

D.W. KOZERA, INC.
PROFESSIONAL ENGINEERS & GEOLOGISTS

October 17, 2014

Vienna Development Associates, LLC
c/o Hekemian & Co., Inc.
505 Main Street
Annapolis, MD 21403

Attn: Mr. Christopher P. Bell, Senior Vice President
(cbell@hekemian.com)

Subject: Design Memorandum, 444 Maple Avenue West, Vienna, Virginia (DWK
Contract Number 14107.D)

Dear Mr. Bell,

Based on the following information, we have estimated the groundwater inflow into the subdrainage system of the proposed building to be located at 444 Maple Avenue in Vienna, Virginia:

Building Lower Floor Elevation	EL 363
Groundwater Table Elevation	EL 381
Basement Plan Dimensions	380 ft. x 190 ft.

In order to estimate groundwater inflow, an estimate of the hydraulic conductivity of the soil surrounding and located below the building has to be made. We have made our estimate of hydraulic conductivity based on rising head slug tests performed in wells installed on site. Table 1 presents the hydraulic conductivity determined in each well from the tests.

Table 1: Hydraulic Conductivity Determined	
Well	Hydraulic Conductivity (gpd/ft²)
EX-1	4.0
EX-2	16.9
EX-3	6.4
EX-4	11.5

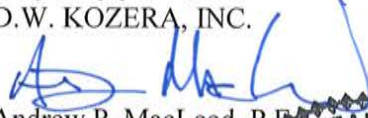
The analysis method used was to approximate the basement as a trench and to utilize a conventional formula for flow from the water table to a drainage trench. In addition, the contribution of flow from beneath the building was calculated by approximating the basement as two wells and using a conventional well formula. The calculations using these methods are attached. Note that the flow rate predicted by this analysis is for a steady state condition, and it is assumed that the steady state condition will be reached during construction, as construction dewatering will be required. The predicted inflow rates at the steady state condition range from 120 gpm to 445 gpm.

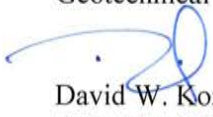
In order to better estimate the inflow rates, it is recommended that an inline flowmeter be installed on the subdrainage discharge line at your Northgate project in Falls Church, Virginia. This project is located in similar geology and the lower level elevation is beneath the water table, and a comparison of predicted flow rates vs. actual rates can be performed. Discharge measured from this building will provide data for comparison. Once rates are established from Northgate, correlations may be

flow rate at the Maple Avenue project. Literature on an inline flow meter has been enclosed with this letter.

We appreciate the opportunity to be of service to you on this project. Please contact us with any questions.

Very truly yours,
D.W. KOZERA, INC.


Andrew P. MacLeod, P.E.
Geotechnical Engineer


David W. Kozera, P.E.
Commonwealth of Virginia No. 011857
Expiration: 06-30-2015



Enclosures: Calculations (2)
 Inline Flow Meter Literature (8)

D. W. KOZERA, INC.

PROFESSIONAL ENGINEERS & GEOLOGISTS

1408 Bare Hills Road Suite 200 Baltimore, MD 21209

Phone: 410.823.1060 Fax: 410.823.1062

444 MAPLE Ave

WATER FLOW INTO SUBDRAINAGE

AM 1/2

WATER TABLE FLOW FROM A LINE SOURCE TO A DRAINAGE TRENCH:

$$\frac{Q}{x} = \frac{K(H^2 - h^2)}{2880L}$$

Q = Flow (gpm)

x = unit length of trench

K = Hydraulic conductivity (gpd/ft²)

H = height from GWT to impervious layer (ft)

h = height from subgrade (ft)

L = length of influence

$$L = \frac{1}{2} R_0 \Rightarrow R_0 = 3000(H-h)\sqrt{K} \text{ where } (H-h) \text{ is in feet and } K \text{ is in m/sec}$$

$$R_0 = 3000(18)\sqrt{10^{-6}}$$

$$R_0 = 54 \text{ ft}$$

$$L = \frac{1}{2} R_0 = \frac{54}{2} = 27 \text{ ft}$$

ASSUME IMPERVIOUS LAYER AT EL 325

ASSUME GWT @ EL 381

FF @ E 363

$$H = 381 - 325 = 56$$

$$h = 363 - 325 = 38$$

Foot print of Bldg = ± 380' x 190'

x = 1/40 lf of basement wall

$$\frac{Q}{x} = \frac{K(56^2 - 38^2)}{(2880)(27)} = 0.022K$$

$$Q = (0.022)(140)K, K \text{ varies from } 4.0 \text{ to } 16.9 \text{ gpd/ft}^2$$

$$Q = 25.08K \Rightarrow Q \text{ varies from } 100 \text{ to } 425 \text{ gpm}$$

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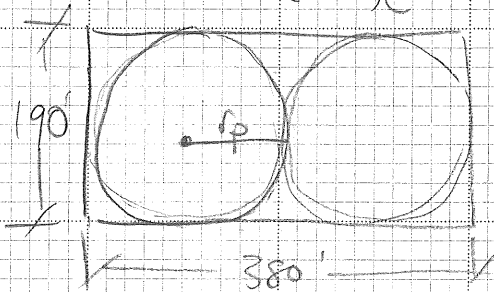
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444 MAPLE AVE

Aug 2/2

CALCULATE FLOW FROM BEYOND FLOOR

$$Q = 4r_p \left(\frac{K}{m} \right) (H-h)$$



Q = Flow (m^3/sec)

r_p = radius of well (m) = $95' = 29m$

m = ratio of vertical to horizontal conductivity

Assume $m = 1$

$(H-h) = 18' = 5.5m$

K = hydraulic conductivity (m/sec)

$$Q = 4(29)(10^{-6})(5.5) \times 2 \text{ wells}$$

$$Q = 1.28 \times 10^{-3} m^3/sec$$

$$\frac{1.28 \times 10^{-3} m^3}{sec} \times \frac{60 sec}{1 min} \times \frac{264 gallons}{1 m^3} = 20 gpm$$

TOTAL FLOW INTO SUBDRAINAGE SYSTEM:

$$100 + 20 \rightarrow 425 + 20$$

$$120 - 445 gpm$$

WT-Series

Seametrics

INLINE TURBINE METER INSTRUCTIONS



WTP
PVC Body



WTC
Carbon Steel



WTS
Stainless Steel

WT-SERIES INLINE TURBINE METER INSTRUCTIONS

GENERAL INFORMATION and SPECIFICATIONS

GENERAL INFORMATION

This unique system of 2" to 8" turbine meters uses just one moving part, a precision helical rotor. Rotation of the rotor is electronically detected and processed. The high-quality jewel bearings and shafts minimize friction while providing long wear life in non-lubricating fluids. The entire rotor assembly can be easily removed for field service without removing the meter from the pipe.

WTP bodies are fabricated from Schedule 80 PVC fittings, WTC bodies from carbon steel tubing, and WTS bodies from stainless steel tubing. The turbine insert on WTC and WTS meters is machined from a stainless steel casting. The WTP turbine insert is machined from a solid piece of PVC. Turbine rotors on all models are Kynar (PVDF).

WT meters can be ordered with various output options. The basic model (100) comes with pulse output only. An electronic display (Seametrics FT420) is mounted on the 101 model to display flow rate and total (resettable or non-resettable), and provide a programmable pulse or 4-20 mA output. Other electronics options include a blind 4-20 mA transmitter (AO55) on the 102 model and a battery-powered (FT415) rate/totalizer plus pulse output for applications that lack power (104 model). All of these controls/displays can be mounted on the meter or remotely mounted on a wall or panel up to 2,000 feet away. WT-Series meters are compatible for use with most other remote-mount Seametrics displays and controls as well.

SPECIFICATIONS*

		WTP				WTC					WTS				
Pipe Sizes		2", 3", 4", 6"				2", 3", 4", 6", 8"					2", 3", 4", 6", 8"				
Materials	Meter Body	PVC Schedule 80 fittings				Painted carbon steel					304 Stainless steel (316 SS optional)				
	Turbine Insert	PVC				CF8M cast stainless					CF8M cast stainless				
	Rotor	Kynar (PVDF)				Kynar (PVDF)					Kynar (PVDF)				
	Shaft	Zirconia ceramic 3"-6"				Zirconia ceramic 3"-8"					Zirconia ceramic 3"-8"				
	Shaft	Tungsten Carbide 2"				Tungsten Carbide 2"					Tungsten Carbide 2"				
Bearings		Sapphire journal, ruby endstone				Sapphire journal, ruby endstone					Sapphire journal, ruby endstone				
Cable		#22 AWG, 2000' max				#22 AWG, 2000' max					#22 AWG, 2000' max				
Flanges		Optional (See Dimensions)				150 lb. drilling (3-8" only)					150 lb. drilling (3-8" only)				
Maximum Pressure		150 psi @ 75° F (10 bar @ 24° C) (see chart)				200 psi (14 bar)					200 psi (14 bar)				
Maximum Temperature		120° F (50° C) (see chart)				200° F (93° C)					200° F (93° C)				
Accuracy	3"-8"	+/- 1% of full scale				+/- 1% of full scale					+/- 1% of full scale				
	2"	+/- 2.5% of full scale				+/- 2.5% of full scale					+/- 2.5% of full scale				
Flow Range (GPM)		2"	3"	4"	6"	2"	3"	4"	6"	8"	2"	3"	4"	6"	8"
Minimum		2	3	6	12	2	3	6	12	30	2	3	6	12	30
Maximum		150	400	600	1200	150	400	600	1200	3000	150	400	600	1200	3000

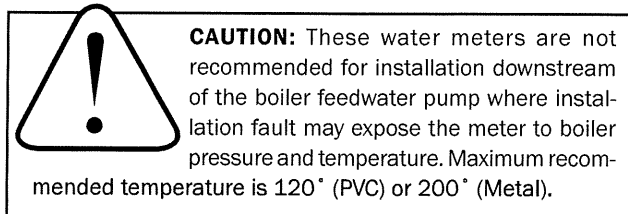
Electronic Options Specifications*

WT100 (Pulse Output Only)		WT102 (Blind 4-20 Transmitter) (e.g. AO55)	
Power	6-24 Vdc	Power	24 - 36 Vdc (isolated)
Pulse Output	0-160 pulse/second current sinking	Analog Output	4-20 mA loop
		Response Time	2-60 seconds, 90% of full scale (depends on input averaging)
WT101 (Powered Rate/Totalizer) (e.g. FT420)		WT104 (Battery-powered Rate/Totalizer) (e.g. FT415)	
Power	12-32 Vdc (for 4 mA DC min); 24-32 Vdc (for accuracy of 4-20 mA loop)	Power	3.6 Vdc Lithium battery replaceable, 3-5 year life
Rate	6-digit autorange	Rate	6-digit auto range
Total	8-digit	Total	8-digit
Memory	Non-volatile (no battery needed)		
Pulse Output	0.1 second open collector (scaled); 0-75 pulse/second passthrough (unscaled); High alarm or low alarm	Pulse Output	0.1 second open collector (scaled); 0-75 pulse/second passthrough (unscaled); High alarm or low alarm
Analog Output	4-20 mA loop (24-32 Vdc required)		

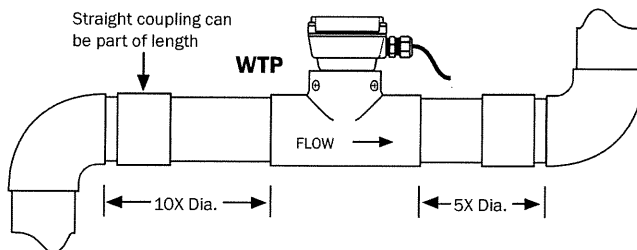
*Specifications subject to change • Please consult our website for current data (www.seametrics.com).

INSTALLATION, CONNECTIONS, MAINTENANCE and REPAIR

INSTALLATION



Piping Conditions. Installing the meter with 10 diameters of straight pipe upstream and 5 downstream is recommended.

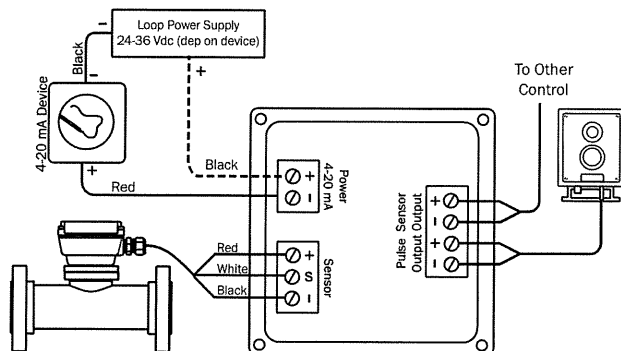


Flanges. For 3-8" WTC and WTS meters, standard flanges are 150 lb. ANSI drilling. 2" WTC or WTS meters and all PVC meters can be installed with optional flanges according to pipe manufacturer's recommendations. For PVC a bolt torque of 10-20 ft-lbs. for 2" flanges, 20-30 ft-lbs. for 3" and 4" flanges, and 35-50 ft-lbs. for 6" flanges is recommended.

Either partial or full-face gaskets can be used. Tighten the bolts evenly. Use care to prevent a misaligned gasket from entering the flow stream.

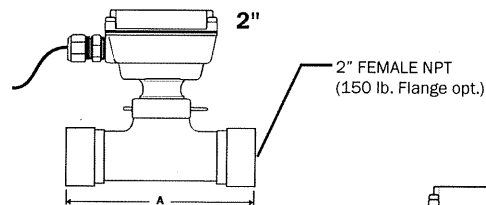
Position. The WT-Series are all-position meters, operable in a vertical or horizontal position, with the meter insert in any radial position. A horizontal position is preferred if there is a risk of air becoming trapped due to constant low flows. Operating the meter in partially-filled pipe will result in inaccuracies.

CONNECTIONS



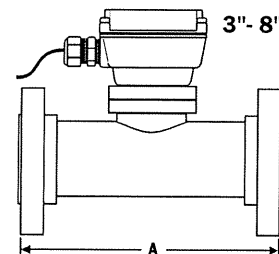
For operating instructions for the various electronic modules, consult the manual for the specific module, included with the meter at purchase.

WTC and WTS Meters

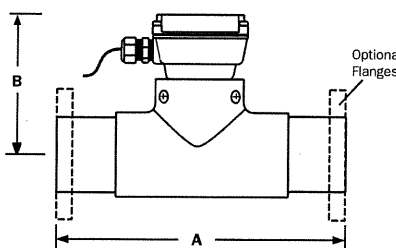


Size	Dim A
2"	* 8"/±10"
3"	12"
4"	14"
6"	18"
8"	20"

*Without flange
±With flange



WTP Meter



Size	A	B
2"	10"	7.5"
3"	12"	6.5"
4"	14"	7.0"
6"	18"	8.5"

MAINTENANCE and REPAIR

Recalibration. If it is necessary to recalibrate the meter for any reason, this can be done by any Seametrics-authorized facility. Call your supplier for information.

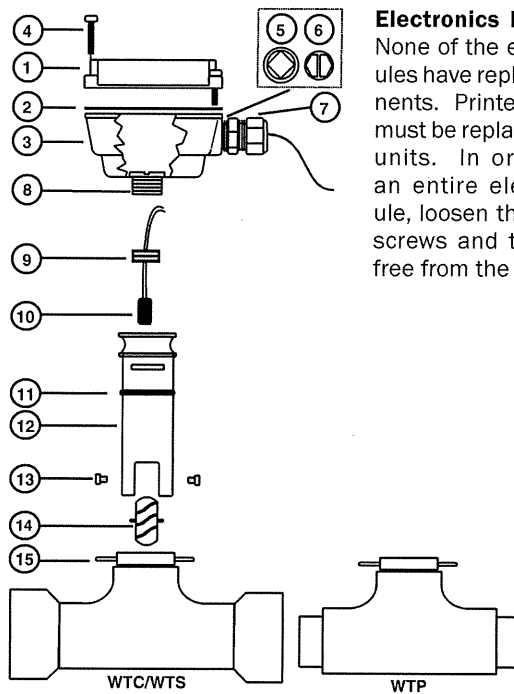
Turbine Insert Removal and Installation. CAUTION: First remove all pressure from the line. Then remove the screws or bolts that hold the insert in place (or the U-clip in the 2" meters) and tug gently until the insert comes free. A twisting motion can help to loosen the O-ring seal. Reverse the procedure to reinstall, after coating the O-ring with lubricant (plastic compatible in the WTP). Do not overtighten.

Rotor and Shaft Replacement. Examine the rotor to determine if bearings or shaft are damaged or excessively worn. The rotor should spin smoothly and freely, with no visible wobble. Back and forth play should be very minor, less than 1/64". If it is necessary to replace the rotor or shafts, first back out both shafts with a small blade screwdriver. The rotor will come free as soon as the shaft ends come free of the rotor bearings. Reverse the procedure to reinstall. **Note:** Do not overtighten the shaft screws. Check to be sure that a small amount of free play between the shaft ends and the bearings remains.

Sensor Replacement. This is rarely necessary. However, certain electrical conditions can damage the sensor. To replace it, first remove the electronics module. Disconnect the sensor leads from the electronics module terminals and remove the threaded plug over the sensor. Finally, remove the sensor by pulling on the sensor leads. A gentle tug should be sufficient. Reverse the process to replace the sensor.

REPLACEMENT PARTS

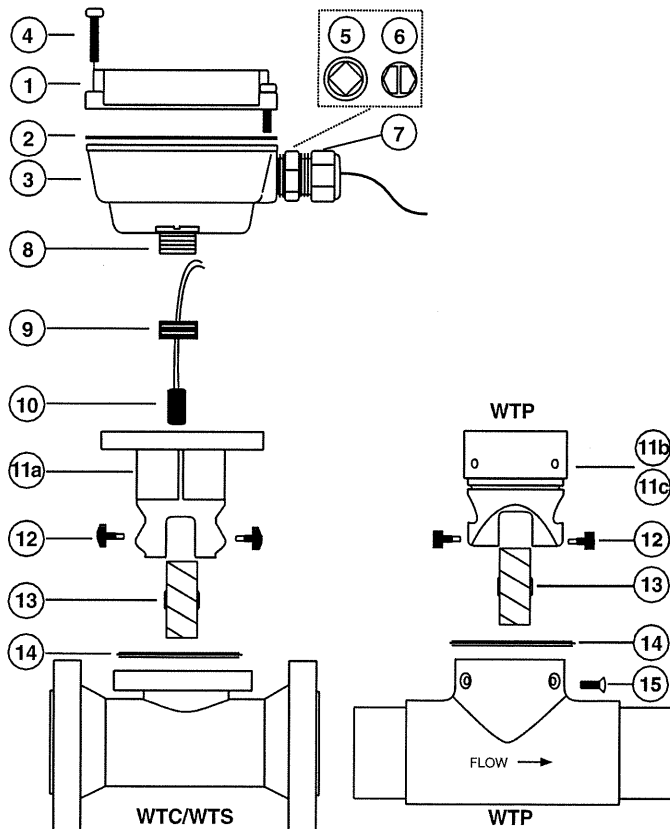
2" METERS		
1-6	Housing	see 3 - 8"
7	Strain relief	101850
8	Square housing adapter	Not Available
9	Pickup retaining screw	100298
10	Pickup, Micropower (for WT104)	100508
	Pickup, Standard (for WT101)	100419
11	O-ring, EPDM	100264
12	Insert	Contact Factory
13/14	Rotor Repair Kit, Polypro/Tungsten Carbide	101912 After 1-1-2011
14	Rotor Assembly, Polypro/Tungsten Carbide	101862 After 1-1-2011
15	U-clip, stainless	100154



Electronics Module Repair.

None of the electronics modules have replaceable components. Printed circuit boards must be replaced as complete units. In order to replace an entire electronics module, loosen the four retaining screws and the unit will lift free from the insert housing.

3" - 8" METERS		WTC	WTP	WTS
1	Upper blind housing assembly	100662	100662	100662
1	Powered rate/totalizer	100495	100495	100495
1	Blind 4-20 mA transmitter	100471	100471	100471
1	Battery-powered rate/totalizer	100469	100469	100469
2	Lower housing gasket	100411	100411	100411
3	Lower housing	100502	100502	100502
4	Upper housing screw assembly (4 req)	100414	100414	100414
5	Plug, steel	100360	100360	100360
6	Water seal assembly	100364	100364	100364
7	Strain relief	101850	100850	100850
8	Square housing adapter	Part Not Replaceable		
9	Pickup retaining screw	100298	100298	100298
10	Pickup, Micropower (for WT104)	100508	100508	100508
	Pickup, Standard (for WT101)	100419	100419	100419
11a	Insert, 3"-8" WTC and WTS	100440	100440	100440
11b	Insert, 3" PVC	N/A	100438	N/A
11c	Insert, 4"-6" PVC	N/A	100439	N/A
12	Shaft assembly, ceramic (2 req)	100227	100227	100227
13	Rotor (PVDF)/bearing assembly	100152	100333	100152
14	O-ring, EPDM	100270	100214	100270
15	Insert screw (4 req'd)	N/A	100023	N/A



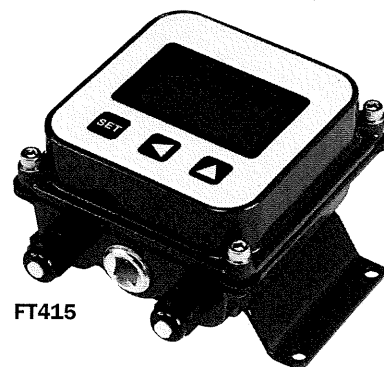
Seametrics

Seametrics Incorporated • 19026 72nd Avenue South • Kent, Washington 98032 • USA

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FT420



FT415

FEATURES

- Simple Setup
- Battery (FT415) or Loop Powered (FT420)
- Remote or Flow Sensor Mounted Indicator
- Rugged Metallic Housing
- Non-volatile Memory

APPLICATIONS

- Water Treatment
- Water Utility
- Industrial Chemical Handling

GENERAL INFORMATION

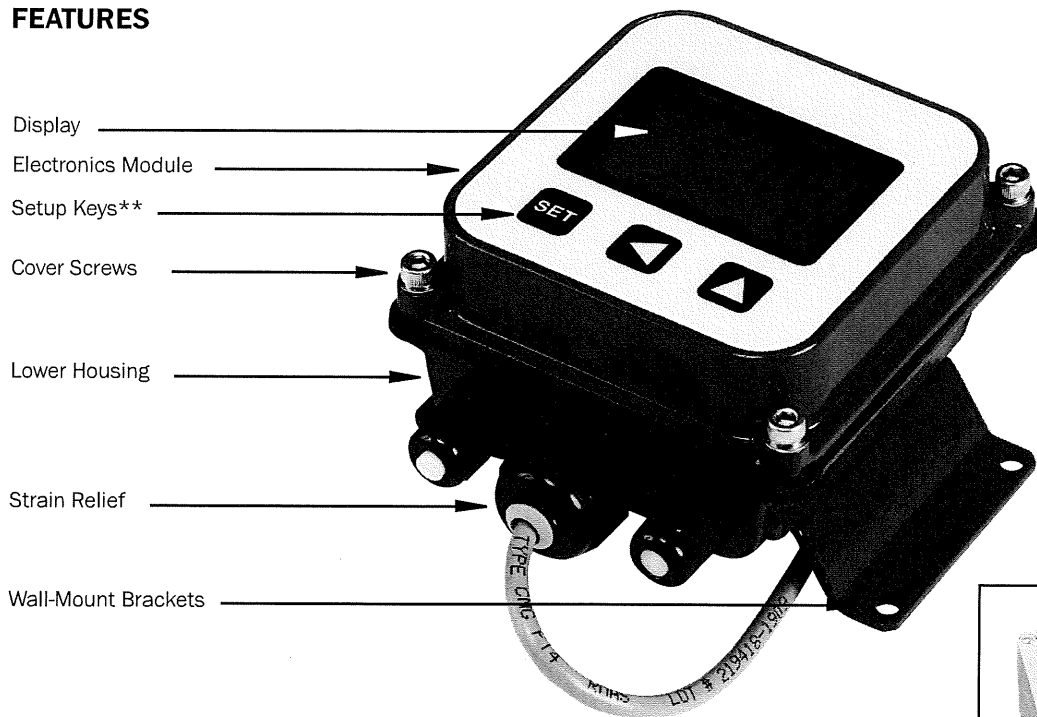
The FT400-Series flow computers are microcontroller-based indicator/transmitters that display flow rate and total and provide output signals. The FT415 is battery-powered and provides a scalable pulse output. The FT420 is powered by external DC voltage and has both pulse and 4-20 mA analog outputs. When the FT420 is being used in the 4-20 mA mode, it is a "two-wire" or "loop-powered" device, meaning that the 4-20 mA output signal doubles as its power supply.

The addition of a dual-relay output board (FT420 only) allows for certain applications requiring contact output isolation (e.g., certain metering pumps and water treatment controls). Dual solid state relays provide exactly the same pulse output as the standard unit, and each can signal one external device. A non-resettable total is also available. The FT420 can be ordered in a plastic enclosure with a 115 Vac power supply for use with mechanical meters, or with a built-in 115 Vac/12-24 Vdc dual power supply for magmeters.

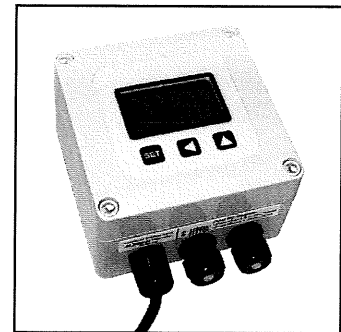
Both the FT415 and the FT420 can be factory-mounted on the meter or remotely wall mounted with the brackets provided. The FT420 is also available as a panel mount with an open back for easy installation in the user's own electrical enclosure. Most FT400's can be converted from wall-to-meter or meter-to-wall mount configurations after installation if needed.

Housings for the wall and meter-mounted models are rugged cast aluminum, potted and gasketed for maximum environmental protection. A membrane keypad allows settings to be changed without removing the cover. (Password protection, a standard feature on the FT420, can be used to prevent settings from being changed.)

FEATURES



**The FT420 includes password protection for tamper prevention when needed



FT420 with -27 or -65 Option

SPECIFICATIONS*

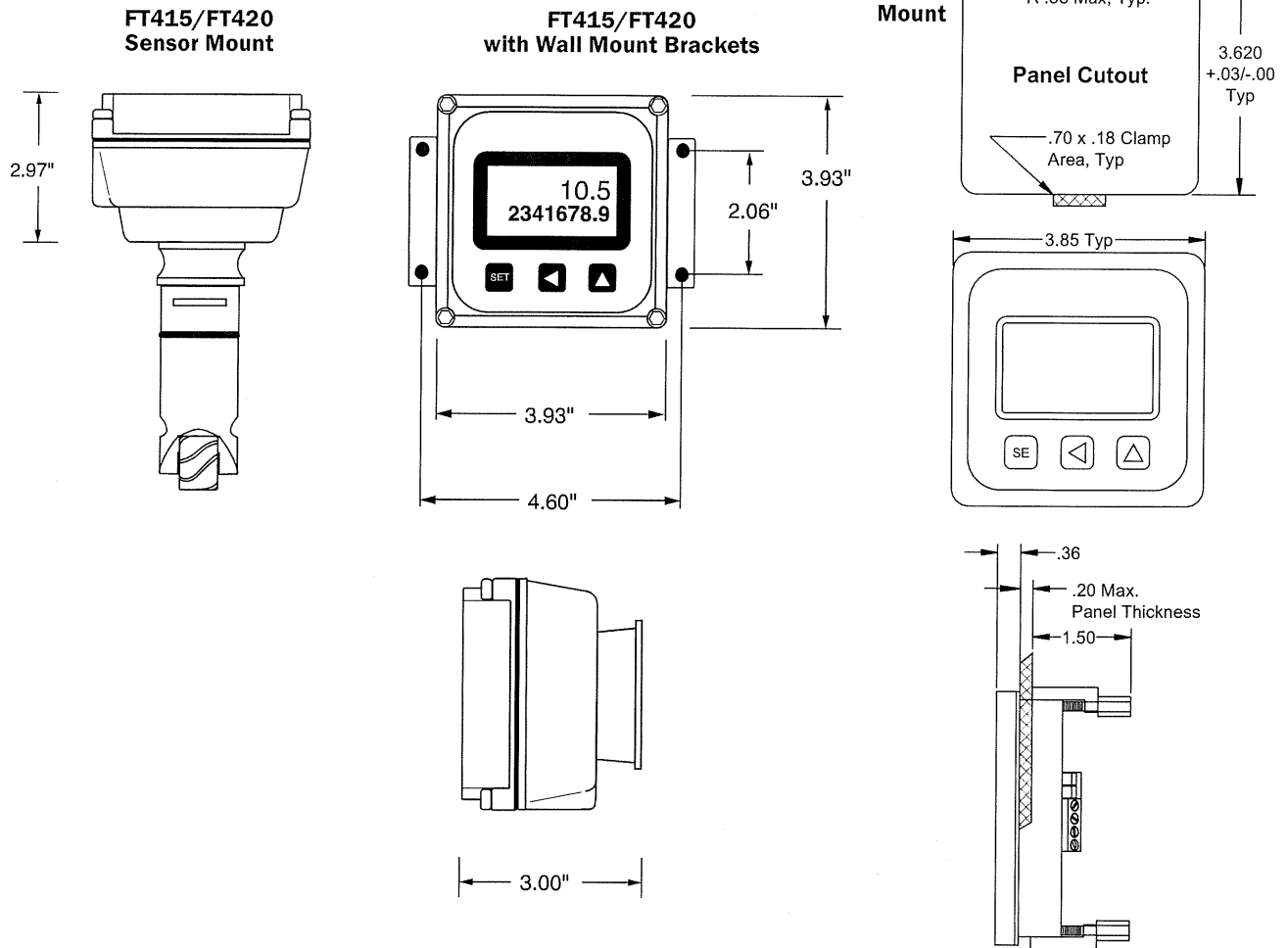
		FT415	FT420
Power		Lithium "C", 3.6 Vdc, replaceable. Estimated life is 3-5 years depending on usage.	12-30 Vdc, 4mA (4-20 mA when loop-powered)
Display	Rate	6-digit autorange, 1/2" character height	6-digit autorange, 1/2" character height
	Total	8-digit, 5/16" character height	8-digit, 5/16" character height
Outputs	Current Sinking Pulse	Scaled Pulse output (0.1 sec duration 6.1 Hz max) (or High Alarm output or Low Alarm output) Sensor pass-through Pulse output (unscaled)	
	Analog	None	4-20 mA loop; 24-30 Vdc
Pulse Output Range		0.1 - 9999999.9 units/pulse	0.1 - 9999999.9 units/pulse
Input		Micropower GMR Sensor (square wave)	5V pulse or contact closure
Input Range		1.0 - 150 pulses/second	1.0 - 1,500 pulses/second
K-Factor Range		.001 - 99999.999	.001 - 99999.999
Flow Alarm Output Range		.01 - 999999.99	.01 - 999999.99
Operating Temperature		-30° to 65° C (-22° to 148° F)	-30° to 65° C (-22° to 148° F)
Environmental		NEMA 4X, IP66	NEMA 4X, IP66

*Specifications subject to change • Please consult our website for current data (www.seametrics.com).

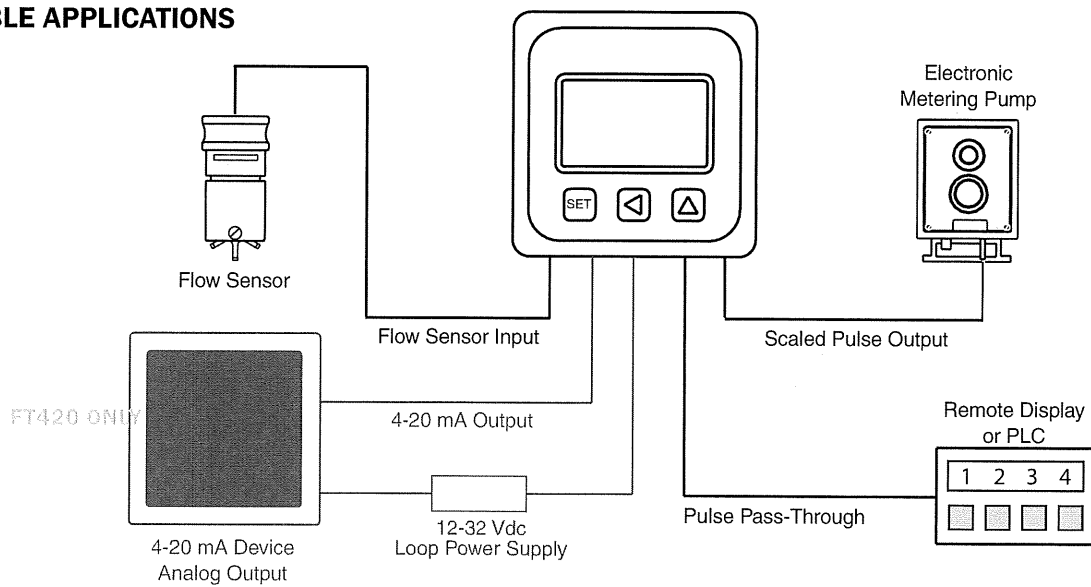


FT400-SERIES Rate/Total Indicator

DIMENSIONS



POSSIBLE APPLICATIONS





FT400-SERIES Rate/Total Indicator

HOW TO ORDER

MODEL

Battery-powered indicator = **FT415**

Loop-powered indicator/transmitter = **FT420**

MOUNTING

Wall mount = **W**

Panel mount = **P**

Meter mount = **See appropriate
meter specification to order meter
mounted units.**

OPTIONS

Built-in 115 Vac/12-24 Vdc dual power supply
(FT420W only, use with magmeters) = **-27**

Tamper-evident = **-32**

Non-resettable total = **-64**

Built-in 115 Vac power supply
(FT420W only, use with mechanical meters) = **-65**

Dual relay output (FT420 only) = **-98**

ACCESSORIES

Data logger (wall mount) = **DL76W**

Power converter, plug-in, 115 Vac, 24 Vdc = **PC3**

Dual power supply, plug-in, 115 Vac, 12/24 Vdc = **PC42**

Protective cover, hinged = **101949**

Mounting kit, wall-to-meter conversion = **102632**

Mounting kit, meter-to-wall conversion = **102633**

LMI pump power cable = **100013**

LMI pulse out cable = **100039**

CONTACT YOUR SUPPLIER