Industrial and Commercial Measurement

Ohio Gas Association
Technical Seminar
March 2014

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Dresser Meters & Instruments

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Overview

Application Guidelines

- Sizing

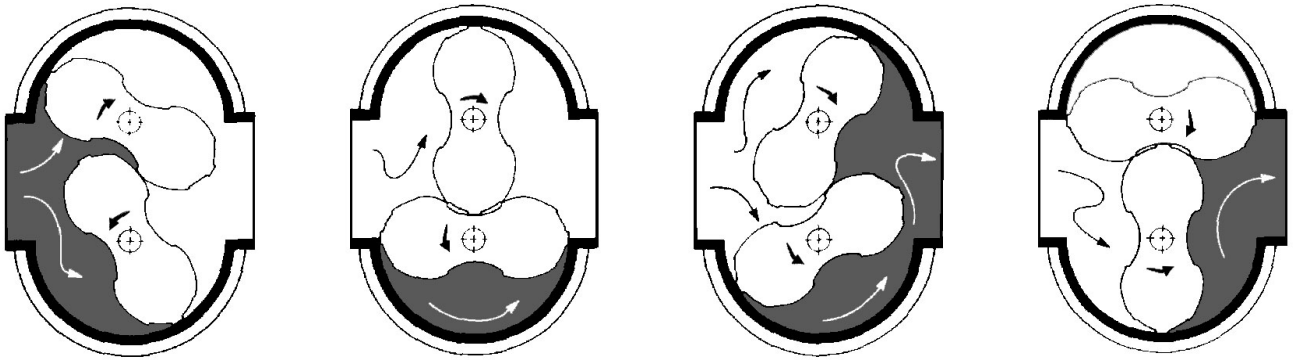
Installation Recommendations

- Meter set design
- Mounting & start-up

Maintenance Techniques

- Inspection
- Testing

Rotary Meter Operating Principle



- Gas enters meter, turning the impellers, and fills the cylinder.
- Bottom & top impellers trap fixed volumes of gas.
- With each full turn of the impeller shafts, four measured volumes of gas are swept through the meter to the right.
- As impeller RPM increases, gas slippage rapidly decreases

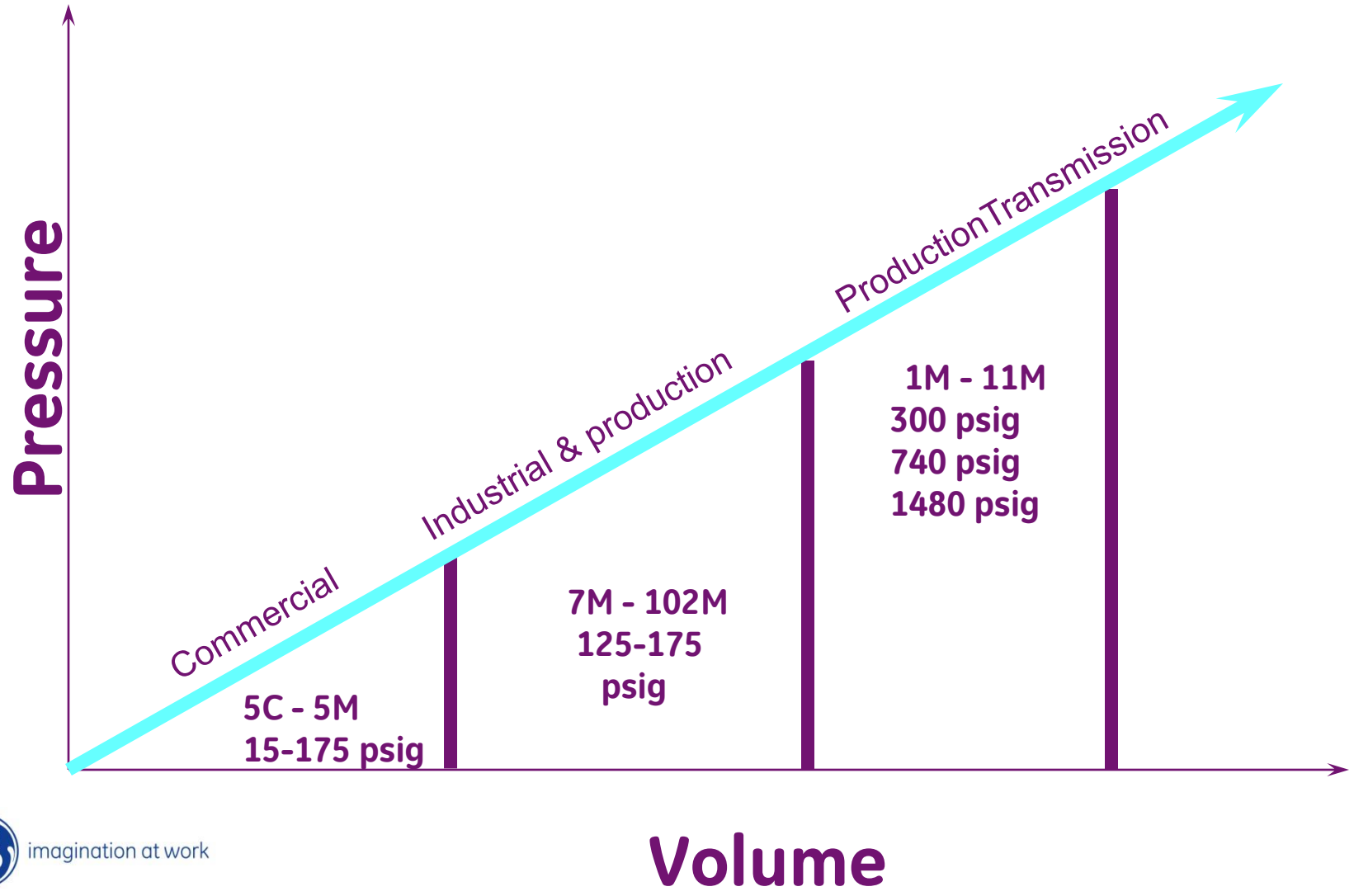
Application Guidelines

Production

Transmission

Distribution

Rotary Meter Applications



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Sizing Rotary Meters

Minimum parameters:

- Minimum operating pressure
- Total connected load

Apply diversity factors when permissible and/or required

Sizing Example

For 4,400 scfh (4.4 million BTU/hr.) load at 25 psig, select meter:

a. 5M175
b. 3M175
c. 2M175
d. 15C175
e. 8C175

Imperial Sizing Charts

Line Mounted														
Model	**8C175***	**11C175***	**15C175***	**2M175***	**3M175***	**5M175***	**7M175**	**11M175**	**16M175**	**23M175**	**23M232**	**38M175**	**56M175**	**102M125**
	*Also available in 200 PSIG Rating													
Rating	800	1100	1500	2000	3000	5000	7000	11000	16000	23000	23000	38000	56000	102000
PSIG	**Corrected Capacity at Metering Pressure – in MSCFH**													
1	0.84	1.15	1.57	2.09	3.1	5.2	7.3	11.5	16.7	24.0	24.0	39.7	58.5	106.6
3	0.95	1.30	1.77	2.36	3.5	5.9	8.3	13.0	18.9	27.2	27.2	44.9	66.2	120.5
5	1.05	1.45	1.98	2.63	4.0	6.6	9.2	14.5	21.1	30.3	30.3	50.0	73.8	134.3
10	1.33	1.82	2.48	3.31	5.0	8.3	11.6	18.2	26.5	38.1	38.1	62.9	92.8	168.9
15	1.60	2.20	2.99	3.99	6.0	10.0	14.0	22.0	31.9	45.9	45.9	75.8	111.8	203.6
20	1.87	2.57	3.50	4.67	7.0	11.7	16.3	25.7	37.4	53.7	53.7	88.7	130.8	238.2
25	2.14	2.94	4.01	5.35	8.0	13.4	18.7	29.4	42.8	61.5	61.5	101.6	149.8	272.9
30	2.41	3.32	4.52	6.03	9.0	15.1	21.1	33.2	48.2	69.3	69.3	114.5	168.8	307.4
40	2.95	4.06	5.54	7.39	11.1	18.5	25.9	40.6	59.1	84.9	84.9	140.3	206.8	376.7
50	3.50	4.81	6.56	8.74	13.1	21.9	30.6	48.1	70.0	100.6	100.6	166.1	244.8	445.9
60	4.04	5.56	7.58	10.10	15.2	25.3	35.4	55.6	80.8	116.2	116.2	191.9	282.9	515.2
70	4.58	6.30	8.59	11.46	17.2	28.6	40.1	63.0	91.7	131.8	131.8	217.7	320.9	584.5
80	5.13	7.05	9.61	12.82	19.2	32.0	44.9	70.5	102.5	147.4	147.4	243.5	358.9	653.7

Sizing Example

For 4,400 scfh (4.4 million BTU/hr) load at 25 psig, select meter using chart

- **5M175** Oversize
- **3M175** Oversize
- ***2M175***
- ***15C175 10% Over-speed*** OK*
- **8C175** Undersize

Imperial Sizing Charts

Line Mounted														
Model	**8C175***	**11C175***	**15C175***	**2M175***	**3M175***	**5M175***	**7M175**	**11M175**	**16M175**	**23M175**	**23M232**	**38M175**	**56M175**	**102M125**
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5	1.05	1.45	1.98	2.63	4.0	6.6	9.2	14.5	21.1	30.3	30.3	50.0	73.8	134.3
10	1.33	1.82	2.48	3.31	5.0	8.3	11.6	18.2	26.5	38.1	38.1	62.9	92.8	168.9
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50	3.50	4.81	6.56	8.74	13.1	21.9	30.6	48.1	70.0	100.6	100.6	166.1	244.8	445.9
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70	4.58	6.30	8.59	11.46	17.2	28.6	40.1	63.0	91.7	131.8	131.8	217.7	320.9	584.5
80	5.13	7.05	9.61	12.82	19.2	32.0	44.9	70.5	102.5	147.4	147.4	243.5	358.9	653.7

Selection Criteria

Gas Quality

Line Pressure

Line Temperature

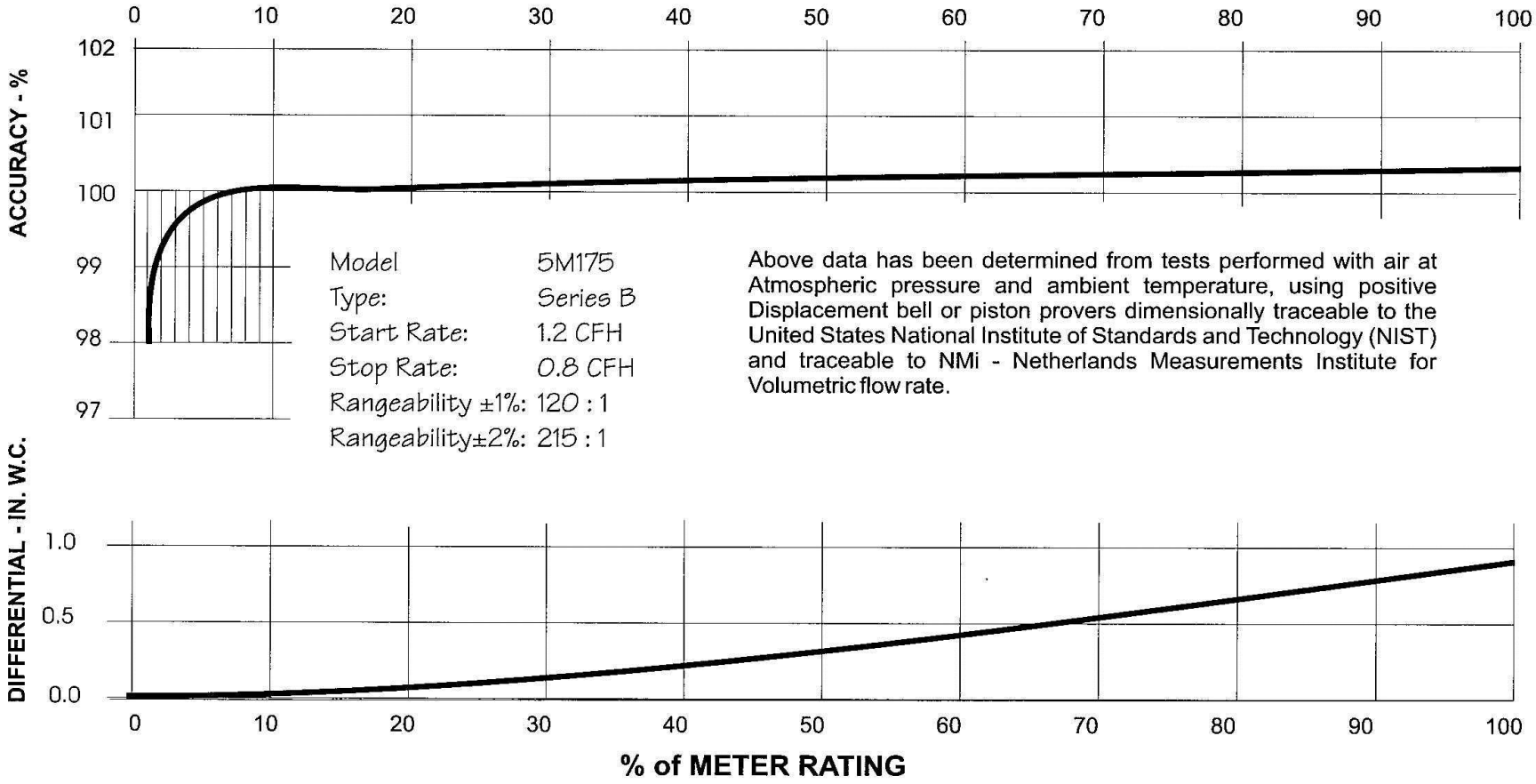
Flow Rate

Gas Quality	Meter Selection
Clean & dry	**Standard version meter**
Wet or sour gas	**Stainless Steel components**
Frozen condensation	**Catalytic Heater**
Heavy solids	**Fluid shut-off device**

Line Pressure

Maximum meter operating pressure	*Factor in meter pressure rating*
Minimum meter operating pressure	*Factor in maximum flow rate (capacity)*
Pressure control	*Impact meter accuracy*

Typical Accuracy Curve



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Rotary Accuracy Characteristics

- At the start rate, meter accuracy is typically at 80 to 90%
- As flow increases, the accuracy curve quickly flattens out at a nominal 100.35%
- Displacement accuracy is permanent, it never changes

Line Temperature

Actual flow increases 1% for each 5˚ F. increase	Temperature compensated indexes
Meter temperature operating range	-40˚ to +140˚ F.
TC operating range	-20˚ to +100˚ F.

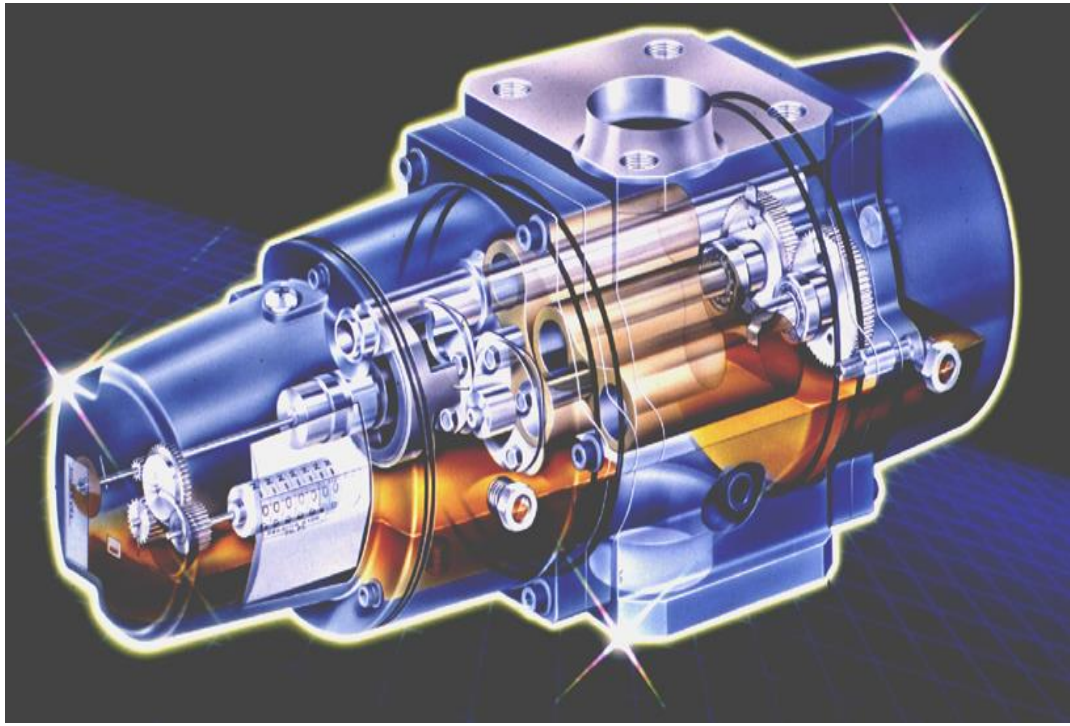
Flow Rate

Over-speed protection

- Restricting flow orifice plate
  - Request Dresser Form RM-52

Splash Lubrication

- 10% of flow once every few weeks



Sizing Summary

Identify minimum operating pressure and maximum flow rate

Consider selecting smallest possible meter for your load

Include adequate equipment in your meter set design

Installation Suggestions

Basic meter set design ideas

Mounting the meter in your set

Starting-up your rotary meter

Meter Set Design

Adequate support piping for meter flanges

Ensure meter is level

Include hard bypass

When possible design top inlet flow

Meter Set Design

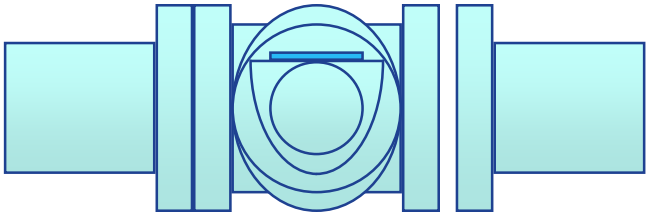
Install strainer or filter when conditions merit

Avoid placing meter at the low point of a meter set

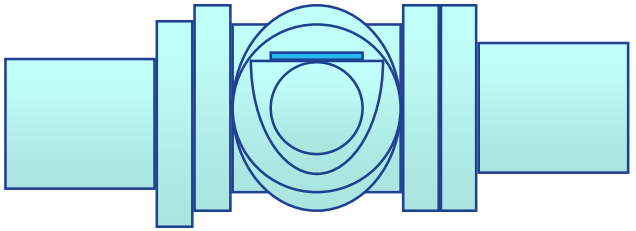
Meter Set Design

support piping

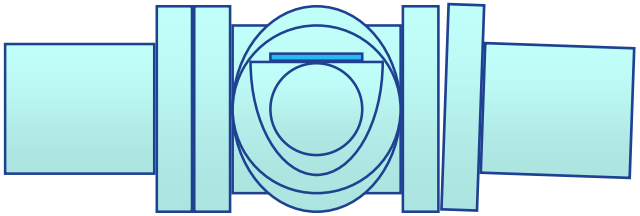
- Flange Spacing



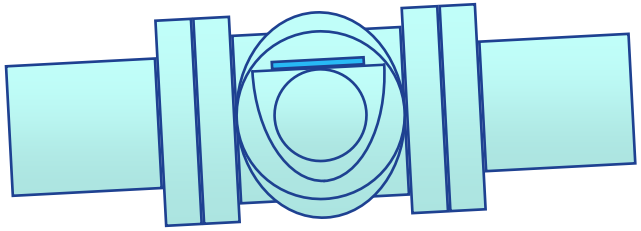
- Pipe Alignment



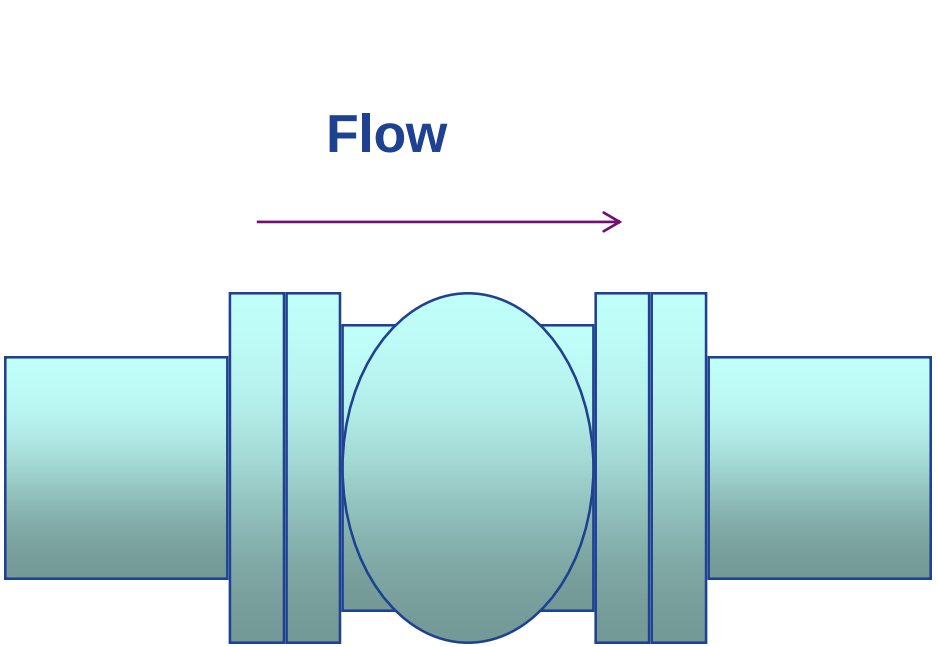
- Flanges Parallel



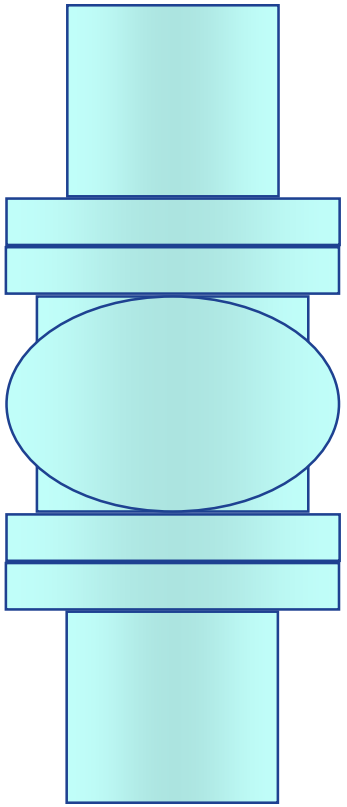
- Pipe Level



Meter Set Design



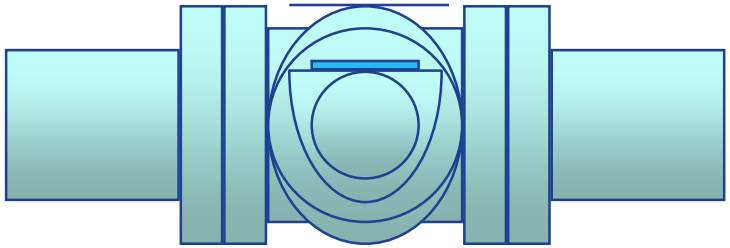
Side Inlet

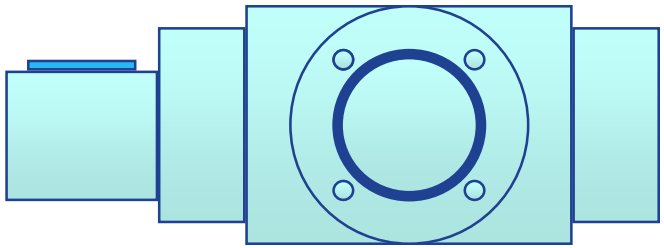


Top Inlet (Preferred)

Meter Set Design

Level within 1/16”/ft.





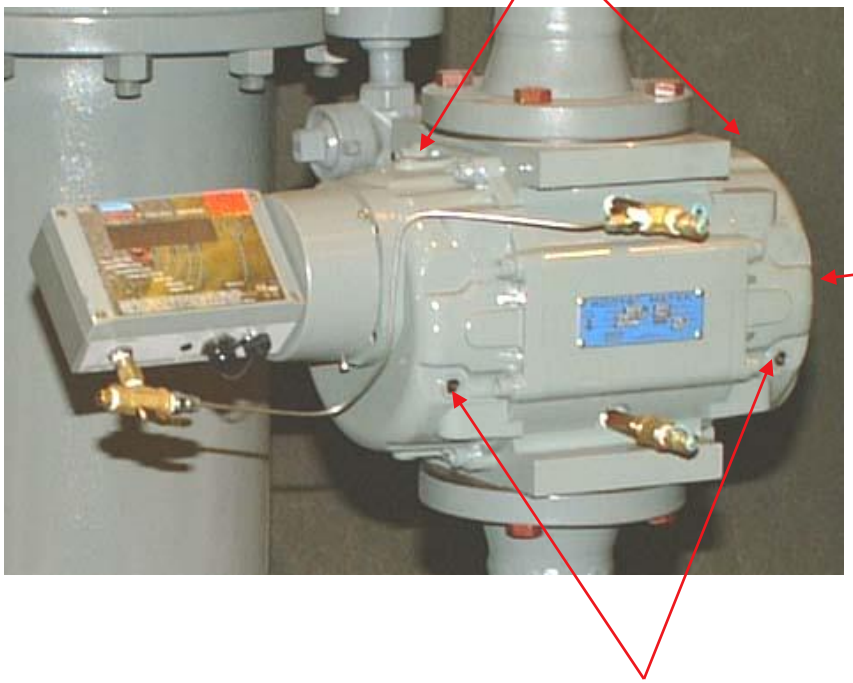
Mounting In Your Set

Blow down the meter set

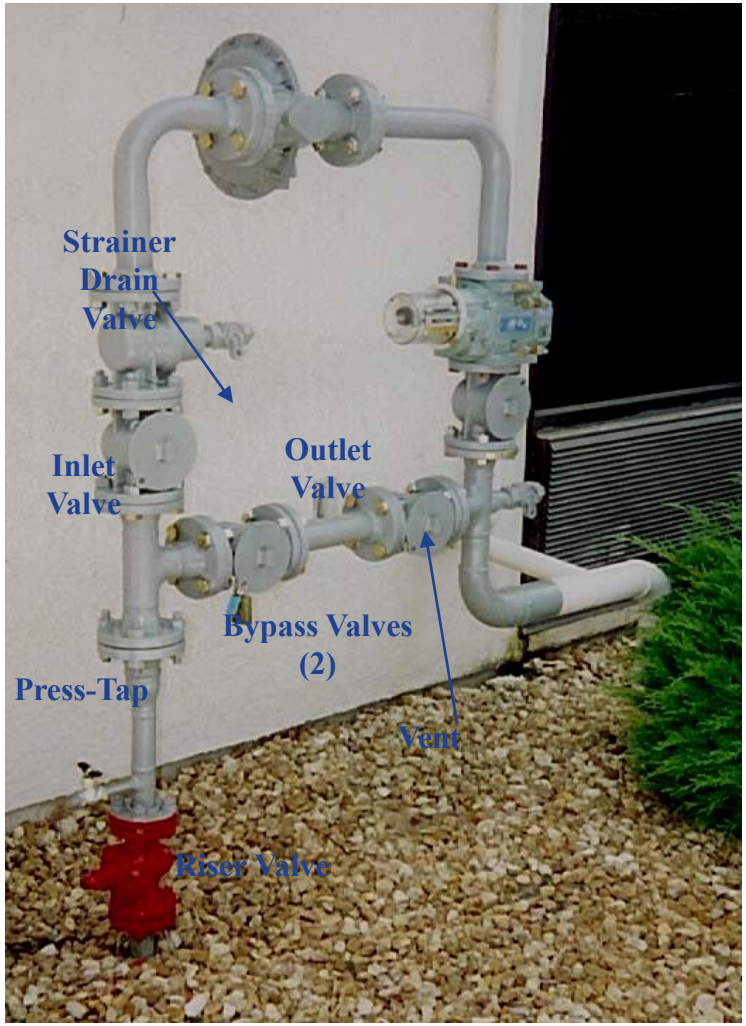
Utilize proper flange gaskets

Follow manufacturer's torque recommendations

Start-up preparation



Start-Up



Close all valves, taps, & vents

Open riser & inlet valves and check for leaks

Slowly open outlet valve

Close bypass valves

Don’t pressurize more than 5 psig per second

Maintenance

Routine Maintenance

Remove Bowl & Clean Screen as Needed

Drain Excess Liquids as Needed

Check Oil Level & Color Drain & Replace

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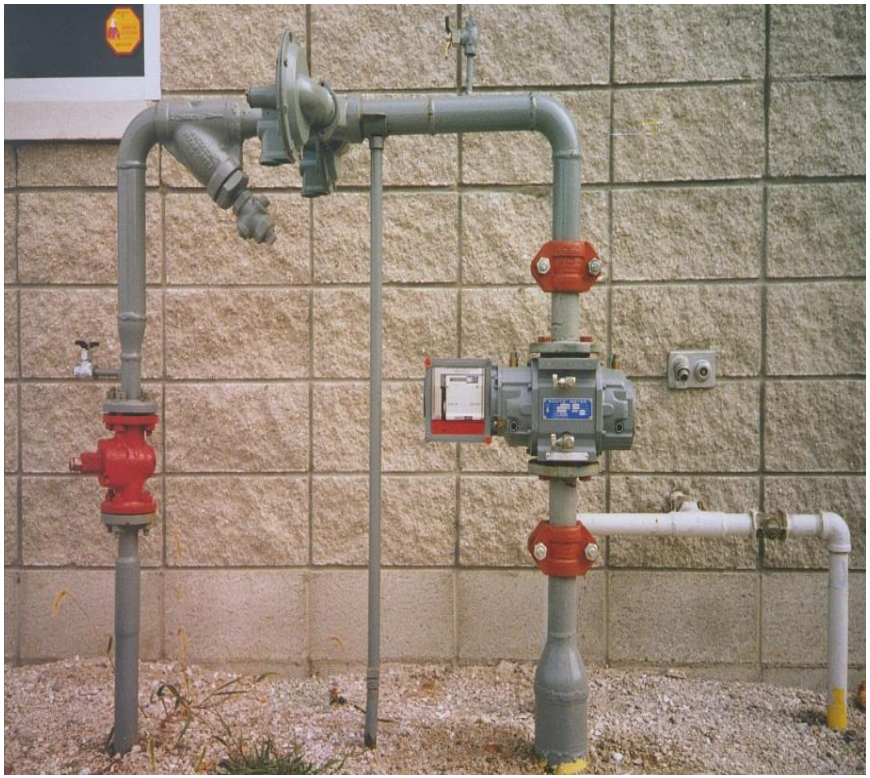
Oil sight gauge showing proper level and condition of oil

Routine Maintenance



- Meter registration
- Oil color & level
- Oil leaks
- Condensation in index
- Abnormal meter noise
- Meter set level
- Strainer sump
- Gas leaks

Rotary Meter Testing

Differential testing

Transfer prover testing

In-service performance testing

Differential Testing

Low Equipment Cost

Quick & Easy

Reliable

An Inferential Test (i.e. Spin Testing for Turbines)

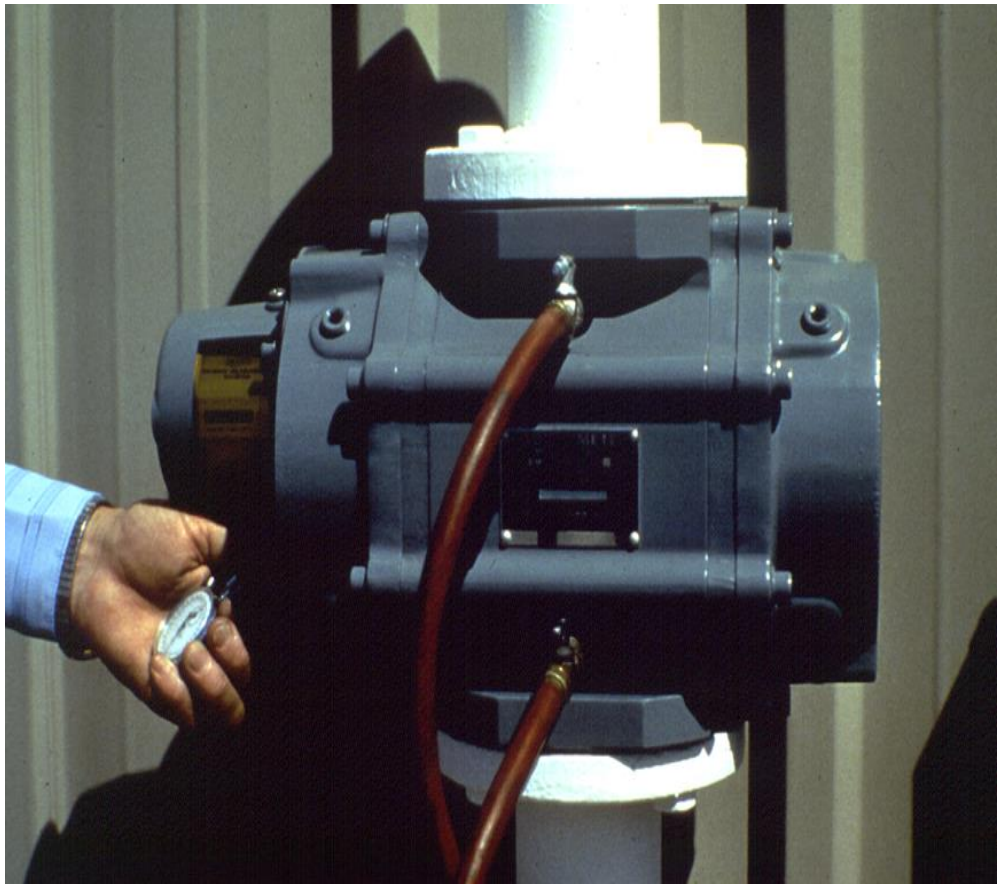
Recognized by NIST since 1948

Recognized by AGA (ANSI B109.3)

Used by Gas Companies across the U.S.

Differential Pressure

ANSI B109.3: “pressure loss across a rotary meter at specified index rate, specific gravity, & pressure is indicative of the meter’s condition.”



Differential Pressure Varies With:

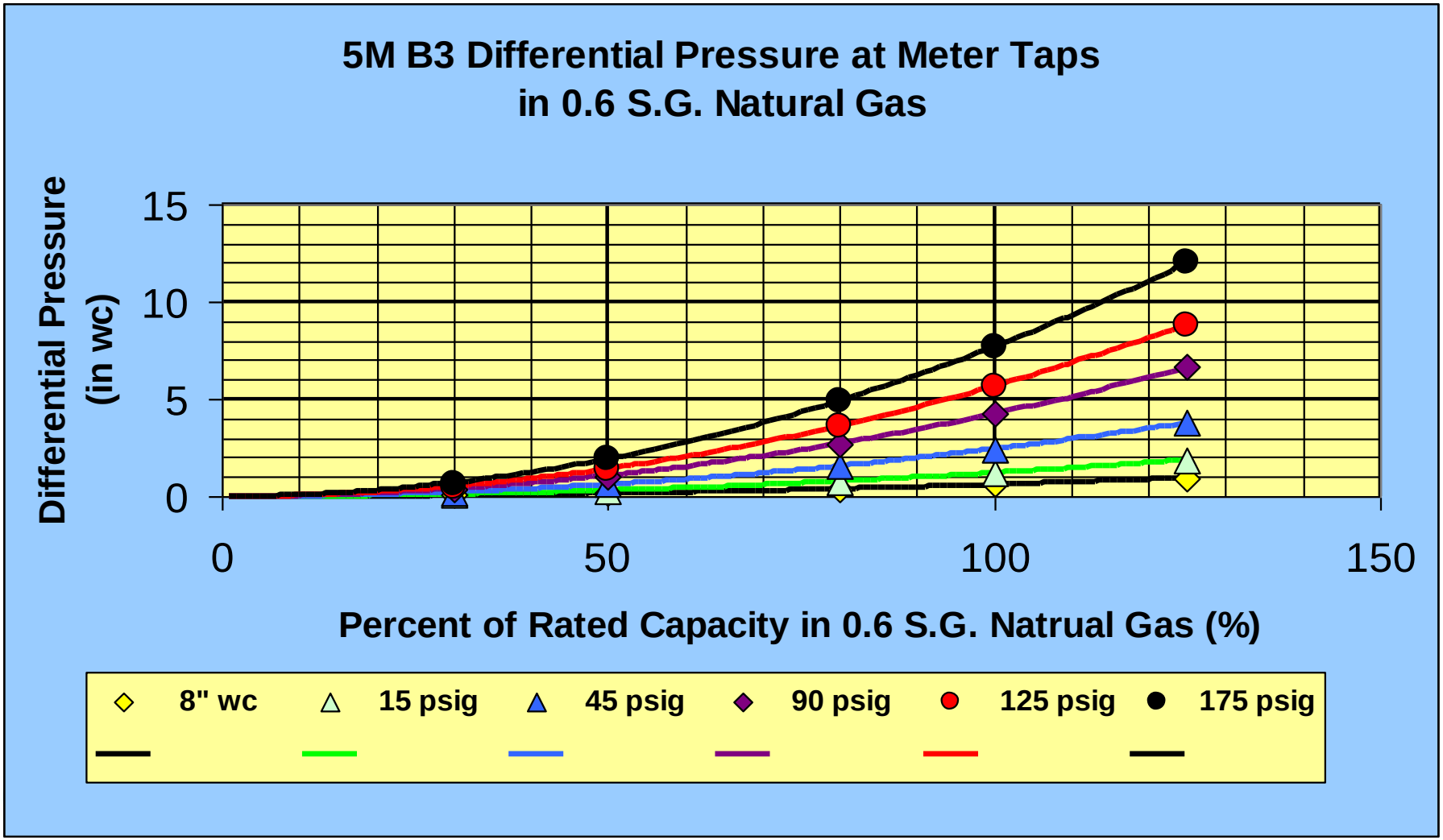
Flow rate

Pressure

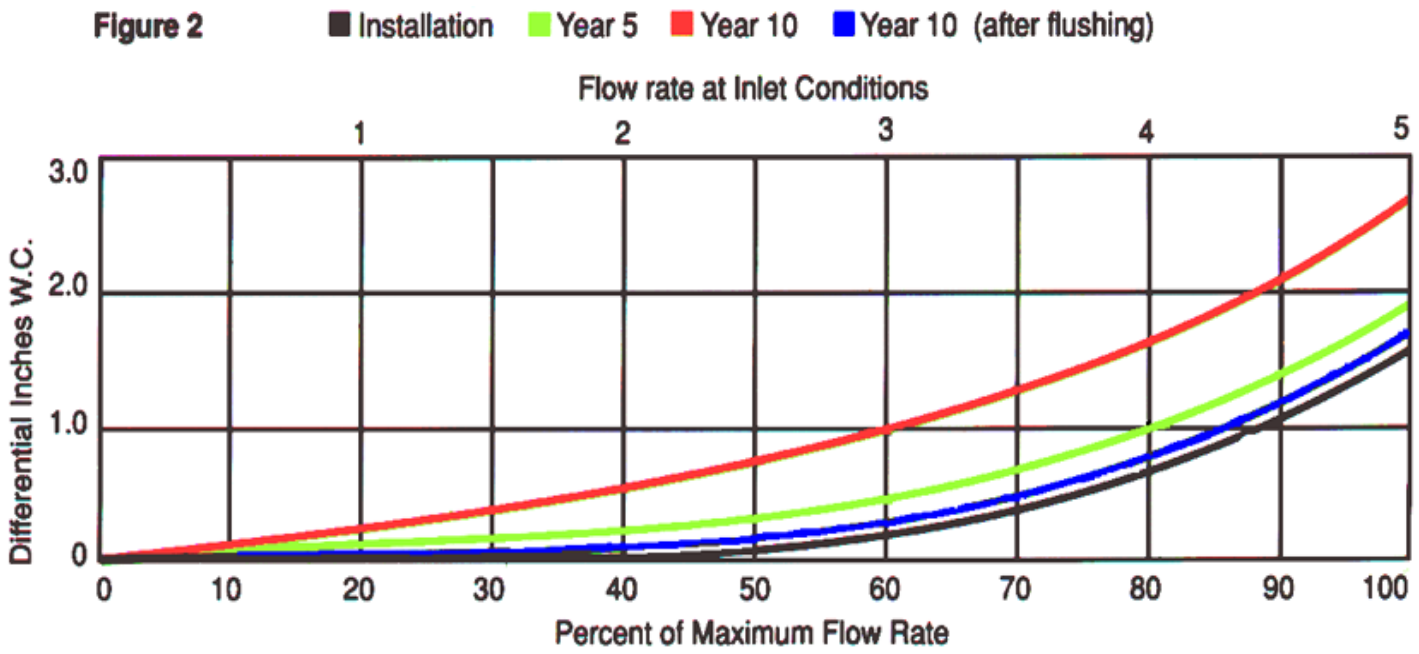
Specific gravity

Internal friction

Differential Pressure



Differential Testing



Look for 50% increase

Try flushing meter with approved solvent to restore meter condition and accuracy

Transfer Proving

- Higher equipment cost than Differential Testing
- Limited to 10 MACFH
- Not for Hazardous Locations
- Reliable
- A Volumetric rather than an Inferential Test providing direct Accuracy results
- Compares volume of Master Meter to Field Meter
- Measures and compensates for inlet pressures and temperatures
- Tertiary Standard traceable to NIST

Rotary Meter Advantages

Compact installations.

Accurate operational range.

Maintains accuracy after several years of service.

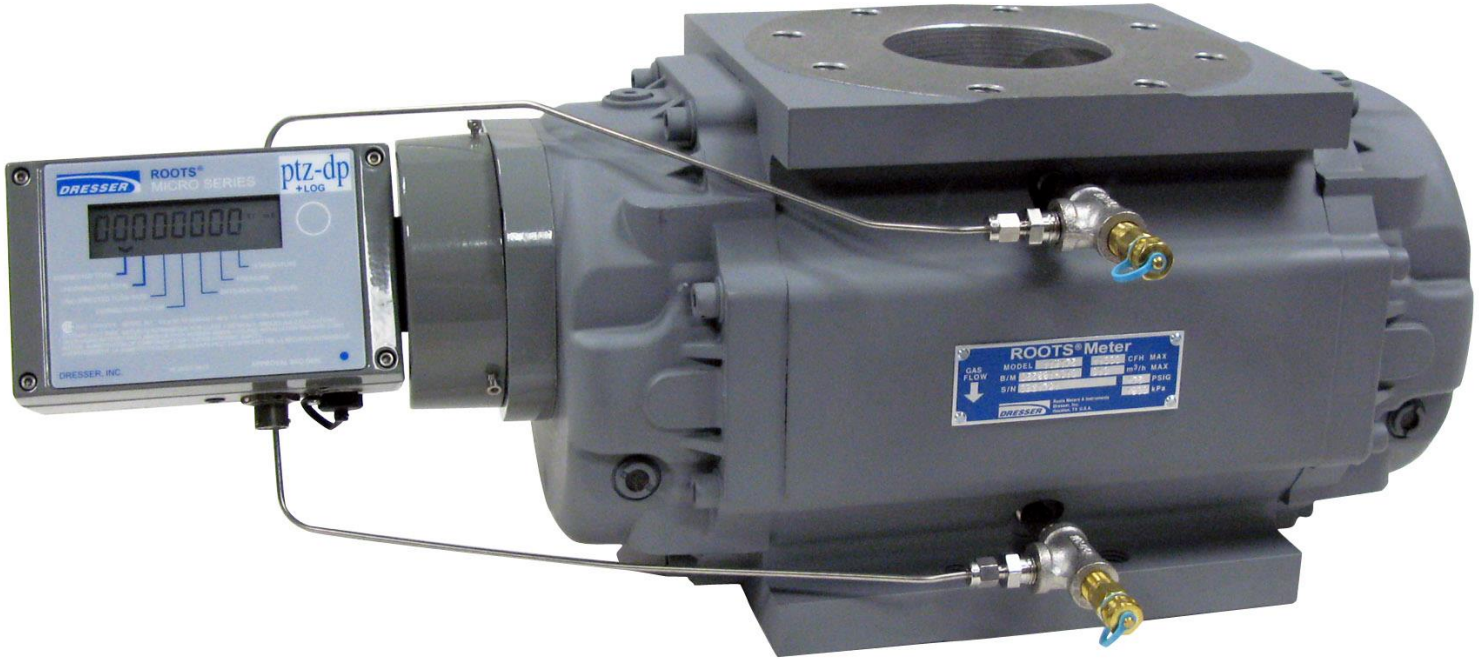
Mechanical design provides long service life.

Low cost maintenance.

Large number of installations throughout the world.

What's New?

Self Diagnostics
IMC-DPX

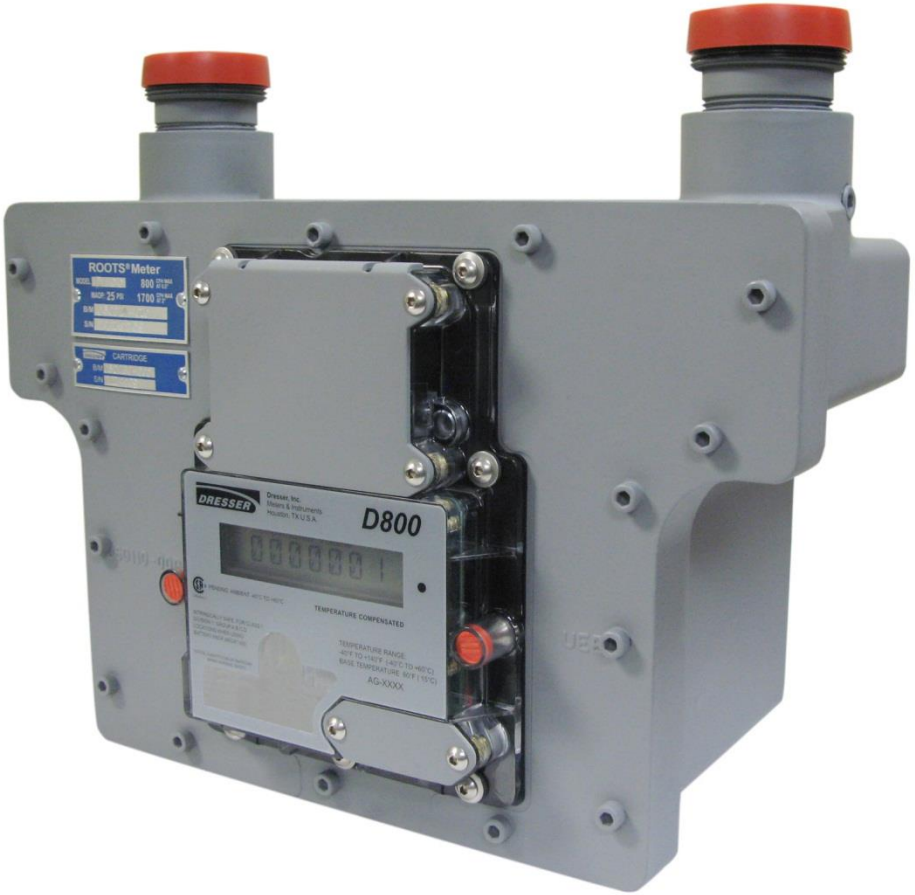


Electronic TC Meter

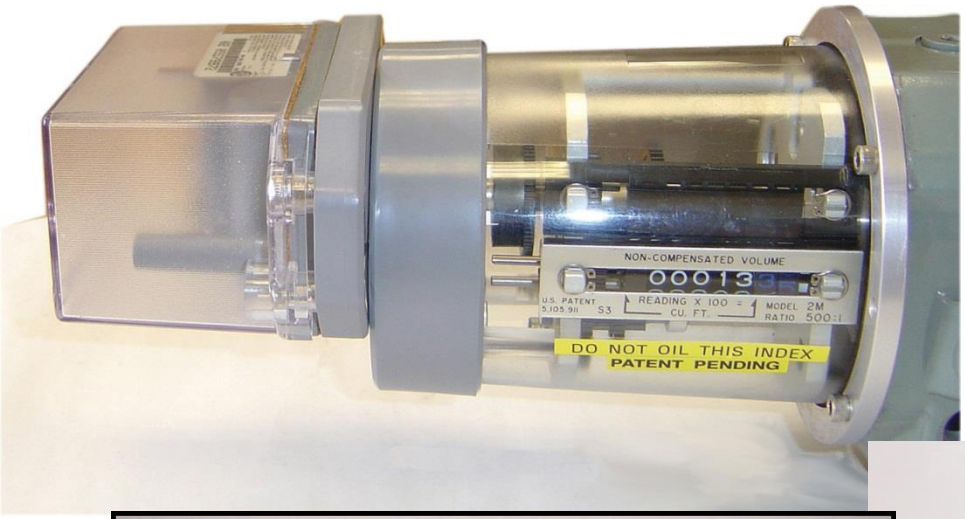
Dresser ETC


06120
Electrical Rating: 3-24 VDC, 0-10 mA
Dresser Battery Pack: #060247-000
Clean only with a damp cloth.
Do not use solvents.
Dresser® Electronic TC Index
Temp. Range: -40°F to +140°F
or -40°C to +60°C
PENDING
Exia IICT4
ROOTS® METER

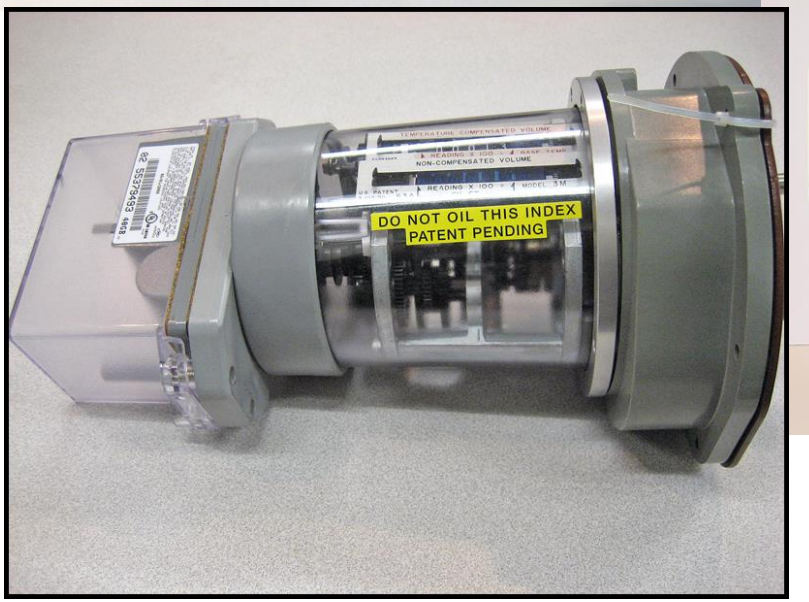
D800 and D1000
Commercial Service Meter

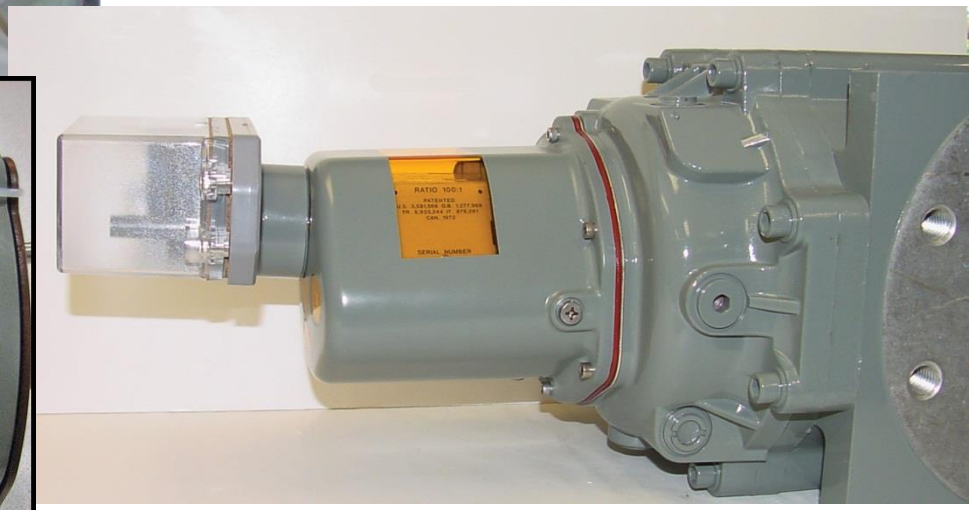


AMR Devices



Series B3 meter with Itron Residential AMR





ERT can be mounted on either LMMA or S3A Accessory Units

Thank you.

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