Metering Simplified Ultrasonic Technology



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Complicated Choice







Fire-Service Turbine Multi-jet Turbine Mag Fire-Service Assembly Floating Ball Ultrasonic Positive Displacement



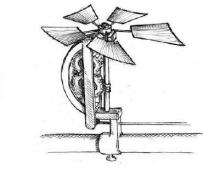


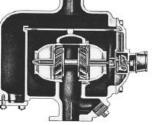
Legacy Products (still in use)

Turbine / Propeller (introduced in the late 1700s)













Legacy Products (still in use)



- ➤ Compounds (introduced in 1914)
- ➤ Mainline turbine
- Low flow meter (Multi-jet or PD)
- Automatic valve for diverting flow rates
- ➤ Dual or single registers

Master Meter DBC (Dual Body Compound)





Legacy Products (still in use)



- Fire Assembly Meters (introduced in 1908)
- Mainline meter (turbine or proportional type)
- Low flow meter (MJ, PD, turbine or compound)
- Automatic valve for diverting flow rates



Master Meter FSC (Fire Service Compound)



Why it is important



The 80/20 Rule

AYPHNDSTAVIS

Generally 20 % of a utilities total installed meter base measures 80% of the total billable volume

20% = Commercial and Industrial meters

All lead to lost revenue

Frequent repairs

Damaged meters

Inaccurate meters

Unmetered consumption



How Ultrasonic Works



Ultrasonic Technology

Basic Operating Principle is <u>Sound</u> Two types Doppler-Effect Best suited for wastewater and slurries





How Ultrasonic Works

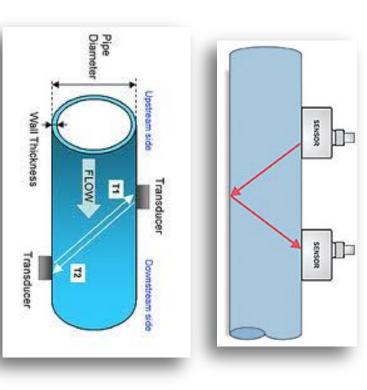


Ultrasonic Technology

Basic Operating Principle is <u>Sound</u> Two types:

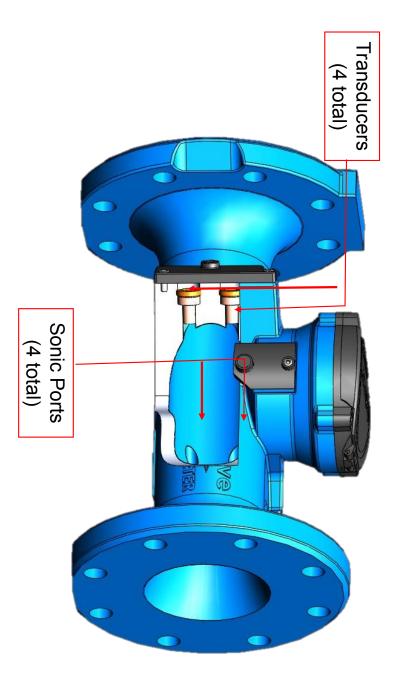
Transit Time (the Octave)

- Best suited for clean water.
- Sound waves are generated by a transmitter and are either reflected to, or sent across the pipe to a receiver.
- This same process happens in the opposite direction. (one with flow, one against flow).
 Upstream and downstream times are
- Upstream and downstream times are compared. The difference in time equates to the water velocity.
- No time difference = no flow





How Ultrasonic Works





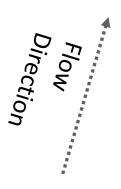


Measuring Principle





- Dual Beam
- Ultrasonic Transit Time
- Sing Around



Ultrasonic vs. Turbine



- 3 GPM Average Low Flow @ -5% +1%.
- 5 GPM Normal Range @ + 1.5%

The 80/20 Rule



- 0.5 0.7 GPM Average Flow
- Toilets ('92): Up to 1.6 USG per flush
 Urinals ('92): Up to 0.5 USG per flush

RESTROOM





Performance Data

Octave Nominal Size inch (mm)	† Typical Starting Flow GPM (Lt/s)	Extended Low Flow 95% - 105% Accuracy GPM (Lt/s)	Normal Flow Range 98.5% - 101.5% Accuracy GPM (Lt/s)	‡ Continuous Safe Max Flow GPM (Lt/s)	Linearity Range +/- 0.5% Maximum Deviation GPM (Lt/s)
2"	1/16	1/4	1/2 - 250	250	4 - 200
(50mm)	(.004)	(.016)	(.032 - 15.77)	(15.77)	(.25 - 12.62)
<mark>3</mark> "	1/16	1/2	1 - 500	500	5 - 350
(80 mm)	(.004)	(.032)	(.06 - 31.54)	(31.54)	(.32 - 22.08)
4"	1/16	3/4	1-1/2 - 1,000	1000	15 - 700
(100 mm)	(.004)	(.047)	(.09 - 63.09)	(63.09)	(.94 - 44.16)
<mark>6</mark> "	3/4	2	3 - 1,600	1,600	20 - 1,150
(150 mm)	(.047)	(.13)	(.19 - 100.94)	(100.94)	(1.26 - 72.55)
8"	3/4	4	5 - 2,800	2,800	50 - 2,000
(200 mm)	(.047)	(.25)	(.32 - 176.65)	(176.65)	(3.15 - 126.18)
10"	2.5	8	14 - 5,500	5,500	400 - 4,000
(250 mm)	(.16)	(.50)	(.88 - 346.99)	(346.99)	(25.24 - 252.36)
12"	2.5	8	14 - 5,500	5,500	400 - 4,000
(300 mm)	(.16)	(.50)	(.88 - 346.99)	(346.99)	(25.24 - 252.36)
† Starting flows vary per m	eter but can go as low a	† Starting flows vary per meter but can go as low as the above listed flow rates.			

Continuous Safe Max Flow ranges listed for the Octave are for accurate flow measurement only and do not limit the Octave from meeting the Short-term Deluge Flow for fire services.



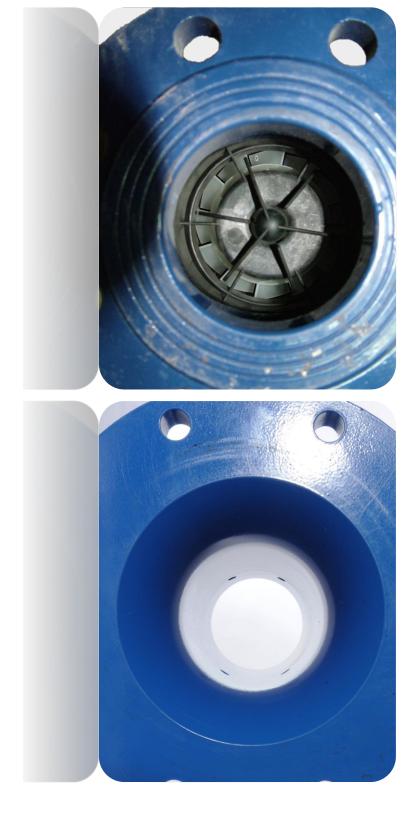


Ultrasonic vs. Turbine



Turbine

Ultrasonic





MASTER

ELIMINATE:

- Installing the wrong meter type Excessive maintenance
- costs
- Gradual decrease in
- accuracy High overhead &
- inventory costs
- costs Decrease installation



Simplified Installation







- Turbines up to 80% heavier
- Compounds up to 300% heavier
- Fire Assemblies up to 1800% heavier



Simplified Meter Selection



Ultrasonic is Migrateable

	Steven Bruskiewicz Produci/AM Enterprise Manuger/Wal Office: 440 528-7289 Cell: 262 305 5238	Respectfully.	Our approval is contringent or mea- planned changes to the approved met that would take an impact on the met Actara MTU and upon request will pro Actara MTU and upon request	This letter confirms that are compating passed Adara Technologies compating Network via the Senters 2000 and Senti Network via the Senters 2000 and Senti of our acceptance has been document of our acceptance has been document Water Meter Compatibility List.	Dear Greg:	Greg Land Manter Meter 101 Regency Parkeray Mansfield, TX 76093	December 17, 2014	ACLARA	
na da a pogra esta de la testa seconda e a sura na na e que que non esta esta deficiente Articulario 1 ha Endopsion ne elégized in en OROX Callular endopsion se elégized in en			CBRCH CARA	Ladged at	NOTE: TO THE DOCUMENT	2 SPE		10.0	Stadger Maine OlicOle, Mater Endpoint
kholas J Deffee (Nick) vodurt Manager Mobile Solutions, Gas & Water east Coheterer	gether. H1 Regards	I like to wish you and your team at masses	ie used Sensus protocol and performan	ear Jamie: The have tested both the Master Meter Octave and Elins products: The have tested both them using Energy Asis water modules: Id we succensfully read them using Energy Asis water modules.		rind zwarz cas President of Sales – Western Notgorn Jaster Moter Nrc. 31 Bagency Parkwey Jantheda, Jenais 76063			welster

meter installation services The Octave fits most









Simplified Inventory

Ultrasonic Meters



The Octave eliminates the requirement to stock multiple meter types





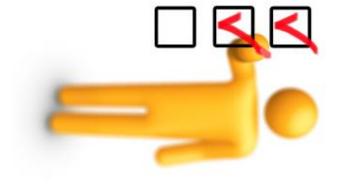


Features & Benefits



Ultrasonic Technology Overview

- \checkmark No moving parts
- ✓ Sustained meter accuracy
- No strainer required
- Low flows similar to compounds and high flows similar to turbines
- ✓ FM Approval one meter for all applications
- ✓ Reduced headloss
- Light-weight design
- ✓ No cross-over drop in accuracy





Improving Water System Operations



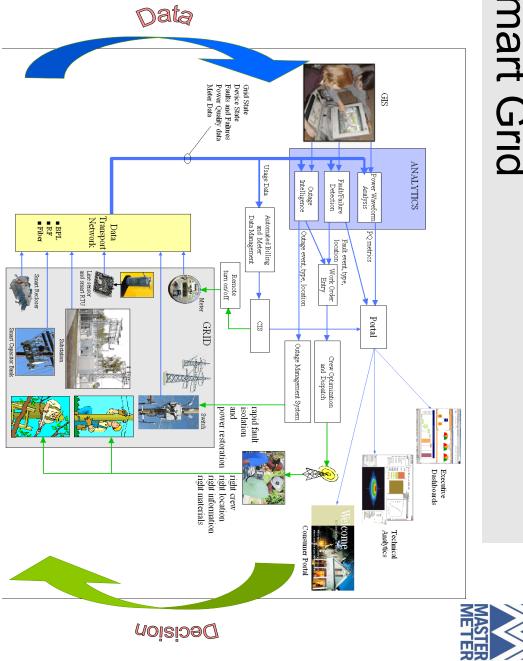
AMI (Advanced Metering Infrastructure)

- Meter selection and accuracy
- Non Revenue Water Evaluation (DMA)
- System Leak Monitoring
- System Backflow
- Water Quality Monitoring



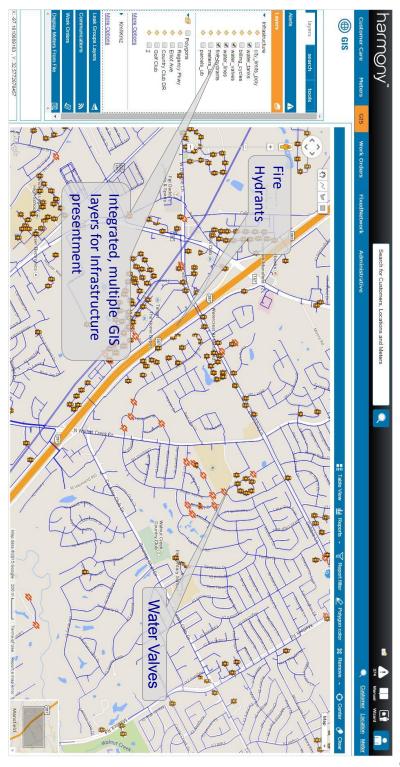
Smart Grid

- measurement, collection and processing of meter and other customer data AMI refers to the full
- two way communications network, and data management systems installed at each premise, a AMI includes "smart" meters
- data AMI enables more granular measurement of consumption, the matching of consumption to price and more frequent transmittal of consumption
- customers to help customers AMI enables a partnership between Utilities and their make better energy decisions





GIS / Layered Maping









Customer Engagement





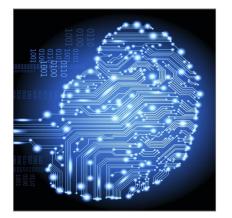








Final Considerations



- O How will you use this massive amount of data to reach your goals?
- O Customer segmentation?
- O Creating value?



- O Which insights are you after?
- O What metrics are most helpful in your day-to-day operations?



- O How do you currently track Service Reliability?
- O Index customer satisfaction?





Thank You



Brandon Begley- Fortiline Waterworks Mike Phillips- Master Meter