



## DOR Insertion Paddle Wheel Flowmeter



### Benefits and Features

- Installation in Line Sizes from 1-1/2 to 100 Inches
- Velocity Measuring Range 1-33 Ft./Sec.
- 316L Stainless Steel Construction
- High Pressure Submersible Design
- Integral Insertion Mechanism Allows for Precise Paddle Insertion Within the Pipe
- Blind Pulse Transmitter, Battery Powered or Loop Powered Indicators
- Capable of Hot-Tap Installation
- Tolerates Liquids with Dirt and Solids

### General Description

The DOR series insertion paddle wheel flow sensor is a very cost effective means of accurately measuring the flow of water or water-like liquids in large pipes. The sensor is inserted into the process piping via a threadolet or half nipple fitting. Liquid flow through the pipe results in rotation of the affixed paddle wheel. The rotational speed of the paddle is proportional to the flow velocity, and therefore, proportional to the flowrate in the pipe. The insertion type design provides a measuring technique that is much less expensive than full bore flowmeters, especially in larger pipe sizes. Insertion paddle wheel sensors are a robust measuring technology that boasts exceptional tolerance to dirt and solids. The DOR series features an all 316 L stainless steel body.

The rotor is made of PVDF or PEEK, with a long-life, graphite/ PTFE self-lubricating bearing. The DOR has an integral, precision insertion mechanism that allows the installer to insert the rotor to the precise depth in the pipe for optimal readings. Outputs include NPN open collector frequency, and/or reed contact frequency or millivolt frequency. Optional indicators include battery powered totalizers, loop powered ratemeter/totalizers and batch controllers.

### Specifications

#### Base Models

**DOR-4:** Line sizes 1-1/2" to 36"

**DOR-5:** Line sizes 2" to 100"  
(capable of hot tap installation)

#### Fitting Size

**DOR-4:** 1-1/2" NPT or BSPT

**DOR-5:** 2" NPT or BSPT

**Application:** Water or water-like liquids

#### Wetted Materials

**Body:** 316L Stainless Steel

**Rotor:** PVDF or PEEK depending on model

**Rotor Shaft:** 316L stainless steel or Hastelloy C depending on model

**Bearing:** Graphite/PTFE

**Seals:** Viton®, Buna-N, EPDM or PTFE

#### Velocity Measuring

**Range:** 1-33 Ft./Sec., equates to approximately 6-880,000 GPM in 1-1/2" to 100" lines

**Linearity:** ±1.5% of full scale

**Repeatability:** ±1.0% of full scale at factory conditions and optimal straight runs

#### Straight Piping Requirement

##### Minimum

**Upstream:** 10x diameter

**Downstream:** 5x diameter

##### Optimal

**Upstream:** 25x diameter

**Downstream:** 10x diameter

**Maximum Pressure:** 1200 PSIG

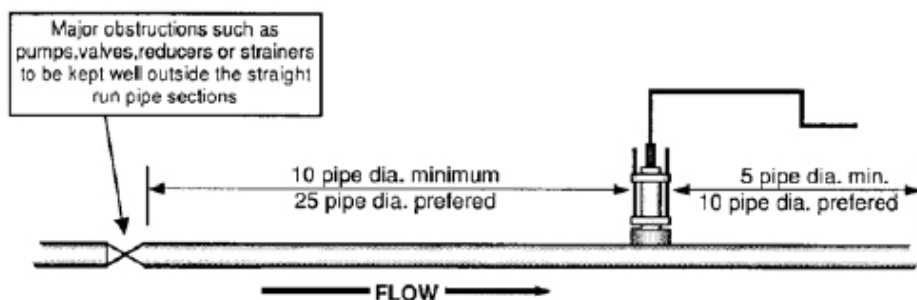
**Max. Operating Temp:** See table next page





## DOR Insertion Paddle Wheel Flowmeter

### Installation Straight Piping Requirements



#### Output F1, F2, F5, Dual Pulse Frequency

**Description:** Combined output with one reed switch pulser and one NPN Hall Effect pulser.

**Reed Switch:** Max. 30 VDC, 200 mA

**Hall Sensor:** 3-wire, NPN open collector, 5-24 VDC 20 mA Max.

**Electrical Connection**

**Output F1:** 10 Ft. cable

**Output F2:** 30 Ft. cable

**Output F5:** Terminal box

**Electrical Protection**

**Output F1, F2:** NEMA 6/ IP68, permanently submersible to 9 feet

**Output F5:** NEMA 4X/ IP 67

#### Output R1, R2, R5, Dual Reed Switch Pulser

**Description:** 2-wire reed switch pulser, intrinsically safe when installed with proper intrinsic safety barriers.

**Ratings:** Max. 30 VDC, 20 mA

**Electrical Connection**

**Output R1:** 10 Ft. cable

**Output R2:** 30 Ft. cable

**Output R5:** Terminal box

**Electrical Protection**

**Output R1, R2:** NEMA 6/ IP68, permanently submersible to 9 feet

**Output R5:** NEMA 4X/ IP 67

#### Output Q1, Q2, Q5, Dual Hall Effect Pulser

**Description:** Dual 3-wire NPN open collector Hall Effect pulsers.

**Ratings:** 5-24 VDC 20 mA Max.

**Electrical Connection**

**Output Q1:** 10 Ft. cable

**Output Q2:** 30 Ft. cable

**Output Q5:** Terminal box

**Electrical Protection**

**Output Q1, Q2:** NEMA 6/ IP68, permanently submersible to 9 feet

**Output Q5:** NEMA 4X/ IP 67

### Electrical Specifications : Special Purpose Transmitter Options

#### Output E1, NPN Inductive Pickup

**Description:** inductive pickup w/ and non-magnetic rotor for applications with high ferrous content liquids.

**Output:** 3-wire NPN, 5-24 VDC, 20 mA Max.

**Electrical Conn:** 10 Ft. cable, longer on request

**Electrical Prot:** NEMA 6/ IP 68, permanently submersible to 9 feet

#### Output T5, Hi-Temp (250°F) Millivolt Inductive Pickup

**Description:** inductive pickup with non-magnetic rotor for applications with high ferrous content liquids. Good for process temperatures to 250°F.

**Output:** 2-wire pulse, 1500 mV. Max., 10 µSec. period

**Electrical Conn:** Junction Box

**Electrical Prot:** NEMA 4X/ IP 67

#### Output H5, Hi-Temp (390°F) Millivolt Inductive Pickup

**Description:** inductive pickup with magnetic rotor for high temperature applications. Good for process temperatures to 390°F.

**Output:** 2-wire pulse, 1500 mV. Max., 10 µSec. period

**Electrical Conn:** Junction Box

**Electrical Prot:** NEMA 4X/ IP 67





## DOR Insertion Paddle Wheel Flowmeter

### Ratemeter/Totalizer/Controller Options



#### Display Z3 Battery/Loop Powered Ratemeter/Totalizer

**Display:** LCD single line; toggles between rate, resettable and non -resettable total  
**Battery:** 3.6 V Lithium  
**External Power:** 8-24 VDC or 4-20 mA loop powered  
**Output:** Scalable pulse and 4-20 mA flow rate output  
**Switches:** NPN or PNP programmable setpoint  
**Programmable Features**  
 Lockout code, measuring units, pulse scale factor, totalizer reset, alarm setpoints  
**Electrical Connection:** 1/2" NPT  
**Electrical Protection:** NEMA 4X, IP67

### Electrical Specifications : Ratemeter/Totalizer/Controller Options

#### Display B1 Programmable Batch Controller

**Display:** LCD single line; toggles between batch total and grand total  
**External Power:** 12-24 VDC @ 50 mA  
**Control Switches:** 2-NPN Open collector, 2-stage with programmable prewarn  
**Programmable Features**  
 Lockout code, measuring units, batch amount, Max. batch limit, prewarn setpoint  
**Other Features:** Remote start, stop and batch reset  
**Electrical Connection:** 1/2" NPT  
**Electrical Protection:** NEMA 4X, IP67

#### Display Z1, Battery Powered Dual Totalizer

**Display:** 2-line LCD, resettable and non-resettable total  
**Battery:** 3.6 V Lithium  
**Output:** Scalable pulse NPN or PNP selectable  
**Programmable Features**  
 Lockout code, measuring units, pulse scale factor, totalizer reset  
**Electrical Connection:** Cable Gland  
**Electrical Protection:** NEMA 4X, IP67

#### Display Z5 Battery Powered Ratemeter/Totalizer

**Display:** Backlit LCD single line; toggles between rate, resettable and non-resettable total  
**Battery:** 3.6 V Lithium  
**Output:** Scalable NPN pulse output  
**Switches:** NPN programmable setpoint  
**Programmable Features**  
 Lockout code, measuring units, pulse scale factor, totalizer reset, alarm setpoints  
**Electrical Connection:** 1/2" NPT  
**Electrical Protection:** NEMA 4X, IP67

### DOR Series Nominal Flow Measuring Ranges in Sch. 40 Steel Pipe at 1-33 Ft/Sec. Average Fluid Velocity

Line Size (Sch. 40 Steel)	Nominal Measuring Range (GPM)	Line Size (Sch. 40 Steel)	Nominal Measuring Range(GPM)
1-1/2"	6-210	12"	360-11,625
2"	10-345	14"	480-15,850
2-1/2"	15-490	16"	560-18,175
3"	25-760	18"	700-23,100
4"	40-1,300	20"	875-28,550
5"	65-2,060	24"	1,250-41,250
6"	90-2,975	32"	2,300-75,640
8"	160-5,170	34"	2,600-85,850
10"	245-8,080	36"	2,915-96,150





## DOR Insertion Paddle Wheel Flowmeter

### Ordering Information

Base Model	Rotor/Shaft Material	Fitting	O-ring Material	Output/Display
DOR-42...=1-1/2" to 36" line sizes	...2..= PVDF Rotor/316L SS Shaft (standard), 250°F Max.	...N8.. =1-1/2" NPT male ...N9..= 2" NPT male	...F= Viton® (standard)	<p><b>Outputs</b></p> <p>...F1 = Dual Pulse 10 Ft. Cable (standard)                      ...F2 = Dual Pulse 30 Ft. Cable                      ...F5 = Dual Pulse Junction Box</p> <p>...Q1 = Dual NPN Pulse 10 Ft. Cable                      ...Q2 = Dual NPN Pulse 30 Ft. Cable                      ...Q5 = Dual NPN Pulse Junction Box</p> <p>...R1 = Dual Reed Pulse 10 Ft. Cable                      ...R2 = Dual Reed Pulse 30 Ft. Cable                      ...R5 = Dual Reed Pulse Junction Box</p> <p>...E1 = Non-magnetic Rotor, NPN Output 10 Ft. Cable                      ...H5 = Magnetic Rotor, Hi-Temp. Millivolt Output (390°F), Junction Box                      ...T5 = Non-magnetic Rotor, Hi-Temp. Millivolt Output (250°F), Junction Box</p> <p><b>Displays</b></p> <p>...B1 = Batch Controller                      ...Z1 = Battery Powered Dual Totalizer                      ...Z3 = Battery/LoopPowered Dual Totalizer/Ratemeter                      ...Z5 = Battery Powered Dual Totalizer/Ratemeter, Backlit LCD</p>
	...3..=PVDF Rotor/Hast. C Shaft, 250°F Max.	...R8..=1-1/2" BSPT male ...R9..= 2" BSPT male	...E= EPDM	
DOR-52...= 2" to 100" line sizes, hot tap capable	...4..= PEEK Rotor/316L SS Shaft, 390°F Max.	...N9..= 2" NPT male	...P= PTFE coated Viton®	
	...5..=PEEK Rotor/Hast. C Shaft, 390°F Max.	...R9..= 2" BSPT male		

### Recommended Hot-Tap Installation for DOR-52 Series (Valve & nipple not included with DOR-52)

