8	471	2.8	0.71
8.00	203	3.466	88.04	0.4333	21.00	533	4.85	123	598.73	0.862	37.774	3263.7	211	5.1	1.27
8.00	203	4.018	102.06	0.5023	19.00	483	5.00	127	799.21	1.151	50.422	4356.5	282	4.3	1.08
8.00	203	4.919	124.94	0.6149	15.50	394	5.20	132	1200.2	1.728	75.718	6542.1	423	3.6	0.90
8.00	203	5.978	151.84	0.7473	11.60	295	5.60	142	1835.5	2.643	115.80	10005.3	647	2.8	0.69
10.00	254	3.991	101.37	0.3991	27.50	699	8.00	203	798.13	1.149	50.354	4350.6	225	5.7	1.41
10.00	254	4.919	124.94	0.4919	24.00	610	8.35	212	1198.6	1.726	75.621	6533.6	338	4.4	1.10
10.00	254	6.343	161.11	0.6343	17.00	432	8.65	220	2000.3	2.880	126.20	10903.5	564	3.5	0.87
10.00	254	6.907	175.44	0.6907	13.75	349	18.65	474	2399.1	3.455	151.36	13077.2	676	3.2	0.79
12.00	305	4.892	124.26	0.4077	32.00	813	9.70	246	1197.4	1.724	75.545	6527.1	281	5.5	1.37
12.00	305	6.966	176.94	0.5805	24.50	622	10.50	267	2400.8	3.457	151.47	13086.7	564	3.8	0.95
12.00	305	8.000	203.20	0.6667	18.75	476	10.80	274	3199.8	4.608	201.87	17441.9	752	3.3	0.82
14.00	356	5.600	142.24	0.4000	38.00	965	11.25	286	1571.1	2.262	99.124	8564.3	316	5.7	1.41
14.00	356	6.958	176.73	0.4970	31.50	800	11.55	293	2397.4	3.452	151.25	13068.4	483	4.4	1.09
14.00	356	8.044	204.32	0.5746	28.50	724	12.15	309	3200.5	4.609	201.92	17446.1	644	3.9	0.96
14.00	356	9.757	247.83	0.6969	24.00	610	13.80	351	4795.8	6.906	302.57	26142.0	966	3.1	0.78
14.00	356	10.328	262.33	0.7377	20.00	508	13.00	330	5454.3	7.854	344.11	29731.1	1098	2.8	0.71
16.00	406	6.932	176.07	0.4333	40.90	1039	13.10	333	2394.9	3.449	151.10	13054.7	422	5.1	1.27
16.00	406	8.036	204.11	0.5023	37.00	940	13.50	343	3196.8	4.603	201.69	17425.9	563	4.3	1.08
16.00	406	9.838	249.89	0.6149	25.90	658	13.35	339	4800.6	6.913	302.87	26168.3	846	3.6	0.90
16.00	406	11.255	285.88	0.7034	22.90	582	14.30	363	6394.1	9.208	403.41	34854.3	1126	3.1	0.77
18.00	457	8.011	203.48	0.4451	45.00	1143	14.80	376	3193.6	4.599	201.48	17408.2	500	4.9	1.23
18.00	457	8.984	228.19	0.4991	41.65	1058	15.15	385	3996.3	5.755	252.13	21783.9	626	4.4	1.08
18.00	457	9.849	250.16	0.5472	38.30	973	15.50	394	4795.7	6.906	302.56	26141.1	751	4.0	1.00
18.00	457	11.350	288.29	0.6306	27.40	696	15.35	390	6401.4	9.218	403.86	34893.8	1002	3.5	0.88
18.00	457	12.618	320.50	0.7010	28.35	720	16.50	419	8030.5	11.56	506.65	43774.2	1258	3.1	0.77
20.00	508	8.959	227.56	0.4480	49.95	1269	16.50	419	3992.7	5.750	251.90	21764.3	563	4.9	1.22
20.00	508	9.839	249.91	0.4920	46.70	1186	16.80	427	4795.4	6.905	302.54	26139.8	676	4.4	1.10
20.00	508	11.377	288.98	0.5689	40.90	1039	17.35	441	6401.1	9.218	403.84	34892.1	902	3.9	0.97
20.00	508	13.813	350.85	0.6907	31.70	805	18.20	462	9594.7	13.82	605.33	52300.5	1352	3.2	0.79
24.00	610	9.783	248.49	0.4076	62.90	1598	19.45	494	4788.7	6.896	302.12	26103.1	562	5.5	1.37
24.00	610	11.349	288.26	0.4729	57.65	1464	20.35	517	6390.2	9.202	403.16	34832.7	750	4.6	1.14
24.00	610	13.931	353.85	0.5805	45.50	1156	20.45	519	9601.8	13.83	605.78	52339.1	1128	3.8	0.95
24.00	610	16.000	406.40	0.6667	33.50	851	20.55	522	12799	18.43	807.49	69767.5	1503	3.3	0.82
24.00	610	17.677	449.00	0.7365	33.50	851	20.25	514	15970	23.00	1007.53	87050.3	1876	2.9	0.71
30.00	762	12.645	321.18	0.4215	77.30	1963	24.40	620	7982.7	11.50	503.63	43513.7	750	5.3	1.31
30.00	762	16.086	408.58	0.5362	64.60	1641	25.70	653	12794	18.42	807.16	69738.6	1202	4.1	1.02
30.00	762	17.975	456.57	0.5992	57.60	1463	26.35	669	16004	23.05	1009.67	87235.5	1504	3.7	0.92
30.00	762	21.711	551.46	0.7237	43.20	1097	27.75	705	23962	34.51	1511.79	130619	2251	2.9	0.73
36.00	914	16.022	406.96	0.4451	89.50	2273	29.65	753	12774	18.39	805.93	69632.6	1000	4.9	1.23
36.00	914	19.705	500.51	0.5474	75.90	1928	31.00	787	19196	27.64	1211.09	104639	1503	4.0	1.00
36.00	914	22.004	558.90	0.6112	67.20	1707	31.85	809	24007	34.57	1514.59	130860	1880	3.6	0.91
36.00	914	25.183	639.65	0.6995	55.10	1400	33.00	838	31973	46.04	2017.17	174284	2503	3.1	0.77
42.00	1067	22.023	559.38	0.5244	91.90	2334	35.85	911	23987	34.54	1513.33	130752	1610	4.2	1.04
42.00	1067	25.414	645.52	0.6051	79.40	2017	37.05	941	32006	46.09	2019.27	174465	2148	3.7	0.91
42.00	1067	30.664	778.87	0.7301	59.00	1499	38.95	989	47923	69.01	3023.44	261225	3216	2.9	0.72
48.00	1219	19.567	497.00	0.4076	125.50	3188	38.85	987	19157	27.59	1208.60	104423	1125	5.5	1.37
48.00	1219	25.437	646.10	0.5299	103.90	2639	41.05	1043	31995	46.07	2018.59	174406	1879	4.1	1.03
48.00	1219	31.045	788.54	0.6468	82.90	2106	43.05	1093	48007	69.13	3028.78	261686	2819	3.4	0.85
48.00	1219	35.353	897.97	0.7365	69.50	1765	45.00	1143	63874	91.98	4029.84	348178	3751	2.9	0.71

This sizing table can be used as a guide in choosing the proper PMT-CI. Depending on the application details, a more appropriate selection, or a more accurate estimation of performance, may be available. Wyatt Engineering encourages users to contact their local Wyatt representatives, or call us directly, for definitive sizing information.

Incompressible Flow

$\Delta P_N = 100 (Q_N / Q)^2$
 $\Delta H_N = \Delta H (Q_N / Q)^{1.88}$
 $Q_N = Q (\Delta P / 100)^{0.5}$

Examples:

For a 30.00" x 21.711" PMT-CI, find
 ΔP at 50 000 US GPM
 ΔH at 50 000 US GPM
 Q_N at 750" wc

Solutions:

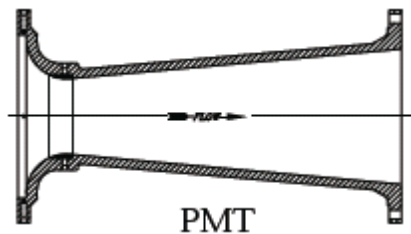
Found using the "Incompressible Flow Relationships"
 $\Delta P_N = 100 (50 000 / 23 962)^2 = 435.41"$ wc
 $\Delta H_N = 2.9 (50 000 / 23 962)^{1.88} = 11.6"$ wc
 $Q_N = 23 962 (750 / 100)^{0.5} = 65 623$ US GPM

Available Options

WYATT

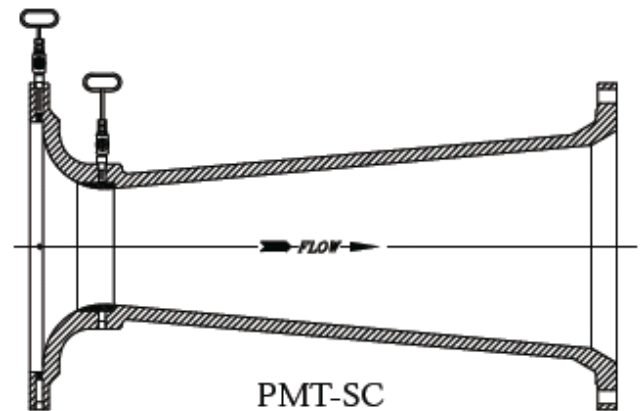
The cast iron Lo-Loss[®] is designed to measure the flow of gases, water, wastewater, sludge, and slurry flows in full pipes. The iron Lo-Loss[®] design can be provided in four models, depending on your application.

Model PMT-CI is a cast iron Lo-Loss[®] meter designed for liquid and gas flow measurement. A variety of throat materials are available. Valves can be direct-coupled downstream for control purposes without loss of accuracy, as can other common fittings. The Lo-Loss[®] can be supplied with flanges, mechanical joints, or plain ends. Typical throat materials are 304 and 316 stainless steel. For ductile iron designs, reference our model **PMT-DI**.



Model PMT-S is a flanged primary element designed for wastewater, sludge, slurry, or other fluids with suspended solids. Manual vent cleaners are provided as standard; automatic vent cleaners or a sealed diaphragm system are available as options. Inspection ports and water purge systems, either continuous or timed, are also available.

Model PMT-SC is a rate-of-flow controller designed for use in applications where the line fluid contains suspended solids. The primary element is provided with vent cleaners or a purge system and will accept a butterfly valve bolted directly to the downstream flange. This allows the PMT-SC to be used in many applications where other standard Venturi or flow tubes cannot be used.



Model PMT-C is a flanged cast iron primary element designed to utilize a direct-coupled butterfly valve in a rate-of-flow controller for liquid or gas service. The direct-coupling of the butterfly valve will not affect the discharge coefficient of the primary element. The meter outlet can be modified to accommodate a valve one or more line sizes smaller than the main piping run.

Consult your local representative or Wyatt Engineering for information on other materials of construction.



ISO 9001:2015 Quality System
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