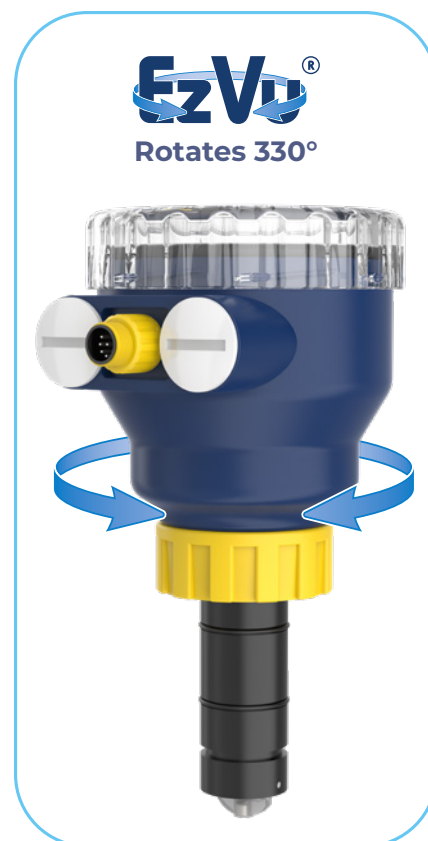


# Quick Start Manual



Read the user's manual carefully before starting to use the unit.  
Producer reserves the right to implement changes without prior notice.

# TIR Series

## Multi-Function Paddle Wheel Flow Meter



### Safety Information

- De-pressurize and vent system prior to installation or removal
- Confirm chemical compatibility before use
- **DO NOT** exceed maximum temperature or pressure specifications
- **ALWAYS** wear safety goggles or face-shield during installation and/or service
- **DO NOT** alter product construction



#### Warning | Caution | Danger

Indicates a potential hazard. Failure to follow all warnings may lead to equipment damage, injury, or death.



#### Hand Tighten Only

Over tightening may permanently damage product threads and lead to failure of the retaining nut.



#### Note | Technical Notes

Highlights additional information or detailed procedure.



#### Do Not Use Tools

Use of tool(s) may damage product beyond repair and potentially void product warranty.



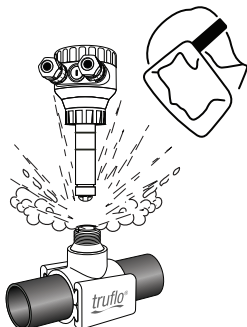
#### Personal Protective Equipment (PPE)

Always utilize the most appropriate PPE during installation and service of Truflo products.



#### Pressurized System Warning

Sensor may be under pressure. Take caution to vent system prior to installation or removal. Failure to do so may result in equipment damage and/or serious injury.



### General Information

General	Description
Operating Voltage	10 – 30VDC
Current Consumption	60mA max.
Control Output	RS-485 Modbus
Transmitter	4-20mA
Relay Output	1A 30VDC   Normally Open   Normally Closed
Flow Rate GPM   LPM	0.0 – 999.9
Fluid	H2O   Liquid Chemical Media
Accuracy	± 0.5% of F.S. @25°C
Response Frequency	5K Hz
Max Flow Rate	10m/s   33ft/s
Min Flow Rate	0.1m/s   0.3ft/s
Materials of Construction	Rotor: ETFE Tefzel®   Rotor Pin: Zirconium Ceramic   Rotor Bushings: Ceramic Sensor Body: PVC/PP/PVDF/316SS
O-ring material	FPM   EPDM Optional   FFKM Optional
Operating Temperature	PVC < 60°C   PP < 80°C   PF < 100°C
Protection Rating	NEMA 4X   IP66   General Purpose
Approval	CE  RoHS

\*Optional

# TIR Series

## Multi-Function Paddle Wheel Flow Meter



### Industry's Most Accurate & Reliable Paddle Wheel Flow Meters

The TI Series insertion plastic paddle wheel flow meter has been engineered to provide long-term accurate flow measurement in tough industrial applications.

The paddle wheel assembly consists of a engineered Tefzel® paddle and micro-polished zirconium ceramic rotor pin and bushings.

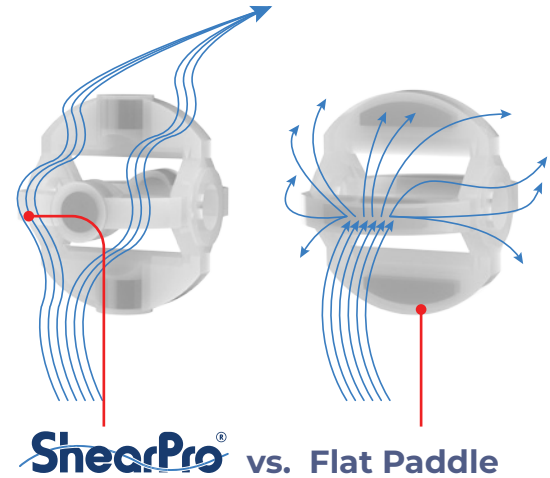
High performance Tefzel® and Zirconium materials have been selected due to their excellent chemical and wear resistant properties.

- ✓ Lifetime Warranty On Paddle Wheel Assembly
- ✓ ½" – 24" Line Sizes
- ✓ Pulse | 4-20mA + 1 Amp Relay Output

#### New ShearPro® Design

- ✓ Contoured Flow Profile
- ✓ Reduced Turbulence = Increased Longevity
- ✓ 78% Less Drag than Old Flat Paddle Design\*

\*Ref: NASA "Shape Effects on Drag"



#### Tefzel® Paddle Wheel

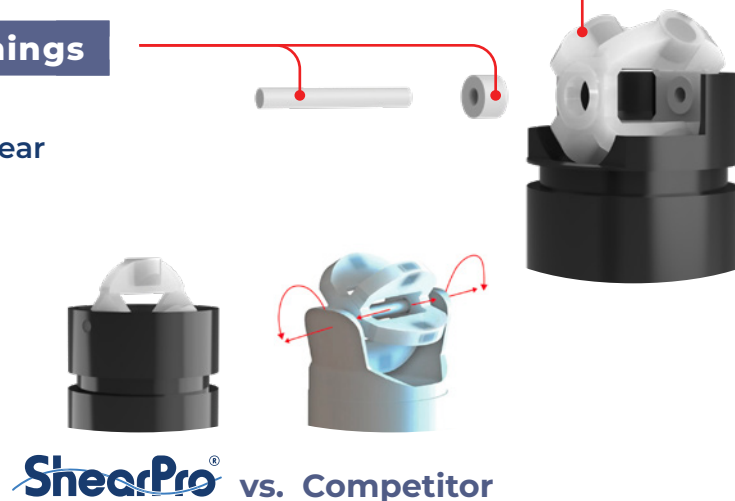
- ✓ Superior Chemical And Wear Resistance vs PVDF

#### Zirconium Ceramic Rotor | Bushings

- ✓ Up to 15x the Wear Resistance
- ✓ Integral Rotor Bushings Reduce Wear and Fatigue Stress

#### 360° Shielded Rotor Design

- ✓ Eliminates Finger Spread
- ✓ No Lost Paddles



# TIR Series

## Multi-Function Paddle Wheel Flow Meter

### Installation

#### Very Important



- Lubricate O-rings with a viscous lubricant, compatible with the materials of construction.
- Using an alternating | twisting motion, carefully lower the sensor into the fitting. | **Do Not Force** | Fig 5
- Ensure tab | notch are parallel to flow direction | Fig-2



Hand tighten the sensor cap. **DO NOT** use any tools on the sensor cap or the cap threads or fitting threads may be damaged. | Fig-5

Fig - 1

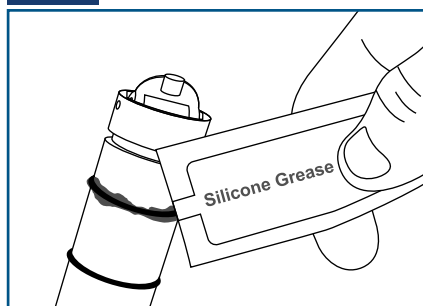
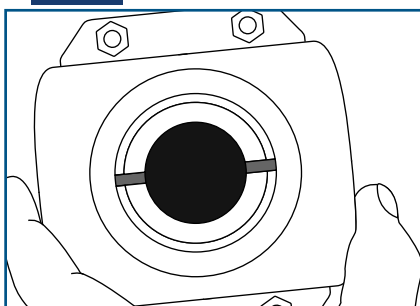
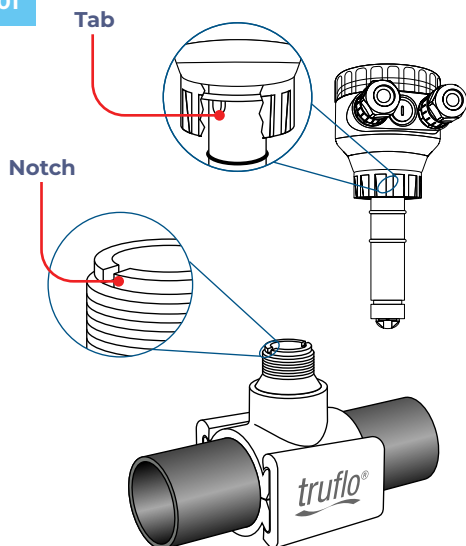


Fig - 2



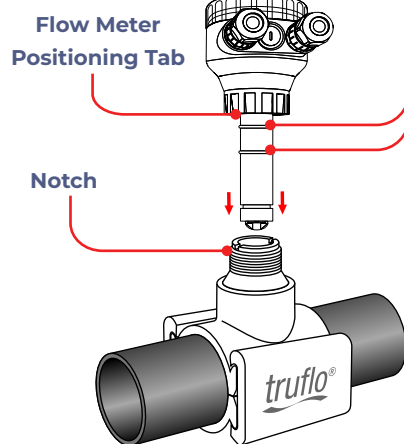
### Correct Sensor Position

01



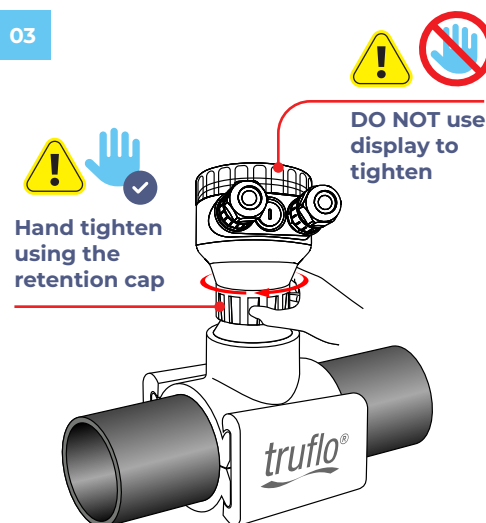
Locate the flow meter positioning tab and clamp saddle notch.

02



Engage one thread of the sensor cap, then turn the sensor until the alignment tab is seated in the fitting notch. Ensure tab is parallel to flow direction.

03



- Hand tighten the screw cap
- **DO NOT** use any tools — threads may be damaged
- Ensure meter is firmly in place

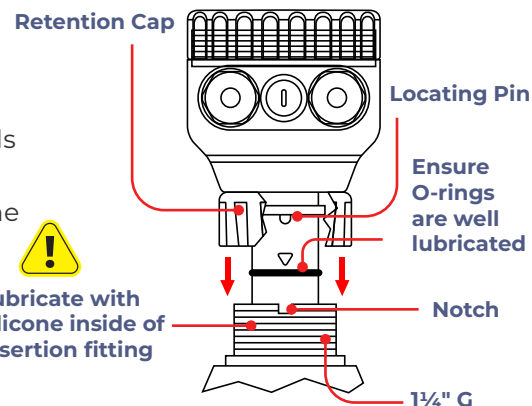


Fig - 3

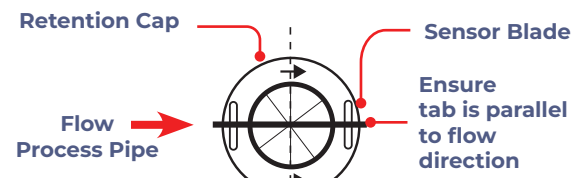


Fig - 4

Top View

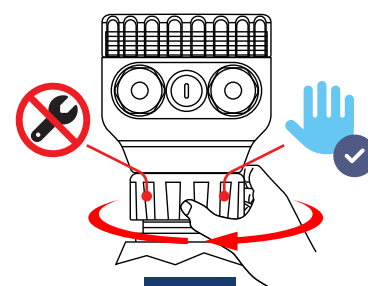


Fig - 5

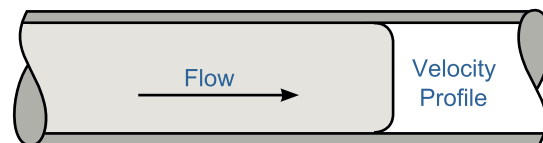
# TIR Series

## Multi-Function Paddle Wheel Flow Meter



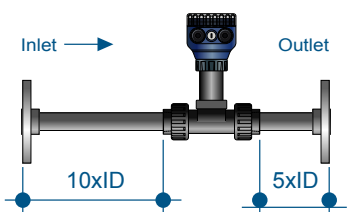
### Correct Sensor Position Setup

TI Series flow meters measure liquid media only. There should be no air bubbles and the pipe must always remain full. To ensure accurate flow measurement, the placement of the flow meters needs to adhere to specific parameters. This requires a straight run pipe with a minimum number of pipe diameters distance upstream and downstream of the flow sensor.

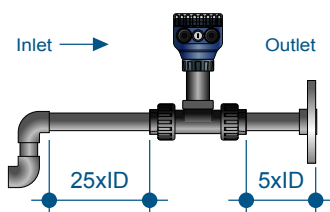


Developed Turbulent Flow

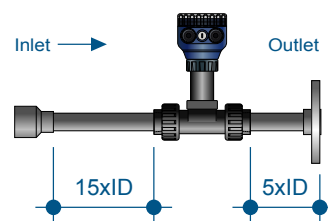
### Flange



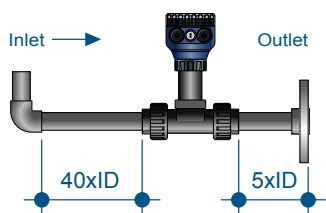
### 2x 90° Elbow



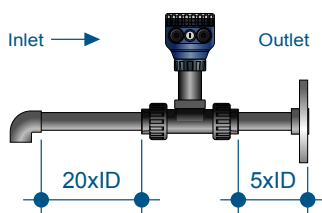
### Reducer



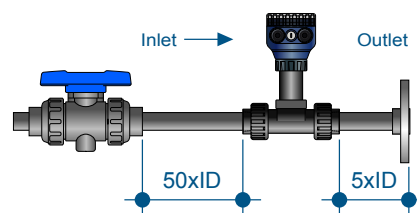
### 90° Downward Flow



### 90° Elbow Downward Flow Upward

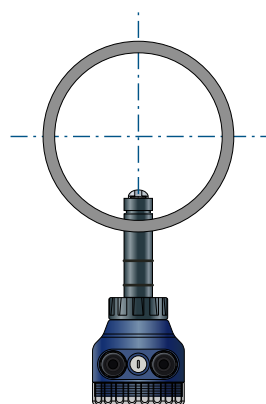


### Ball Valve



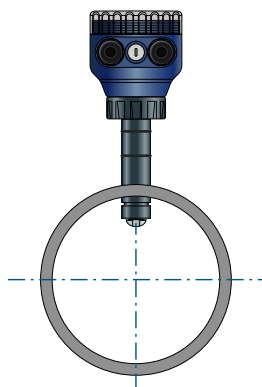
### Installation Positions

Figure - 1



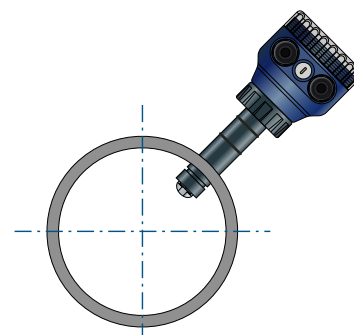
Good if NO SEDIMENT present

Figure - 2



Good if NO AIR BUBBLES present

Figure - 3



Preferred installation if  
SEDIMENT\* or AIR BUBBLES  
may be present

\*Maximum % of solids: 10% with particle size not exceeding 0.5mm cross section or length

# TIR Series

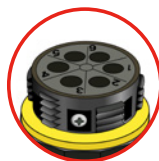
## Multi-Function Paddle Wheel Flow Meter



### Terminal Connections



**Cable Grip Wire Connector Combo**  
(no Internal wiring required)



### Cable Grip Connection

Terminal	Description
1	+ 10-30VDC
2	OUT 2 (NPN)
3	- VDC
4	OUT 1 (NPN)
5	4-20mA -
6	4-20mA +

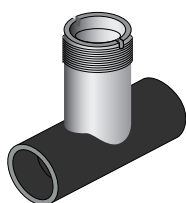


### M12 Connection (no Internal wiring required)

Terminal	Description	Color
1	+ 10-30 VDC	Brown
2	Totalizer Pulse Output NPN	White
3	- VDC	Blue
4	Flow Rate Pulse Output NPN	Black
5	4-20mA +	Yellow
6	4-20mA -	Grey

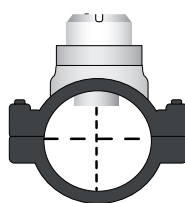
### Fittings and K-Factor

#### TEE FITTINGS



Tee Fitting		K-Factor		Sensor Length
IN	DN	LPM	GPM	
3/4"	20	160.0	604.0	S
1"	25	108.0	408.0	S
1 1/2"	40	37.0	140.0	S
2"	50	21.6	81.7	L
2 1/2"	65	14.4	54.4	L
3"	80	9.3	35.0	L
4"	100	5.2	19.8	L

#### CLAMP-ON SADDLES



Clamp Saddles		K-Factor		Sensor Length
IN	DN	LPM	GPM	
2"	50	21.6	81.7	S
3"	80	9.3	35.0	S
4"	100	5.2	19.8	S
6"	150	2.4	9.2	L
8"	200	1.4	5.2	L

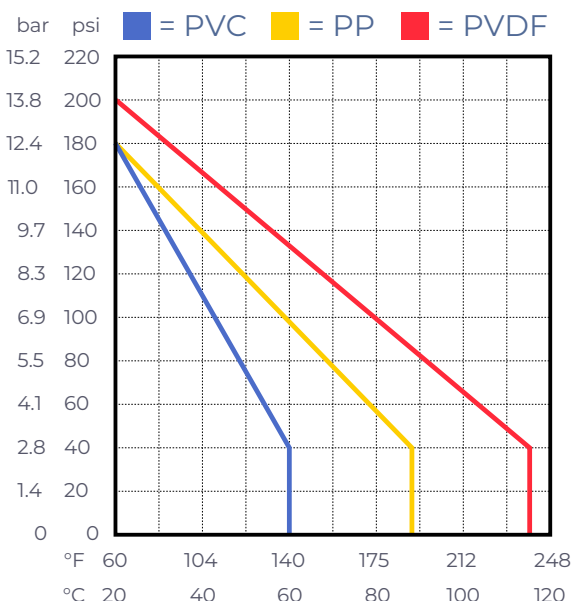
#### CPVC SOCKET WELD-ON ADAPTERS



Weld On Adapter		K-Factor		Sensor Length
IN	DN	LPM	GPM	
2"	50	14.4	54.4	S
2 1/2"	65	9.3	35.5	S
3"	80	9.3	35.0	S
4"	100	5.2	19.8	S
6"	150	2.4	9.2	L
8"	200	1.4	5.2	L
10"	250	0.91	3.4	L
12"	300	0.65	2.5	L
14"	400	0.5	1.8	L
16"	500	0.4	1.4	L
18"	600	0.3	1.1	L
20"	800	0.23	0.9	L
24"	1000	0.16	0.6	L

### Pressure vs. Temperature

**Note:** During system design the specifications of all components must be considered. | Non-Shock



### Min/Max Flow Rates

Pipe Size (O.D.)	LPM   GPM	LPM   GPM
	0.3m/s min.	10m/s max
1/2"   DN15	3.5   1.0	120.0   32.0
3/4"   DN20	5.0   1.5	170.0   45.0
1"   DN25	9.0   2.5	300.0   79.0
1 1/2"   DN40	25.0   6.5	850.0   225.0
2"   DN50	40.0   10.5	1350.0   357.0
2 1/2"   DN60	60.0   16.0	1850.0   357.0
3"   DN80	90.0   24.0	2800.0   739.0
4"   DN100	125.0   33.0	4350.0   1149.0
6"   DN150	230.0   60.0	7590.0   1997.0
8"   DN200	315.0   82.0	10395.0   2735.0

# TIR Series

## Multi-Function Paddle Wheel Flow Meter



### Programming



Select/Save/Continue



Move selection left



Change digit value

STEPS	DISPLAY	RANGE	OPERATION
<b>1 Press and Hold SET</b> 			
<b>2 K Factor</b> 			<b>K1</b> — Pipe Size: 3/4" - 24" GPM   1/2" - 8" LPM <b>K2</b> — Pipe Size: 10" - 24" LPM Press  to select and
<b>3 Enter K Factor Value</b> 		0 – 999.9	Press  to change Press  to move left Press  to save
<b>4 4-20mA Output Range</b> 			Factory default: 4mA = 0   No Flow Press
<b>5 Enter 4-20mA Output Value</b> 			Factory Default =100 Press  to change Press  to move left Press  to save
<b>6 Alarm Set Point</b> 			Press
<b>7 Enter Alarm Set Point Value</b> 			Factory Default =100 Press  to change Press  to move left Press  to save
<b>8 Alarm Hysteresis</b> 			Prevents Relay Chatter Press
<b>9 Enter Hysteresis Value</b> 			Press  to change Press  to move left Press  to save



# TIR Series

## Multi-Function Paddle Wheel Flow Meter



### Additional Programming



Select/Save/Continue



Move selection left



Change digit value

STEPS	DISPLAY	RANGE	OPERATION
1 Press and Hold <b>SET</b> +  3 SEC			
2 Lock Out Feature <b>SET</b>		0 – 99	Factory Default: Lk = 10 Otherwise meter will enter <b>Lockout Mode*</b> Press  to change Press <b>SET</b> to save
3 Decimal Place <b>SET</b>		0 or 1	Change decimal place Press  to change Press <b>SET</b> to save
4 Units of Flow <b>SET</b>			Ut.G = Gallons (Factory default) Ut.L = Liters   Ut.KL = Kiloliters Press  to change Press <b>SET</b> to save
5 Programming <b>OP2</b> Output Pulse Control Totalizer <b>SET</b>		E/F/A	Con.E = Pulse Output of Unit volume = One Gal/Pulse Con.F = Paddle Pulse ► Frequency Max 5 KHZ Con.A = N/A Press  to change, Press <b>SET</b> to save
6 Programming Relay <b>SET</b>		0 – 4	Alt = 0 (Factory default) = No Relay Press  to change Refer to relay selection mode (below) Press <b>SET</b> to save
6 Start Up Delay <b>SET</b>		0 – 99 sec	Prevents false alarms during start-ups Press  to change Press  to move left Press <b>SET</b> to save

\***Lockout Mode** will prevent any changes from being made unless lockout value = "10"

### Relay Selection Mode

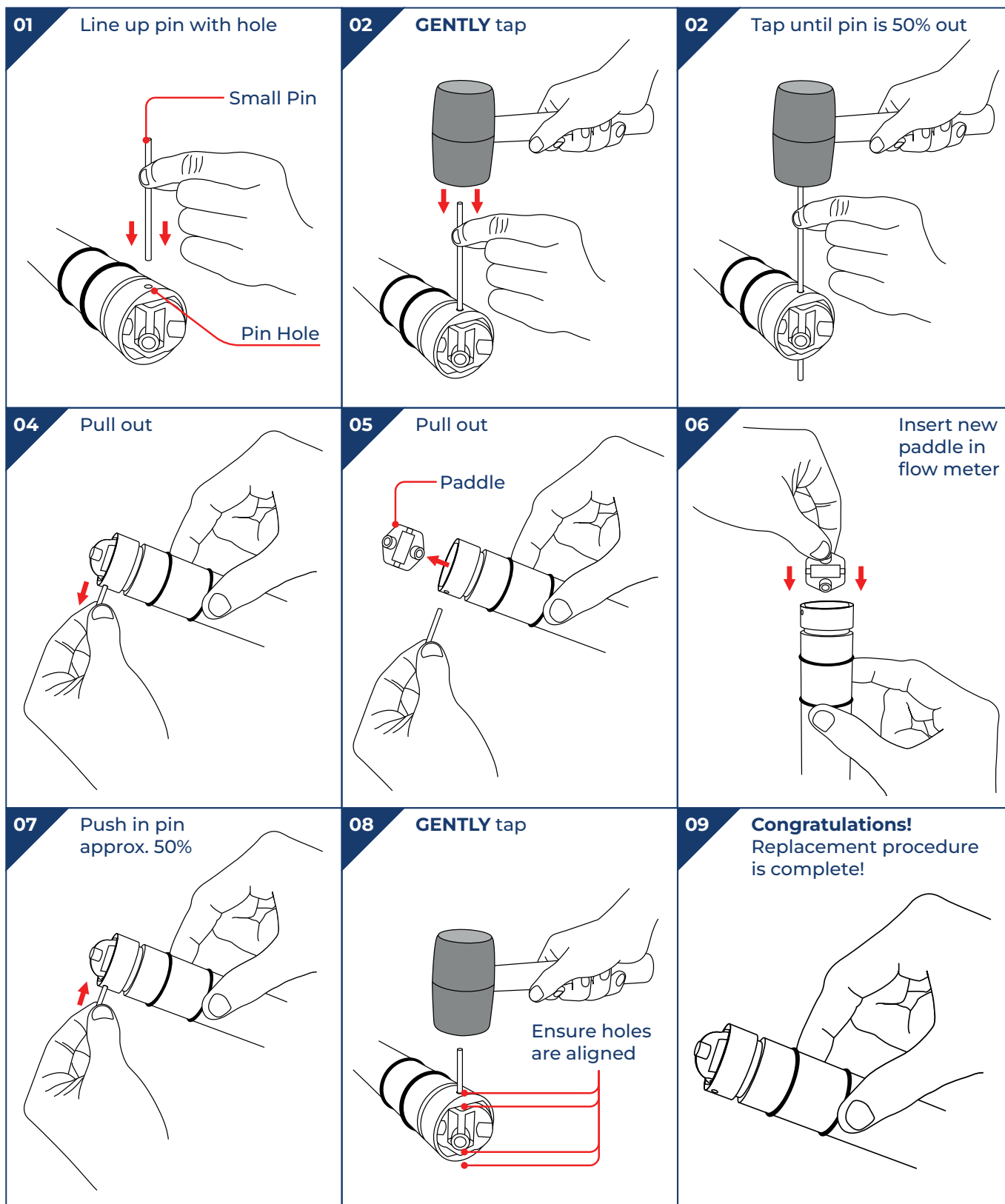
Mode	Description	
<b>Alt.1</b>	<b>No Output</b>	
<b>Alt.1</b>		
	CV > (AL1) → R1/AL1 ON ; C →	CV > (AL2) → R2/AL2 ON ; CV > (AL2+H) → R2/AL2 OFF
<b>Alt.2</b>		
	CV < (AL1 - H) → AL1 → R1/AL1	CV > (AL2 + H) → R2/AL2 ON ; CV < AL2 → R2/AL2 OFF
<b>Alt.3</b>		
	CV > AL1 → R1/AL1 OFF ; CV < (AL1 - H) →	CV > AL2 → R2/AL2 OFF ; < (AL2 - H) → R
<b>Alt.4</b>		
	CV > (AL1) → R1/AL1 ON ; C →	CV > AL2 → R2/AL2 ON ; CV < (AL2 - H) → R2/AL2 OFF



# TIR Series

## Multi-Function Paddle Wheel Flow Meter

### Rotor Pin | Paddle Replacement



### Warranty, Returns and Limitations

#### Warranty

**Icon Process Controls Ltd** warrants to the original purchaser of its products that such products will be free from defects in material and workmanship under normal use and service in accordance with instructions furnished by **Icon Process Controls Ltd** for a period of one year from the date of sale of such products. **Icon Process Controls Ltd** obligation under this warranty is solely and exclusively limited to the repair or replacement, at **Icon Process Controls Ltd** option, of the products or components, which **Icon Process Controls Ltd** examination determines to its satisfaction to be defective in material or workmanship within the warranty period. **Icon Process Controls Ltd** must be notified pursuant to the instructions below of any claim under this warranty within thirty (30) days of any claimed lack of conformity of the product. Any product repaired under this warranty will be warranted only for the remainder of the original warranty period. Any product provided as a replacement under this warranty will be warranted for the one year from the date of replacement.

#### Returns

Products cannot be returned to **Icon Process Controls Ltd** without prior authorization. To return a product that is thought to be defective, go to [www.iconprocon.com](http://www.iconprocon.com), and submit a customer return (MRA) request form and follow the instructions therein. All warranty and non-warranty product returns to **Icon Process Controls Ltd** must be shipped prepaid and insured. **Icon Process Controls Ltd** will not be responsible for any products lost or damaged in shipment.

#### Limitations

This warranty does not apply to products which: 1) are beyond the warranty period or are products for which the original purchaser does not follow the warranty procedures outlined above; 2) have been subjected to electrical, mechanical or chemical damage due to improper, accidental or negligent use; 3) have been modified or altered; 4) anyone other than service personnel authorized by **Icon Process Controls Ltd** have attempted to repair; 5) have been involved in accidents or natural disasters; or 6) are damaged during return shipment to **Icon Process Controls Ltd** reserves the right to unilaterally waive this warranty and dispose of any product returned to **Icon Process Controls Ltd** where: 1) there is evidence of a potentially hazardous material present with the product; or 2) the product has remained unclaimed at **Icon Process Controls Ltd** for more than 30 days after **Icon Process Controls Ltd** has dutifully requested disposition. This warranty contains the sole express warranty made by **Icon Process Controls Ltd** in connection with its products. **ALL IMPLIED WARRANTIES, INCLUDING WITHOUT LIMITATION, THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE EXPRESSLY DISCLAIMED.** The remedies of repair or replacement as stated above are the exclusive remedies for the breach of this warranty. **IN NO EVENT SHALL Icon Process Controls Ltd BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY KIND INCLUDING PERSONAL OR REAL PROPERTY OR FOR INJURY TO ANY PERSON. THIS WARRANTY CONSTITUTES THE FINAL, COMPLETE AND EXCLUSIVE STATEMENT OF WARRANTY TERMS AND NO PERSON IS AUTHORIZED TO MAKE ANY OTHER WARRANTIES OR REPRESENTATIONS ON BEHALF OF Icon Process Controls Ltd.** This warranty will be interpreted pursuant to the laws of the province of Ontario, Canada.

If any portion of this warranty is held to be invalid or unenforceable for any reason, such finding will not invalidate any other provision of this warranty.

For additional product documentation and technical support visit:

[www.iconprocon.com](http://www.iconprocon.com) | e-mail: [sales@iconprocon.com](mailto:sales@iconprocon.com) or [support@iconprocon.com](mailto:support@iconprocon.com) | Ph: 905.469.9283