

Appendix

Application Schematics

The purpose of the application schematics is to show different applications and the best sensor location for a particular application.

Clearance

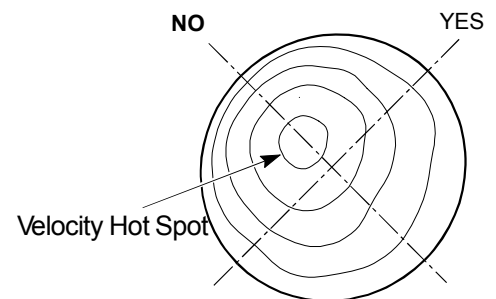
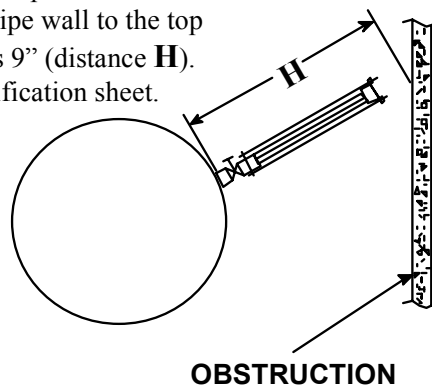
Because the sensor will protrude from the pipe when installed, a clearance length should be allowed. See Obstruction Diagram below and Sensor Specification Sheet on page 50.

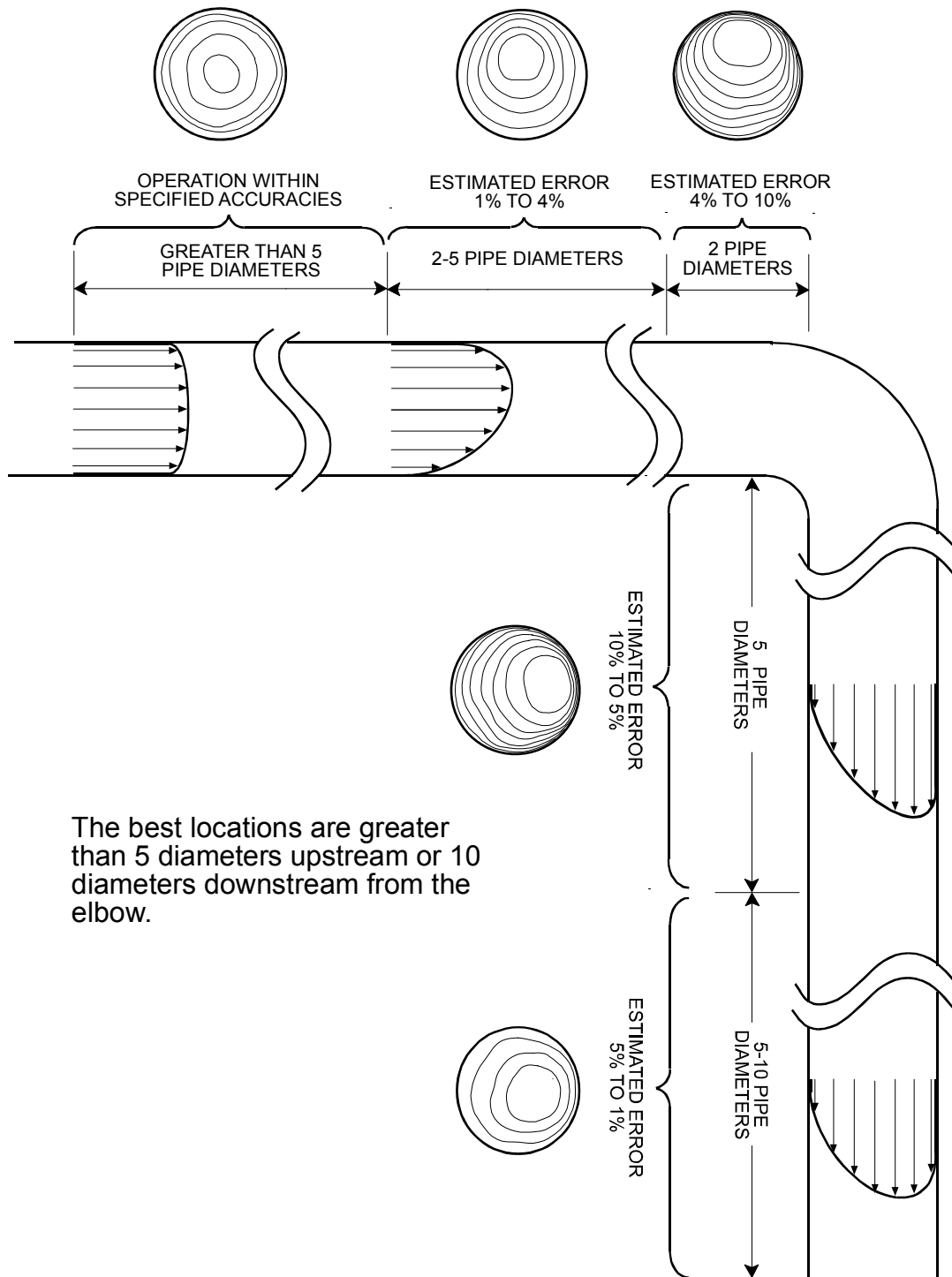
Skewed profiles

The sensor may not operate within specifications in a location where the profile is skewed. These locations are indicated by an ESTIMATED ERROR notation in the application schematics. Errors are estimated for flow at ± 10 ft/sec (± 3 m/sec). *If the velocity is less than ± 10 ft/sec, the error will be less.*

To avoid velocity "hot" or "cold" spots, choose an insertion angle that is away from the hot spot.

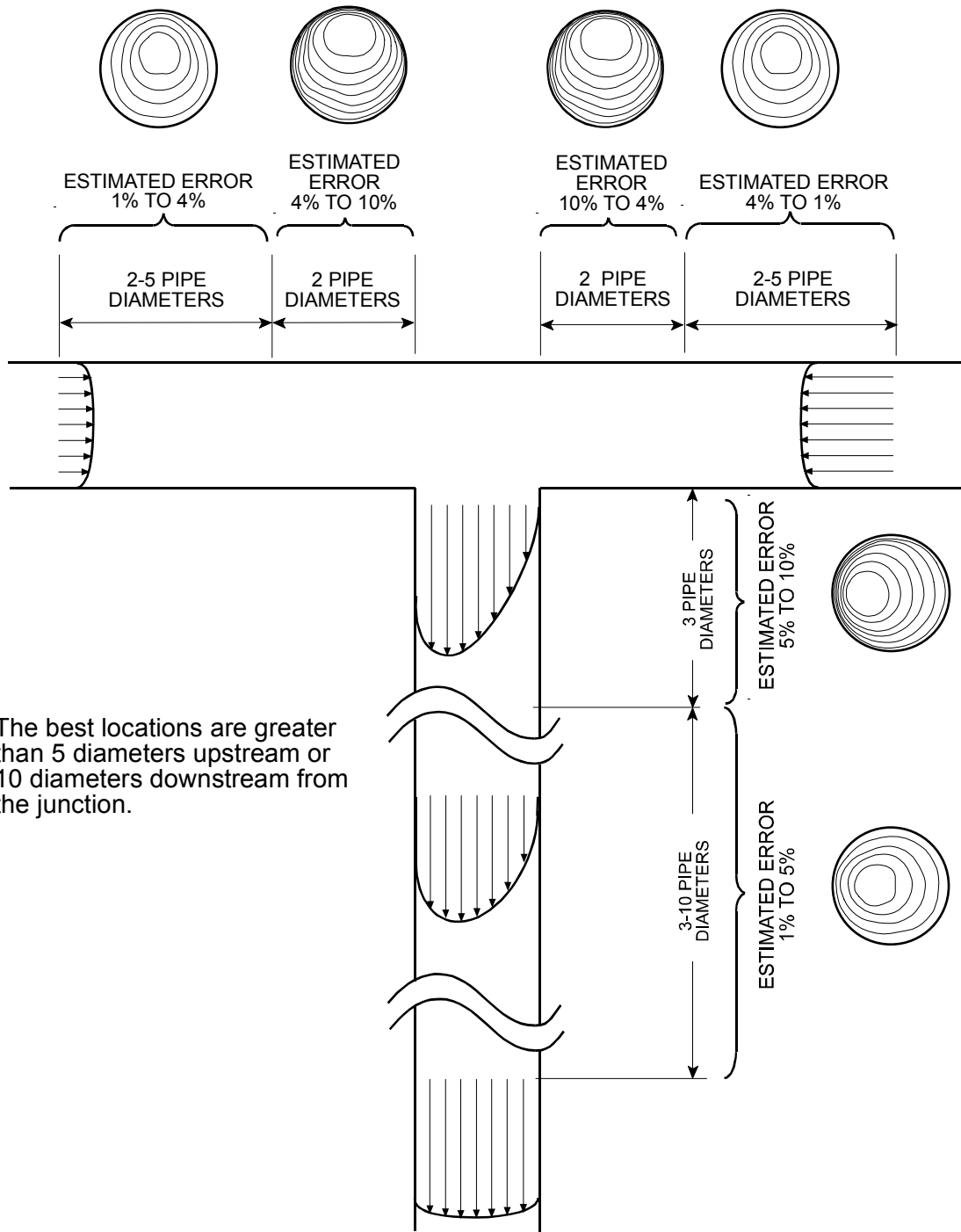
Distance **H** must be at least the total sensor length plus the distance from the outer pipe wall to the top of the valve plus 9" (distance **H**). See sensor specification sheet.





90° Elbow

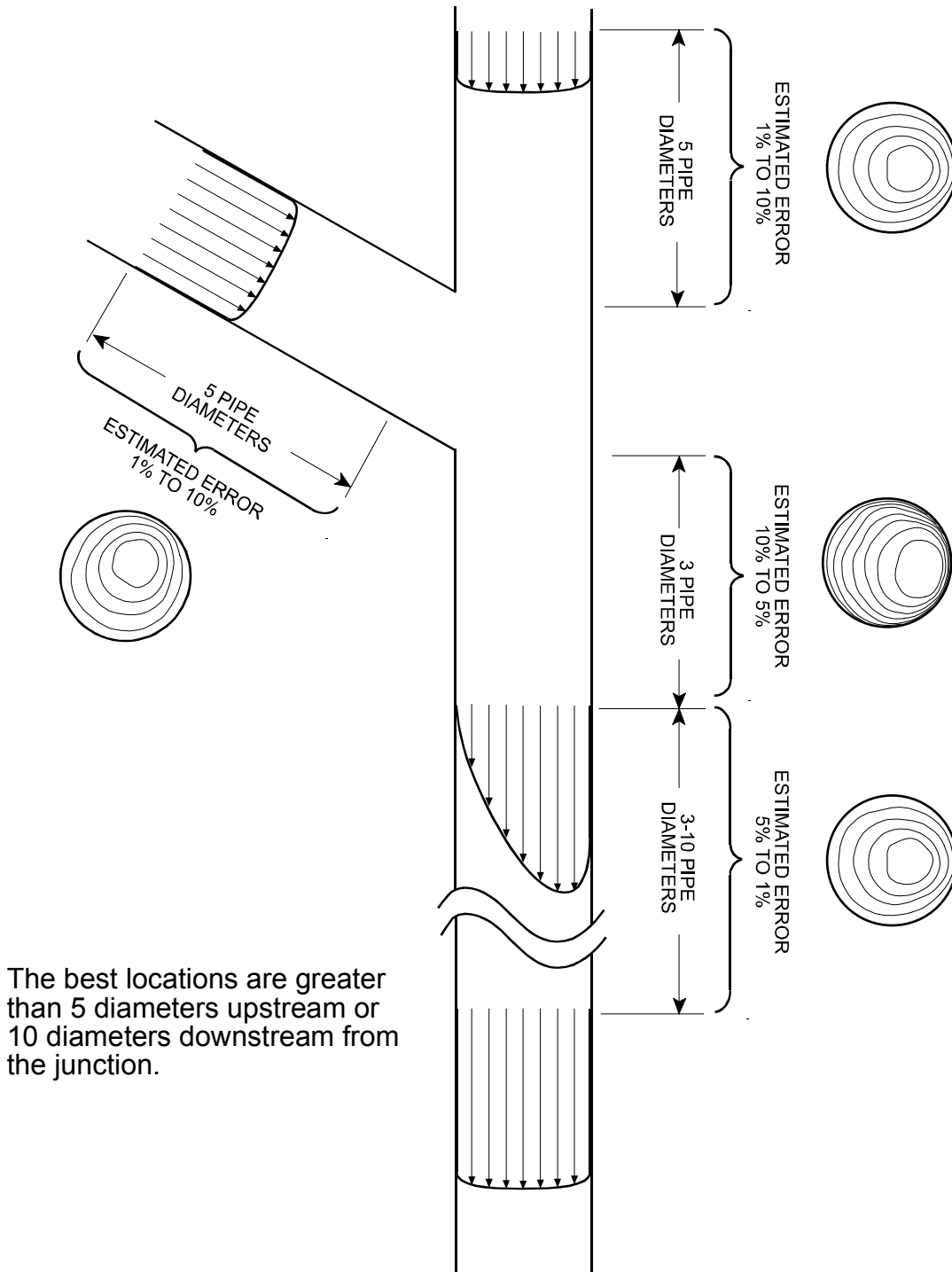
(errors are estimated for flow at 10 ft/sec) (3 m/sec)



The best locations are greater than 5 diameters upstream or 10 diameters downstream from the junction.

T-Junction

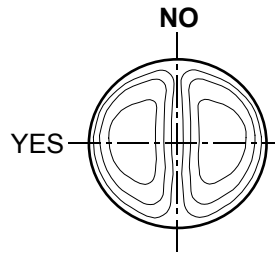
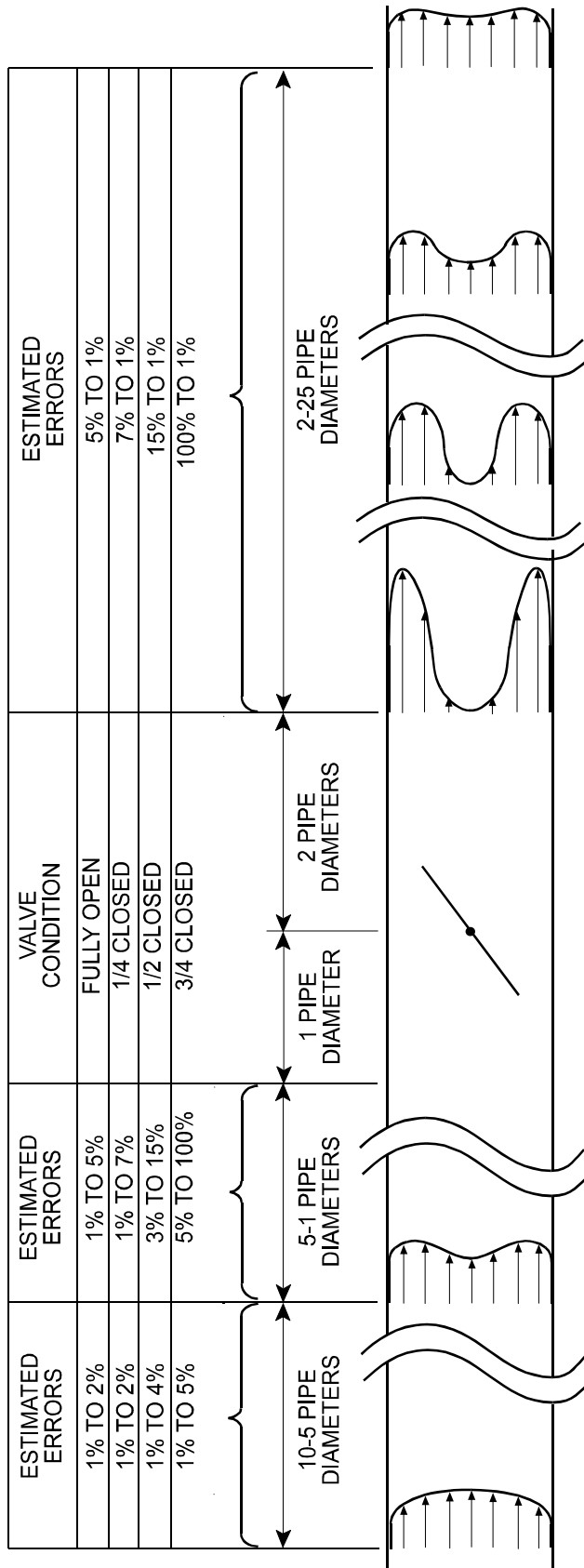
(errors are estimated for flow at 10 ft/sec) (3 m/sec)



The best locations are greater than 5 diameters upstream or 10 diameters downstream from the junction.

Y-Junction

(errors are estimated for flow at 10 ft/sec) (3 m/sec)



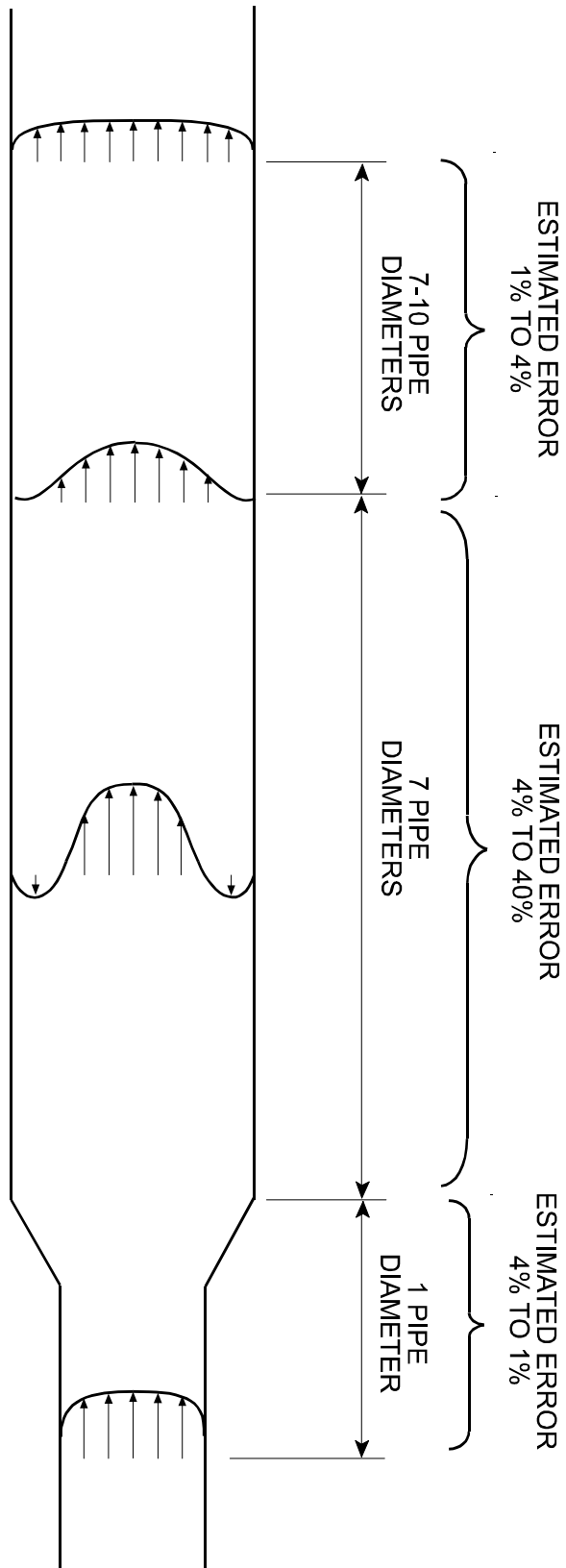
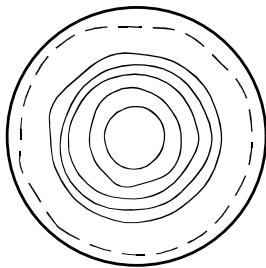
Recommended insertion angle for active valves.

The purpose of an active valve is to vary the flow. An active valve will produce a distorted profile that changes as the flow changes. As a result, the sensor should be installed at least 10 diameters upstream or 25 diameters downstream from an active valve to obtain 1% accuracy. The upstream side is the preferred location.

Active Valves

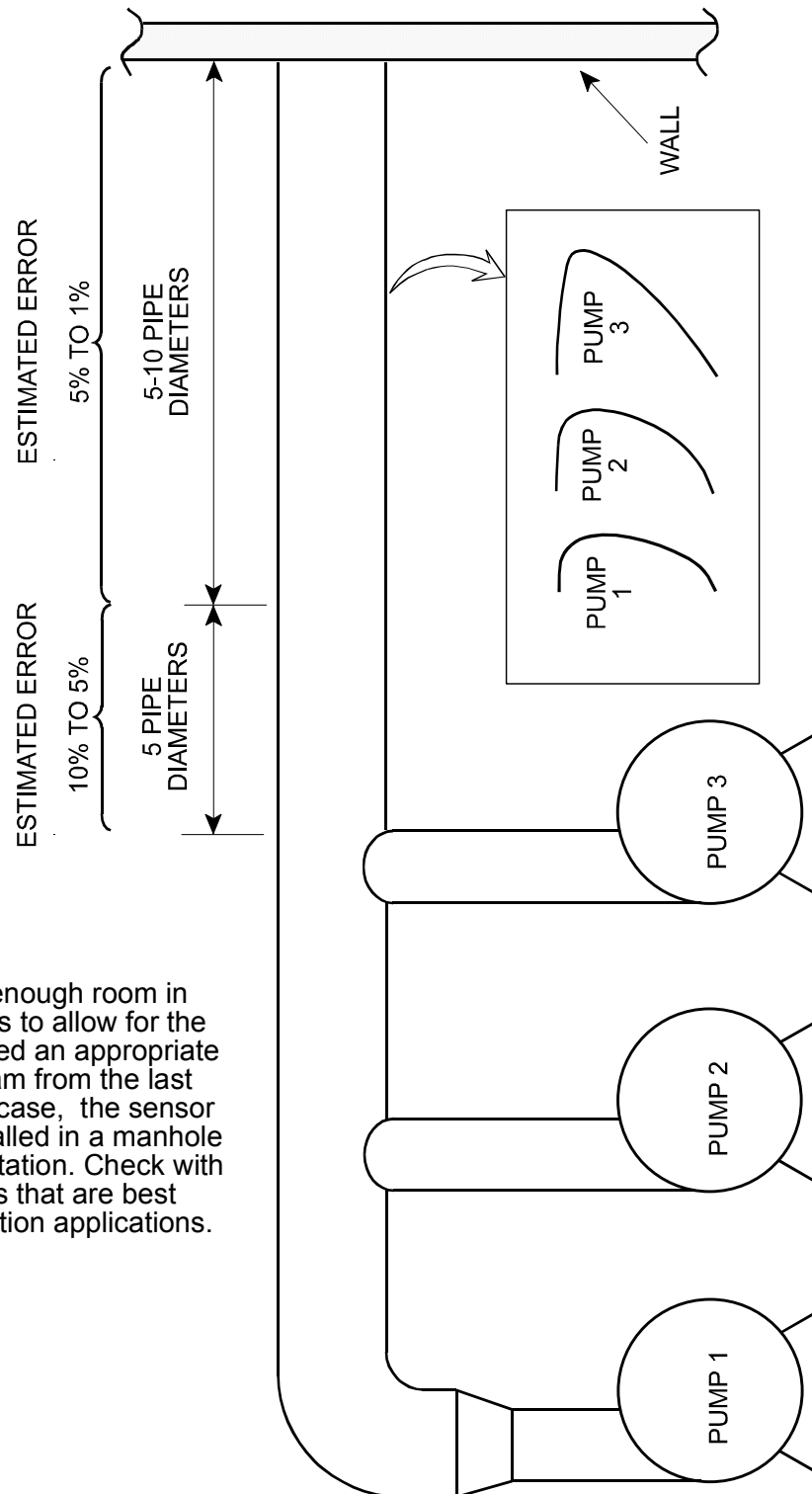
(errors are estimated for flow at 10 ft/sec)

The best locations are greater than 10 diameters downstream or 1 diameter upstream from the junction.



Small-Large Pipe Junction

(errors are estimated for flow at 10 ft/sec)



There may not be enough room in some pump stations to allow for the sensor to be installed an appropriate distance downstream from the last pump. If this is the case, the sensor will have to be installed in a manhole outside the pump station. Check with MMI for instruments that are best suited for pump station applications.

Pump Station

(errors are estimated for flow at 10 ft/sec)

1/28/99

MULTI-MAG SENSOR SPECIFICATION SHEET

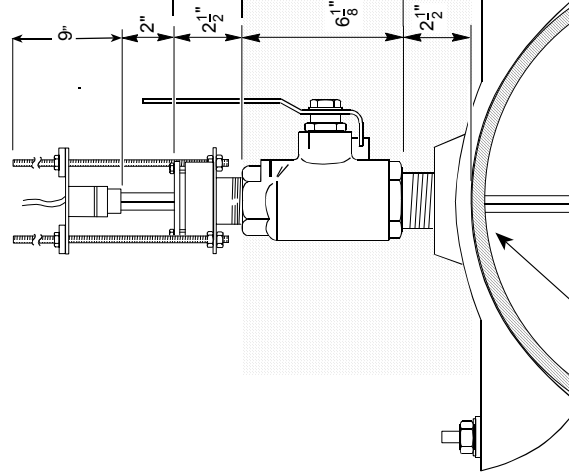
Company Name _____
 Site Tag/ID _____
 Customer Contact _____
 Date Received _____
 Sales Order _____
 Coordinator _____

Note: Production cannot proceed without this information.

Multi-Mag
 Mounting Hardware

AVAILABLE FROM MARSH-McBIRNEY AS ACCESSORIES

PVC valve\PVC nipple 43057\43058 Bronze corporation stop
 Bronze valve\stainless nipple 43055\43060 AWWA/CC Inlet
 Stainless Steel valve\nipple 43059\43060 2" NPT Outlet
 438000401



A 2"

2" CLEARANCE REQUIRED

B 2 1/2"

COMPRESSION SEAL HEIGHT

VALVE HEIGHT

IMPORTANT
 Customer
 Supplied
 Fitting
 Must
 Be 2" NPT
 Female

C

NIPPLE HEIGHT

D

E

PIPE THICKNESS

S

CUSTOM STACK HEIGHT
 ADD A-E

CAUTION
 1-7/8" (48 mm) clearance
 must be maintained through
 valve and the pipe wall to
 allow sensor insertion.

Pipe Material _____
 Schedule Number _____
 Total Cable Length _____

**CHECK HERE TO USE
 STANDARD STACK HEIGHT (15").
 C+D+E MUST BE LESS THAN 10.5"**

ID

INSIDE DIAMETER OF PIPE

Specifications

Measurement

Volumetric flow in filled flow conduits 4" (101.6 mm) to 60" (1.5 m) utilizing insertable electromagnetic averaging sensor. Flow indication in English Std. or Metric units. *Contact factory for larger pipe sizes.*

Flow Measurement

Method: Electromagnetic
Zero Stability: ± 0.03 ft/s (± 0.009 m/s)
Range: +20 ft/s (+6 m/s) Pipe sizes under 24" (600 mm)
+10 ft/s (+3 m/s) Pipe sizes 24" to 42" (600 mm to 1m)
+7.5 ft/s (+2.3 m/s) Pipe sizes 43" to 60" (1m to 1.5m)
Contact factory for pipe sizes >60". (1.5m)
Accuracy: $\pm 1\%$ of reading from 0 to +20 ft/s + zero stability
Has reverse flow indication.
Linearity: 0.3% of range
Repeatability: 0.20% of range

Materials

Sensor: Fiberglass
Cable: Polyurethane outer jacket
Insertion Hardware: 316 stainless steel exposed to flow
Compression Seal: Silicone rubber
Sensor Electrodes: Carbon
4" to 5" probes (92 mm to 144 mm) have 2 electrode pairs
6" to 11" probes (145 mm to 299 mm) have 3 electrode pairs
12" to 60" probes (300 mm to 1.5m) have 5 electrode pairs

Transmitter Enclosure

NEMA 4X/IP65. Separate termination and electronics compartments. Glass filled polypropylene with clear polycarbonate cover.

Dimensions: 8.4"H x 6.4"W x 2.8"D
(214 mm x 163 mm x 70 mm)

Weight: 3.2 lbs. (1.5 kg)

Potable Water Applications

Suitable for use in contact with potable water. Water Byelaws Scheme (WBS) Approved Product. Meets BS6920 – Cert. #9706516.

Configuration and Set-Up

Programming can be easily done on site using the keypad. Two levels of user defined password protection are provided.

Outputs

Analog: Galvanically isolated and fully programmable for zero and full scale. Output capability <16V (800 ohm, 4-20 mA). Secondary range enabled by external input or programmed alarm condition as a percent of full scale.
Pulse/Frequency: One frequency/pulse output for flow rate or for external totalizer. Isolated protected transistor switch capable of sinking <250 mA @ <35V.

Dual Alarms

(2 separate outputs): Isolated protected transistor switch capable of sinking <250 mA @ <35V. Note: Not isolated from frequency output. Fully programmable for high/low flow rates. % of range, empty-pipe, fault conditions, forward/reverse, polarity (normally open/close), analog over-range, pulse over-range, pulse cutoff, etc.

Environmental

Pressure/temperature limits:
Sensor: Flow temperature range
Standard: 32° to 110°F (0° to 44°C) @ 250 psi
Optional: 32° to 175°F (0° to 80°C) @ 250 psi
Electronics: Temperature limits:
Operating: -14° to 140°F (-20° to 60°C)
Storage: 5° to 167°F (-15° to 75°C)

Electrical Connections

0.5 inch NPT with gasket seal

Keypad and Display

Can be used to access and change all setup parameters using four membrane keys and 3-line display.
3-line, 16 character, backlit LCD display with large 1/2" numerals for flow rate and two lines for engineering units, totalizers, alarm status, velocity and percent of range.

Isolation

Galvanic separation to 50VDC between analog, pulse/alarm, and earth/ground.

Electrical Safety

Meets ANSI/ISA-S82.10-1988 and S82.03-1988.

Power Supply

Universal switch mode.
AC: 85 to 265V 45 to 400 Hz at 20VA max. or DC: 11 to 40V at 20VA max. AC or DC must be specified at time of ordering.

Vibration Specification

Meets BS2011: Part 2.1Fc: 1983

Internal Totalizer

9-digit totalizer. Can be programmed to reset via external input or the keypad. Reset from keypad can be password protected.

Test Mode and Output Circuit Loop Verification

After transmitter has been programmed, operation of the test mode will drive all outputs to programmed value, providing a total system test.

Ordering Information

Multi-Mag™ flowmeter includes modified NEMA 4X/IP65 (separate termination and electronics compartment) glass filled polypropylene electronics enclosure with polycarbonate window, electromagnetic velocity sensor with 20' cable, 4 membrane keys for configuring the transmitter, 3-line LCD backlit display with one line of 5-1/2" numerals for flow rate indication and 2 lines containing 16 characters for viewing engineering units, velocity, totalizer, alarm status and flow rate expressed as a percent of full scale, one flow proportional contact closure or frequency output, one 4-20mA output of flow rate and one instruction manual.

Options include high temperature sensor, extended sensor cable (maximum length 500'), pole mounting kit, insertion tool, sun shield, and additional instruction manuals.

Contact factory for sensor mounting hardware ordering information.

Model 285 Ordering Information

The standard Model 285 includes:

- NEMA 4X (IP65) enclosure
- 4-key keypad
- 3-line backlit LCD display
- One flow-proportional frequency output
- One 4-20 mA flow output
- Two alarm outputs
- Multi-Mag™ Sensor
- 20-foot sensor cable
- Installation and Operation Manual

Options

- Extended sensor cable (maximum length 300')
- Pole mounting kit
- Sensor insertion tool
- High temperature sensor (175°F/80°C)
- Sun shield
- Additional Installation and Operation manuals
- Power option

The standard features and options required are designated by the ordering number (285-X40X_).

90 to 265 VAC 45 to 400 Hz
11 to 40 VDC @ 20VA max

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3

Sensor length range
(S, N or L depending on pipe ID)

Cable length (0 for Std. Cable or 1 for additional
sensor cable)

NOTE A *Sensor Specification Sheet* (page 5) should be completed and submitted with all orders.

Spare parts list

	<u>Part Number</u>
F1-AC, 500mm fuse for AC unit	180002101
F1-DC, 3.15A fuse for DC unit.....	180002102

Option parts list

	<u>Part Number</u>
Installation and Operation Manual	105004101
Sensor insertion tool.....	75031
Additional 1/2" NPT cable glands (.187/.250 O.D.)	92125
Sun shield	0624B339001
Pole mounting kit	245000801
Sensor cable (specify length up to 300').....	36001
High temperature sensor.....	SPECIAL

Returning a unit for repair

If the unit needs to be returned to the factory for repair, please do the following:

- Prior to calling the MMI Service Department, determine the model number (285), serial number (located inside the front panel), and reason for return.
- Call the MMI Customer Service Department (1-800-368-2723) and ask for a Return Materials Authorization (RMA) number (FAX 1-301-874-2172).
- Ship the meter in the original packaging, if possible. Do not ship manuals, power cords, or other parts with your unit unless required for repair.
- Please make sure the meter is free from foreign debris prior to shipping.
- Write the RMA number on the outside of the shipping box. All return shipments should be insured.
- Address all shipments to:

Marsh-McBirney, Inc.
RMA #XXXXXX
4539 Metropolitan Court
Frederick, MD 21704-9452