DESCRIPTION

M-series fixed ell irrigation flow meter are designed to provide accurate flow measurement at moderate or high pressure ratings in an inexpensive package.

The impeller and drive assembly are easily accessed through the open end of the meter tube and can be field-serviced without need for factory calibration. The carbon steel flow tube has a fusion-bonded epoxy coating offering excellent corrosion protection.

Models MF1 and ML1 are fitted with AWWA Class D flanges and designed for a maximum continuous pressure of up to 75 psi (ML1) and 150 psi (MF1).

Other meter ends available are smooth end (MS1), grooved end (MT1) and threated end (MT1).

As with all McCrometer propeller flowmeters, standard features include a magnetically coupled drive, instantaneous flowrate indicator and straight-reading, six-digit totalizer.

All Mc Propeller flow meters are manufactured to comply with applicable provisions of NSF 61 / NSF 372 and AWWA Standard No. C704-02 for propeller-type flow meters.

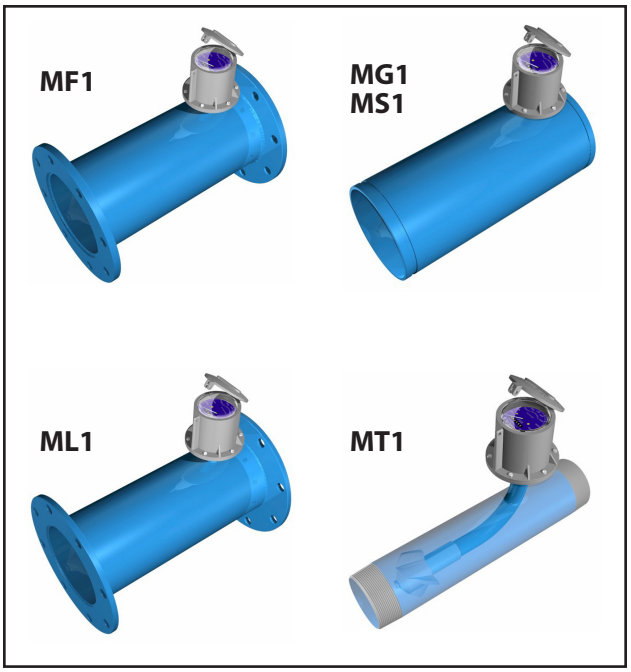
FEATURES

Impellers

- Impellers are manufactured of high-impact plastic, capable of retaining their shape and accuracy over the life of the meter.
- Each impeller is individually calibrated at the factory to accommodate the use of any standard McCrometer register, and since no change gears are used, the flow meters can be field-serviced without the need for factory recalibration.

Bearings

- Factory lubricated stainless steel bearings are used to support the impeller shaft.
- The shielded bearing design limits the entry of materials and fluids into the bearing chamber providing maximum bearing protection.



Typical Applications

The McCrometer propeller meter is the most widely used flowmeter for municipal and wastewater treatment applications as well as agricultural and turf irrigation measurement. Typical applications include:

- Center pivot systems
- Sprinkler irrigation systems
- Golf course and park water management
- Drip irrigation systems
- Commercial nurseries
- Water and wastewater management
- Gravity turnouts from underground pipelines
- Truck loading and discharge

Register

- An instantaneous flowrate indicator is standard and available in gallons per minute, cubic feet per second, liters per second and other units.
- The register is driven by a flexible steel cable encased within a protective vinyl liner.
- The register housing protects both the register and cable drive system from moisture while allowing clear reading of the flowrate indicator and totalizer.

Part Numbers, Digital Registers

M						-		-		-		-		-	
CONNECTION OPTIONS:															
Flanged End 150 PSI	F1														
Flanged End Lightweight	L1														
Grooved End	G1														
Smooth End	S1														
Threaded End	T1														
METER SIZE															
2" Fixed Ell Meter		02													
2.5" Fixed Ell Meter		01													
3" Fixed Ell Meter		03													
4" Fixed Ell Meter		04													
6" Fixed Ell Meter		06													
8" Fixed Ell Meter		08													
10" Fixed Ell Meter		10													
12" Fixed Ell Meter		12													
14" Fixed Ell Meter		14													
16" Fixed Ell Meter		16													
18" Fixed Ell Meter		18													
20" Fixed Ell Meter		20													
24" Fixed Ell Meter		24													
Tube Options															
AWWA Class D Standard Length Tube			A												
ANSI Flange Standard Length Tube			B												
Non Standard Tube			X												
Bearing Options															
Standard				1											
Marathon				2											
SS316				3											
SS316 Marathon				4											
SS316 Ceramic				5											
Register Options															
Flowcom (FC200)					F										
Flow Connect (FC Smart Part on 2nd Line)					T										

MODEL SIZES OFFERED:

MF1	ML1	MG1	MS1	MT1
x		x	x	x
x		x	x	x
x		x	x	x
x		x	x	x
x	x	x	x	x
x	x	x	x	
x	x	x	x	
x	x	x	x	
x		x	x	
x		x	x	
x		x	x	
x		x	x	
x			x	

continued on next page

Part Numbers, Digital Registers (cont.)

Output Options									
No Outputs									
Open Collector Pulse	1								
4-20mA Analog Only	2								
4-20mA Analog + Open Collector Pulse	3								
Output Cable Options									
No Output Cables									
6 ft		C1							
15 ft		C2							
25 ft		C3							
50 ft		C4							
75 ft		C5							
100 ft		C6							
150 ft		C8							
Smart Output Protocol / Telemetry Options									
No AMI Outputs/Telemetry Options									
Sensus Protocol (6ft Open End Cable)				SEN					
Itron 6 digit Protocol (6ft Open End Cable)				IT6					
Itron 9 digit [100W] Protocol (6ft Open End Cable)				IT9					
Neptune Protocol (6ft Open End Cable)				NEP					
SmartTrax On-Board (Integrated Telemetry on FlowCom)				STX					
2 ft SmartTrax Standalone Unit ExactRead Cable				S02					
6 ft SmartTrax Standalone Unit ExactRead Cable				S06					
25 ft SmartTrax Standalone Unit ExactRead Cable				S25					
50 ft SmartTrax Standalone Unit ExactRead Cable				S50					
Register Remote and Extension Options									
Meter Mount (Standard)									
6 ft Cable Remote Mount (Flowcom only)						R06			
25 ft Cable Remote Mount (Flowcom only)						R25			
50 ft Cable Remote Mount (Flowcom only)						R50			
6" Long Extension (Mech or DIgital)						006			
1" Increments for Extensions Lengths						XXX			
150" Maximum extension length						150			
SPECIAL OPTIONS									
No Special Options									
High Temp Prop and Seals							H		
No Batteries, Battery Tray Options									
Includes Batteries (*Standard*)									
No Batteries (Alkaline Tray)									NBA
No Batteries (Lithium Tray)									NBL

Part Numbers, Mechanical Registers

M						-		-	
CONNECTION OPTIONS:									
Flanged End 150 PSI	F1								
Flanged End Lightweight	L1								
Grooved End	G1								
Smooth End	S1								
Threaded End	T1								
METER SIZE									
2" Fixed Ell Meter		02							
2.5" Fixed Ell Meter		01							
3" Fixed Ell Meter		03							
4" Fixed Ell Meter		04							
6" Fixed Ell Meter		06							
8" Fixed Ell Meter		08							
10" Fixed Ell Meter		10							
12" Fixed Ell Meter		12							
14" Fixed Ell Meter		14							
16" Fixed Ell Meter		16							
18" Fixed Ell Meter		18							
20" Fixed Ell Meter		20							
24" Fixed Ell Meter		24							
Tube Options									
AWWA Class D Standard Length Tube			A						
ANSI Flange Standard Length Tube			B						
Non Standard Tube			X						
Bearing Options									
Standard				1					
Marathon				2					
SS316				3					
SS316 Marathon				4					
SS316 Ceramic				5					
Register Options									
6 Wheel					1				
6 Wheel Anti Reverse					2				
6 Wheel with Index					3				
6 Wheel Anti Reverse & Index					4				
7 Wheel					5				
7 Wheel Anti Reverse					6				
7 Wheel with Index					7				
7 Wheel Anti Reverse & Index					8				

MODEL SIZES OFFERED:

MF1	ML1	MG1	MS1	MT1
x		x	x	x
x		x	x	x
x		x	x	x
x		x	x	x
x	x	x	x	x
x	x	x	x	
x	x	x	x	
x	x	x	x	
x		x	x	
x		x	x	
		x	x	
		x	x	
			x	

continued on next page

Part Numbers, Mechanical Registers (cont.)

M		-		-	
Output Options					
No Outputs					
4-20 Analog Only (E7000-000)	A				
Dry Contact Pulse & 4-20 Analog (E7000-001)	B				
Opto Isolated Pulse & 4-20 Analog (E7000-002)	C				
Mechanical Datalogger (MC20-D2)	E				
Non Powered Pulse (EA618-02)	G				
CMOS Square Wave Pulse (EA631-002)	J				
Sink to Ground Pulse (EA631-102)	K				
Dry Contact Pulse (SA100)	L				
Extension Options					
Meter Mount (Standard)					
6" Long Extension			006		
1" Increments for Extensions Lengths			XXX		
150" Maximum extension length			150		
SPECIAL OPTIONS					
High Temp Prop and Seals					H

M-SERIES FIXED ELL FLOW METER SPECIFICATIONS

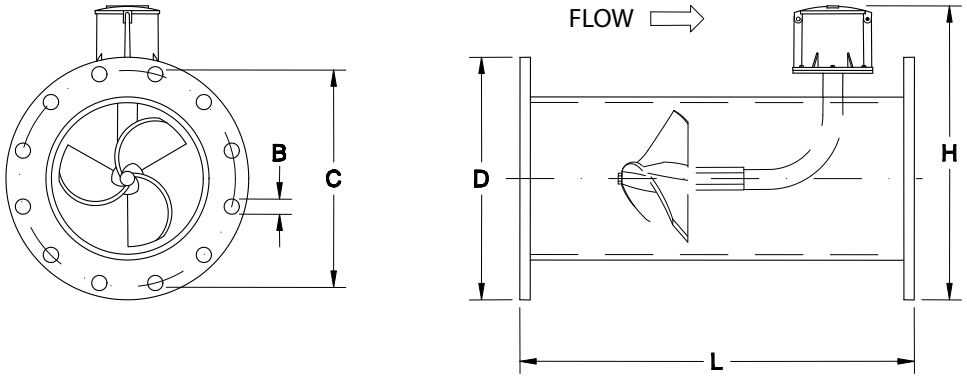
	MF100	ML100	MG100 MS100	MT100
Performance				
Accuracy / Repeatability	• ±2% of reading guaranteed throughout full range • ±1% over reduced range • Repeatability 0.25% or better	• ±2% of reading guaranteed throughout full range • ±1% over reduced range • Repeatability 0.25% or better	• ±2% of reading guaranteed throughout full range • ±1% over reduced range • Repeatability 0.25% or better.	• ±2% of reading guaranteed throughout full range • ±1% over reduced range • Repeatability 0.25% or better
Range	2" to 16"	6", 8", 10" 12"	2" to 24"	2" to 6"
Maximum Temperature	(Standard Construction) 160°F constant		(Standard Construction) 160°F constant	(Standard Construction) 160°F constant
Pressure Rating	150 psi. Consult factory for higher rated version.	75 psi	150 psi	150 psi
Materials				
Tube		Epoxy-coated carbon steel pipe, conforming to ASA pipe standards. Lightweight irrigation flanges with 150 pound drilling		
Spool	Carbon steel standard, stainless steel optional	Carbon steel standard, stainless steel optional	Epoxy-coated carbon steel	Carbon steel standard, stainless steel optional
Coating	Fusion-bonded epoxy	Fusion-bonded epoxy	Fusion-bonded eposxy	Fusion-bonded epoxy
Body	Epoxy-coated carbon steel pipe conforming to A.S.A pipe schedules	Epoxy-coated carbon steel pipe conforming to A.S.A pipe schedules	Epoxy-coated carbon steel pipe conforming to A.S.A pipe schedules	Fusion-bonded epoxy-coated carbon steel threaded to NPT. (Other thread standards available)
Bearing Assembly	Impeller shaft is 316 stainless steel. Ball bearings are 440C stainless steel	Impeller shaft is 316 stainless steel. Ball bearings are 440C stainless steel.	Impeller shaft is 316 stainless steel. Ball bearings are 440C stainless steel	Impeller shaft is 316 stainless steel. Ball bearings are 440C stainless steel.
Magnets	(Permanent type) Alnico	(Permenant type) Alnico	(Permanent type) Alnico	(Permanent type) Alnico

Bearing Housing	• For models 2" to 16": 304 stainless steel standard, 316 stainless steel optional • For models 18" and larger: Brass standard, 316 stainless steel optional	304 stainless steel standard, 316 stainless steel optional	• For models 2" to 16": 304 stainless steel standard, 316 stainless steel optional • For models 18" and larger: Brass standard, 316 stainless steel optional	304 stainless steel standard, 316 stainless steel optional
Register	An instantaneous flowrate indicator and six-digit straight-reading totalizer are standard. The register is hermetically sealed within a die cast aluminum case. This protective housing includes a domed acrylic lens and hinged lens cover with locking hasp.	An instantaneous flowrate indicator and six-digit straight-reading totalizer are standard. The register is hermetically sealed within a die cast aluminum case. This protective housing includes a domed acrylic lens and hinged lens cover with locking hasp.	An instantaneous flowrate indicator and six-digit straight-reading totalizer are standard. The register is hermetically sealed within a die cast aluminum case. This protective housing includes a domed acrylic lens and hinged lens cover with locking hasp.	An instantaneous flowrate indicator and six-digit straight-reading totalizer are standard. The register is hermetically sealed within a die cast aluminum case. This protective housing includes a domed acrylic lens and hinged lens cover with locking hasp.
Impeller	Impellers are manufactured of high-impact plastic, retaining their shape and accuracy over the life of the meter.	Impellers are manufactured of high-impact plastic, retaining their shape and accuracy over the life of the meter.	Impellers are manufactured of high-impact plastic, retaining their shape and accuracy over the life of the meter. High temperature impeller is optional.	Impellers are manufactured of high-impact plastic, retaining their shape and accuracy over the life of the meter. High temperature impeller is optional.

Options

• Extended warranty • Register extensions • All stainless steel construction • High temperature construction • Marathon bearing assembly for higher than normal flowrates • A complete line of flow recording/control instrumentation • Flow straightening vanes • Certified calibration test results • Canopy boot	• Extended warranty • Register extensions • Flow straightening vanes • High temperature construction 180°F • Marathon bearing assembly for higher than normal flowrates • Digital register available in all sizes of this model • A complete line of flow recording/control instrumentation • Canopy boot • SmartTrax on Board integrated telemetry for digital register option	• Extended warranty • High temperature construction 180°F • Marathon bearing assembly for higher-than-normal flowrates 4″ and larger • Digital register available in all sizes of this model • A complete line of flow recording/control instrumentation • Register extensions available • Certified calibration test results • Canopy boot • Non-standard laying lengths • SmartTrax on Board integrated telemetry for digital register option	• Extended warranty • Register extensions • Custom lay lengths • High temperature construction 180°F • Marathon bearing assembly for higher than normal flowrates 4″ and larger • Digital register available in all sizes of this model • A complete line of recording/control instrumentation can be driven from this flowmeter • Canopy boot • SmartTrax on Board integrated telemetry for digital register option

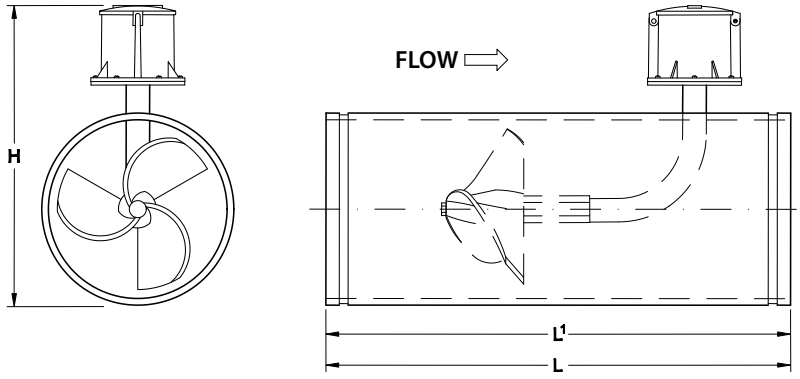
DIMENSIONS



MF1		DIMENSIONS							
Meter Size	inches	2	2 1/2	3	4	6	8	10	12
	mm	51	64	76	102	152	203	254	305
Minimum Flow	GPM	40	40	40	50	90	100	125	150
	LPS	2.5	2.5	2.5	3.2	5.7	6.3	7.9	9.5
Maximum Flow	GPM	250	250	250	600	1200	1500	1800	2500
	LPS	15.8	15.8	15.8	37.9	75.7	94.6	113.6	157.7
Maximum Flow w/ Marathon Bearing	GPM				900	1800	2250	2700	3750
Approx. Head Loss in Inches at Max. Flow	inches	29.5	29.5	29.5	23	17	6.75	3.75	2.75
	mm	749	749	749	584	432	171	95	70
Standard Dial Face*	GPM/ Gal	250/ 10	250/ 10	250/ 10	800/ 100	1300/ 100	2500/ 100	3000/ 1000	4000/ 1000
Approx. Shipping Weight, lbs.	lbs	40	40	40	50	60	102	157	176
	kg	18	18	18	23	27	46	71	80
B	inches	0.75	0.75	0.75	0.75	0.375	0.375	1	1
	mm	19	19	19	19	10	10	25	25
C	inches	4.75	5.5	6	7.5	9.5	11.75	14.25	17
	mm	121	140	152	191	241	298	362	432
D	inches	6	7	7.5	9	11	13.5	16	19
	mm	152	178	191	229	279	343	406	483
H	inches	12.16	12.66	13	13.66	16	17.3	22.5	24
	mm	309	322	330	347	406	439	572	610
L	inches	13	13	13	20	20	20	20	20
	mm	330	330	330	508	508	508	508	508
No. of Bolts Per Flange		4	4	4	8	8	8	12	12

*Indicates the dial face range and multiplier

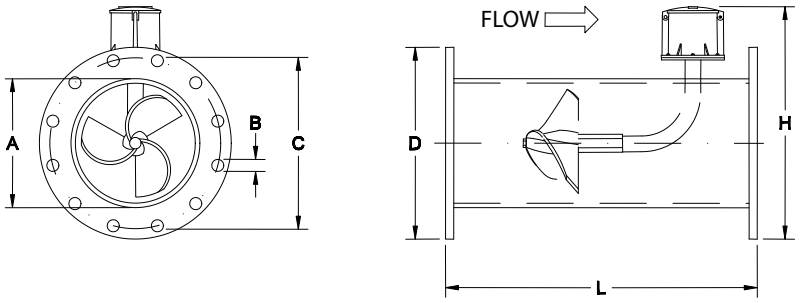
DIMENSIONS



MG1 / MS1		DIMENSIONS												
Meter Size	**inches**	**2**	**2 ½**	**3**	**4**	**6**	**8**	**10**	**12**	**14**	**16**	**18**	**20**	**24**
	mm	**51**	**64**	**76**	**102**	**152**	**203**	**254**	**305**	**356**	**406**	**457**	**508**	**610**
Minimum Flow	**GPM**	40	40	40	50	90	100	125	150	250	275	400	475	700
	LPS	2.5	2.5	2.5	3.2	5.7	6.3	7.9	9.5	15.8	17.4	25.2	30.0	44.2
Maximum Flow	**GPM**	250	250	250	600	1200	1500	1800	2500	3000	4000	5000	6000	8500
	LPS	15.8	15.8	15.8	37.9	75.7	94.7	113.6	157.8	189.3	252.4	315.5	378.6	536.4
Maximum Flow w/ Marathon Bearing	**GPM**				900	1800	2250	2700	3750	4500	6000	7500	9000	12750
Approx. Head Loss in Inches at Max. Flow	**inches**	30	30	30	23	17	7	4	3	2	2	2	1	1
	mm	749	749	749	584	432	171	95	70	51	44	38	32	25
Standard Dial Face*	**GPM/ Gal**	250/ 10	250/ 10	250/ 10	1000/ 100	1800/ 100	2500/ 100	3K/ 1000	4K/ 1000	6K/ 1000	8K/ 1000	10K/ 1000	10K/ 10K	15K/ 10K
Approx. Shipping Weight, lbs.	**lbs**	* See special note		17	28	44	53	87	106	140	144	172	181	223
	kg			8	13	20	24	40	48	64	65	78	82	101
H	**inches**			11	13	14	15	17	19	21	23	26	27	31
	mm			277	325	352	377	430	480	521	572	648	674	775
L - MG1	**inches**			13	20	20	20	20	20	20	22	22	22	22
	mm			330	508	508	508	508	508	508	559	559	559	559
L - MS1	**inches**			13	20	22	22	22	22	22	24	24	24	24
	mm			330	508	559	559	559	559	559	610	610	610	610
O.D. of Meter Tube	**inches**			4	5	7	9	11	13	14	16	18	20	24
	mm			89	114	168	219	273	324	356	406	457	508	610

*Indicates the dial face range and multiplier
**Special Note—Reducing fittings incorporating grooves are supplied to adapt the 3-inch model to smaller line sizes.
Larger flowmeters on special order.

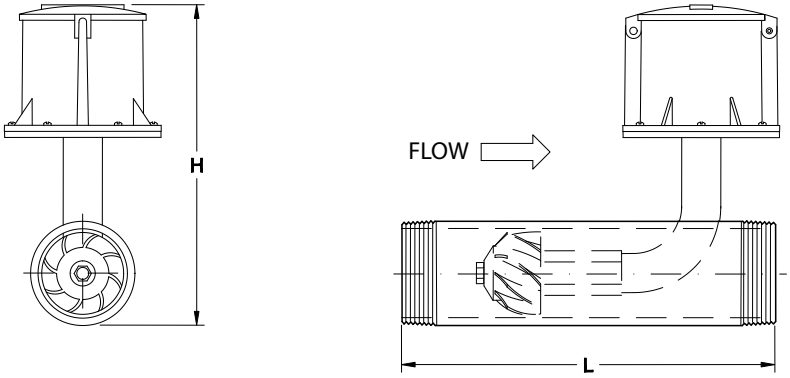
DIMENSIONS



ML1		DIMENSIONS			
Meter Size	inches	6	8	10	12
	mm	152	203	254	305
Minimum Flow	GPM	90	100	125	150
	LPS	5.7	6.3	7.9	9.5
Maximum Flow	GPM	1200	1500	1800	2500
	LPS	75.7	94.6	113.6	157.7
Maximum Flow w/ Marathon Bearing	GPM	1800	2250	2700	3750
Approx. Head Loss in Inches at Max. Flow	inches	17	6.75	3.75	2.75
	mm	432	171	95	70
Standard Dial Face*	GPM/ Gal	1300/ 100	2500/ 100	3000/ 1000	4000/ 1000
Approx. Shipping Weight, lbs.	lbs	50	61	104	125
	kg	23	28	47	57
A	inches	6	8	10	12
	mm	152	203	254	305
B	inches	0.875	0.875	1	1
	mm	22	22	25	25
C	inches	9.5	11.75	14.25	17
	mm	241	298	362	432
D	inches	11	13.25	16	19
	mm	279	337	406	483
H	inches	16.25	18.5	21.75	24.25
	mm	413	470	552	616
L	inches	20	20	20	20
	mm	508	508	508	508
No. of Bolts Per Flange		8	8	12	12

*Indicates the dial face range and multiplier

DIMENSIONS



MT1		DIMENSIONS				
Meter Size	inches	2	2 1/2	3	4	6
	mm	51	64	76	102	152
Minimum Flow	GPM	35	35	40	50	90
	LPS	2.2	2.2	2.5	3.2	5.7
Maximum Flow	GPM	250	250	250	600	1200
	LPS	15.8	15.8	15.8	37.9	75.7
Maximum Flow w/ Marathon Bearing	GPM				900	1800
Approx. Head Loss in Inches at Max. Flow	inches	29.5	29.5	29.5	23	17
	mm	749	749	749	584	432
Standard Dial Face*	GPM/ Gal	250/ 10	250/ 10	250/ 10	800/ 100	1300/ 100
Approx. Shipping Weight, lbs.	lbs	* See special note		40	50	60
	kg			18	23	27
H	inches			13	13.66	16
	mm			330	347	406
L	inches			13	20	20
	mm			330	508	508
OD up to	inches			4	8	8
	mm					

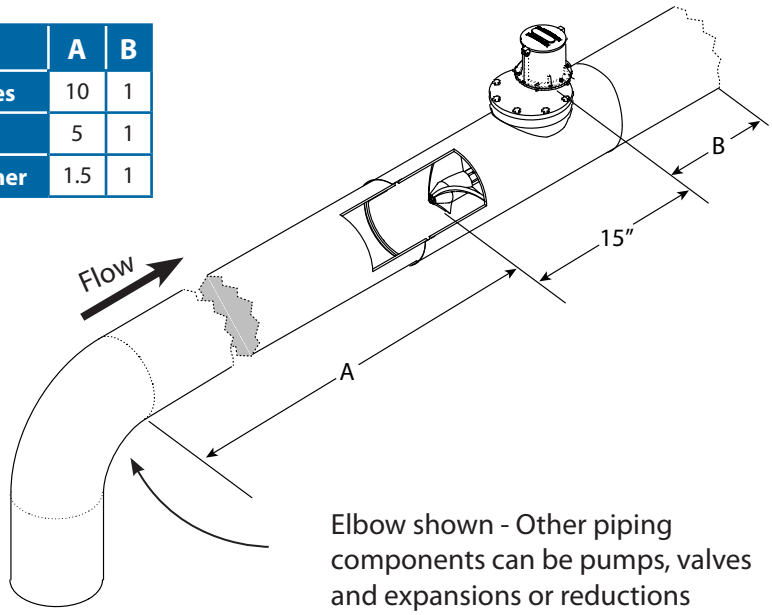
*Indicates the dial face range and multiplier
*SPECIAL NOTE — Reducing fittings are supplied to adapt the 3-inch model to smaller line sizes.

INSTALLATION

Standard installation is horizontal mount. If the meter is to be mounted in the vertical position, please advise the factory.

PIPE RUN REQUIREMENTS

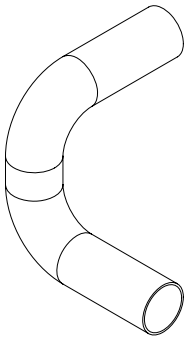
Configuration	A	B
Without straightening vanes	10	1
With straightening vanes	5	1
With FS100 Flow Straightener	1.5	1



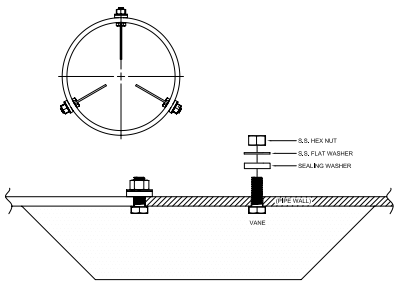
Elbow shown - Other piping components can be pumps, valves and expansions or reductions

STRAIGHTENING VANES

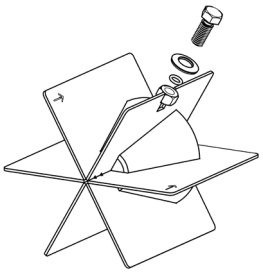
Special attention should be given to systems using two elbows "out of plane" or devices such as a centrifugal sand separator. These cause swirling flow in the line that affect propeller meters. Well developed swirls can travel up to 100 diameters downstream if unobstructed. Since most installations have less than 100 diameters to work with, straightening vanes become necessary to alleviate the problem. Straightening vanes will break up most swirls and ensure more accurate measurement. McCrometer actively encourages installing vanes just ahead of the meter. Straightening vanes are available in weld-in, bolt-in, and the FS100 Flow Straightener.



Elbows out of plane



Bolt-in straightening vanes



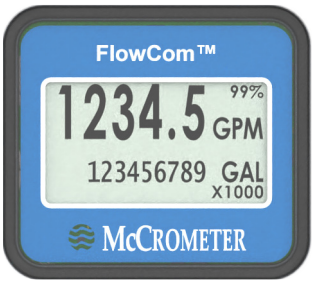
FS100 Flow Straightener

REGISTERS

Typical face plates

Standard register

Optional 7-wheel register



FlowCom register

Mechanical Register

The instantaneous flowrate indicator is standard and available in gallons per minute, cubic feet per second, liters per second and other units. The register is driven by a flexible steel cable encased within a protective vinyl liner. The register housing protects both the register and cable drive system from moisture while allowing clear reading of the flowrate indicator and totalizer.

Digital Register

The optional FlowCom digital register displays a flowmeter's flowrate and volumetric total. Available are four optional outputs: 4-20mA loop, open collector, optically isolated, and contact closure. Unique units of measurement for rate, total, 4-20mA, and pulse outputs. The FlowCom can be fitted to any new or existing McCrometer propeller flowmeter. The FlowCom also features a built-in data logger.

SmartTrax on Board

In addition to features mentioned on the FlowCom digital register, SmartTrax On Board integrated telemetry provide a streamlined, all-in-one flow measurement and telemetry system allowing growers and districts to remotely monitor water usage and manage allocations across their territories. This affects input costs such as chemigation, fuel and electricity costs, and most importantly - your time! For natural resource districts and the like, SmartTrax on Board removes the need to manually collect flow data from each metered well, freeing up personnel time.

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McCROMETER