truflo TK3M Series In Line Paddle Wheel Flow Meter Sensor Instruction Manual

Contents

truflo TK3M Series In Line Paddle Wheel Flow Meter Sensor

Product Description
The TK Series in-line plastic paddle wheel flow meter has been engineered to provide long-term accurate flow measurement in tough industrial applications. It features an M12 Quick Connection, True Union Design High Impact Enclosure, and a Bright LED Display for flow and total measurement.
The TK3M model comes with a Flanged Connection, 316 Stainless Steel construction, Sanitary Connection, and Zirconium Ceramic Rotor and Bushings, offering up to 15 times the wear resistance compared to regular ceramic.-

Product Usage Instruction

Safety Information
Safety is paramount when using the In-Line Paddle Wheel Flow Meter Sensor. Please adhere to the following safety guidelines:

- 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.

PPE and System Precautions

To ensure safe operation of the sensor, follow these precautions:

- **Vent the system prior to installation or removal to prevent pressurized accidents.**
- **Avoid water hammer or pressure spikes by maintaining proper pressure levels.**
- **Maintain a full pipe for accurate readings; install in a horizontal or vertical direction with adequate straight pipe lengths.**
    - Minimize turbulent flow by ensuring at least 10x pipe diameters upstream and 3x pipe diameters

downstream.

- Use a Bag Filter or Y Strainer upstream to protect the paddle wheel from damage by solids or fibers.
  - Do not flush the pipe after installation with compressed air as it may damage the ceramic shaft.

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.

Note | **Technical Notes**
Highlights additional information or detailed procedure.

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.

- Please ensure that the Instruments are not to be subject to water hammer or pressure spikes! Always Pressure Test System with H2O Prior to Initial Start-Up
  Before installation be certain the appropriate instrument has been selected considering operating pressure, full scale pressure, wetted material requirements, media compatibility, operating temperature, vibration, pulsation, desired accuracy and any other instrument component related to the service application including the potential need for protective attachments and/or special installation requirements. Failure to do so could result in equipment damage, failure and/or personal injury. Ensure only qualified personnel are permitted to install and maintain this instrument.
- **Pressurize 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.
- **Please Ensure Full Pipe**
  TK Series can be installed in a horizontal or vertical direction. Please ensure enough length of straight pipe to

avoid intensified turbulent flow that can effect readings.

- **Min 10x Pipe Diameters Upstream 3x Pipe Diameters Downstream (See Page 11)**
  A Bag Filter or Y Strainer Filtering Device upstream to Avoid the Paddle Wheel from being damaged by the solids or fibers – max 10% Particle Size – Not to Exceed .5mm Cross Section or Length. Please do not flush the pipe after the Flow Meter is installed with compressed air this may damage the ceramic shaft and will void warranty.

Product Description

- The TK Series in-line 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.

New ShearPro® Design

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

Ref: NASA “Shape Effects on Drag”

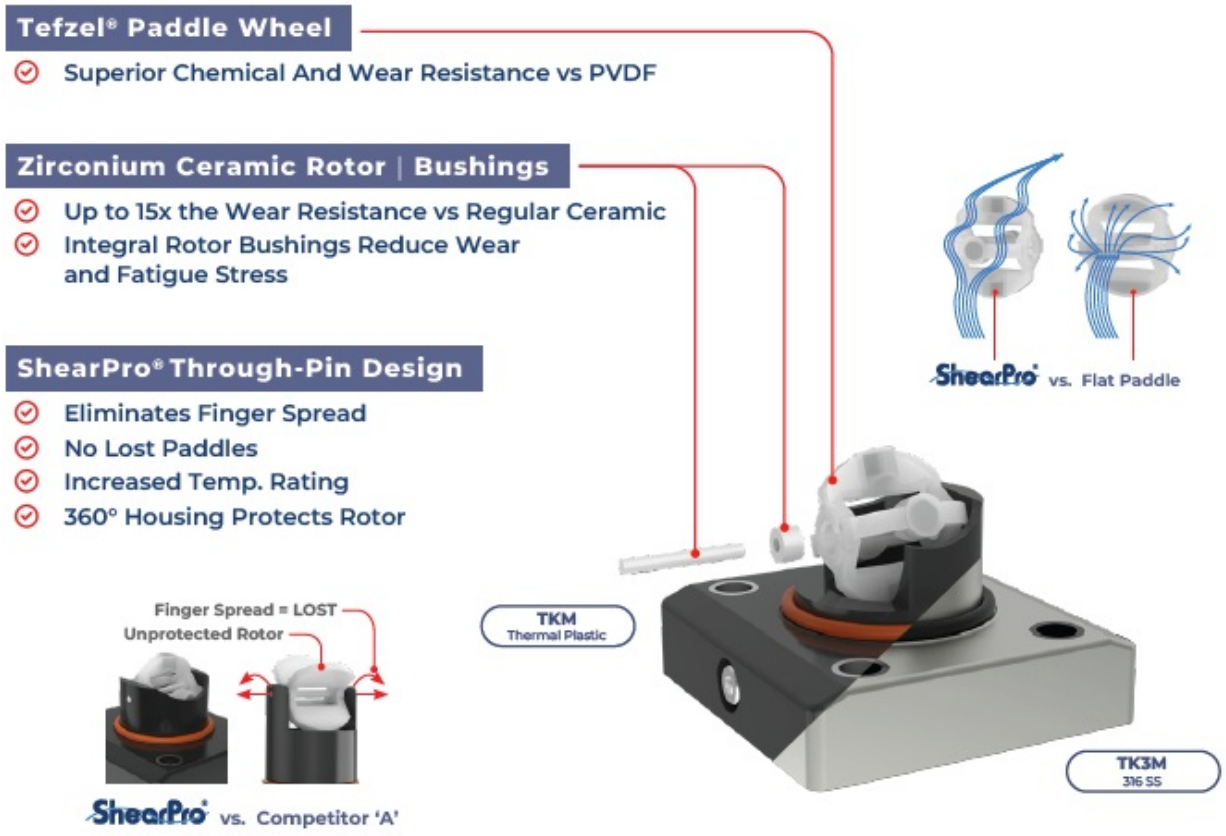
Tefzel® Paddle Wheel
Superior Chemical And Wear Resistance vs PVDF

Zirconium Ceramic Rotor | Bushings

- Up to 15x the Wear Resistance vs Regular Ceramic
- Integral Rotor Bushings Reduce Wear and Fatigue Stress

ShearPro® Through-Pin Design

- Eliminates Finger Spread
- No Lost Paddles
- Increased Temp. Rating
- 360° Housing Protects Rotor



Technical Specifications

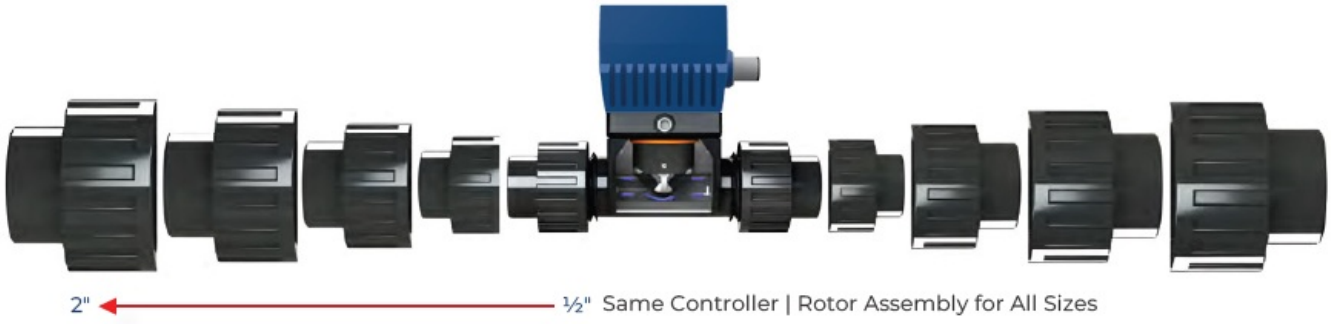
General		
Operating Range	0.3 to 33 ft/s	0.1 to 10 m/s
Pipe Size Range	¼ to 4″ **	DN08 to DN100
Linearity	±0.5% of F.S @ 25°C | 77°F	

Repeatability	±0.5% of F.S @ 25°C | 77°F	
Fluid	Water or Chemical Liquid-Viscosity Range: .5-20 centistokes	
Flow Velocity	10 m/s max.	
Low Cut	0.3 m/s min.	
Operating Pressure	150 Psi (10 Bar) @ Ambient Temp |Non-Shock	
Range Ability	10 : 1	
Response Time	Real Time	
Flow Total Meter	Range = 0~999999 ; Unit = Gallon or Liter or Ton (KL) Selectable	
Repeatability	Range = 0.0~999.9 ; Unit = GPM or LPM or CMH Selectable	
Accuracy	± 0.5% of F.S. @ 25°C	
Wetted Materials		
Sensor Body	PVC (Dark) | PP (Pigmented) | PVDF (Natural) | 316 SS	
O-Rings	FKM | EPDM* | FFKM*	
Rotor Pin | Bushings	Zirconium Ceramic | ZrO2	
Paddle | Rotor	ETFE Tefzel®	
Electrical		
Frequency	49 Hz per m/s nominal	15 Hz per ft/s nominal
Supply Voltage	9 to 30 VDC ±10% regulated	
Supply Current	<1.5 mA @ 3.3 to 6 VDC	<20 mA @ 6 to 24 VDC
Max. Temperature/Pressure Rating – Standard and Integral Sensor | Non-Shock		
PVC	180 Psi @ 68°F | 40 Psi @ 140°F	12.5 Bar @ 20°C | 2.7 Bar @ 60°C
PP	180 Psi @ 68°F | 40 Psi @ 190°F	12.5 Bar @ 20°C | 2.7 Bar @ 88°C
PVDF	200 Psi @ 68°F | 40 Psi @ 240°F	14 Bar @ 20°C | 2.7 Bar @ 115°C
316 SS	200 Psi @ 180°F | 40 Psi @ 300°F	14 Bar @ 82°C | 2.7 Bar @ 148°C
Operating Temperature		
PVC	32°F to 140°F	0°C to 60°C
PP	-4°F to 190°F	-20°C to 88°C
PVDF	-40°F to 240°F	-40°C to 115°C
316 SS	-40°F to 300°F	-40°C to 148°C
Outputs		
NPN Pulse | 4-20mA | Voltage (0-5V)*		
Display		
LED | Flow Rate + Flow Totalizer		

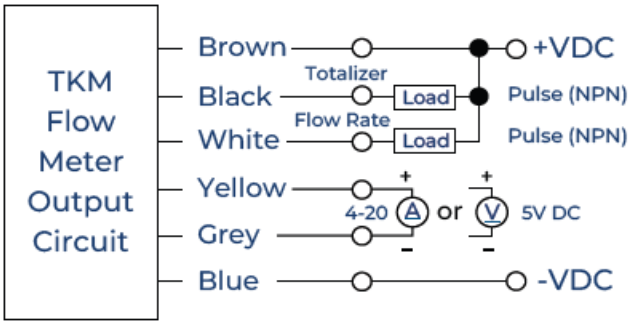
Standards and Approvals
UL | CE | FCC | RoHS Compliant

Exploded View

1	PC Cover
2	TKM Controller
3	Rotor Assembly
4	Body – PVC | PP | PVDF
5	Rotor Pin
6	Rotor Bushing
7	ShearPro® Paddle Wheel
8	Reinforced Inserts



Wiring Diagram



Wire Color	Description
Brown	+ 10~30VDC
Black	Totalizer Pulse Output (OP2)
White	Flow Rate Pulse Output (OP1)
Yellow	+ 4-20mA | 0-5V*
Grey	– 4-20mA | 0-5V*
Blue	-VDC

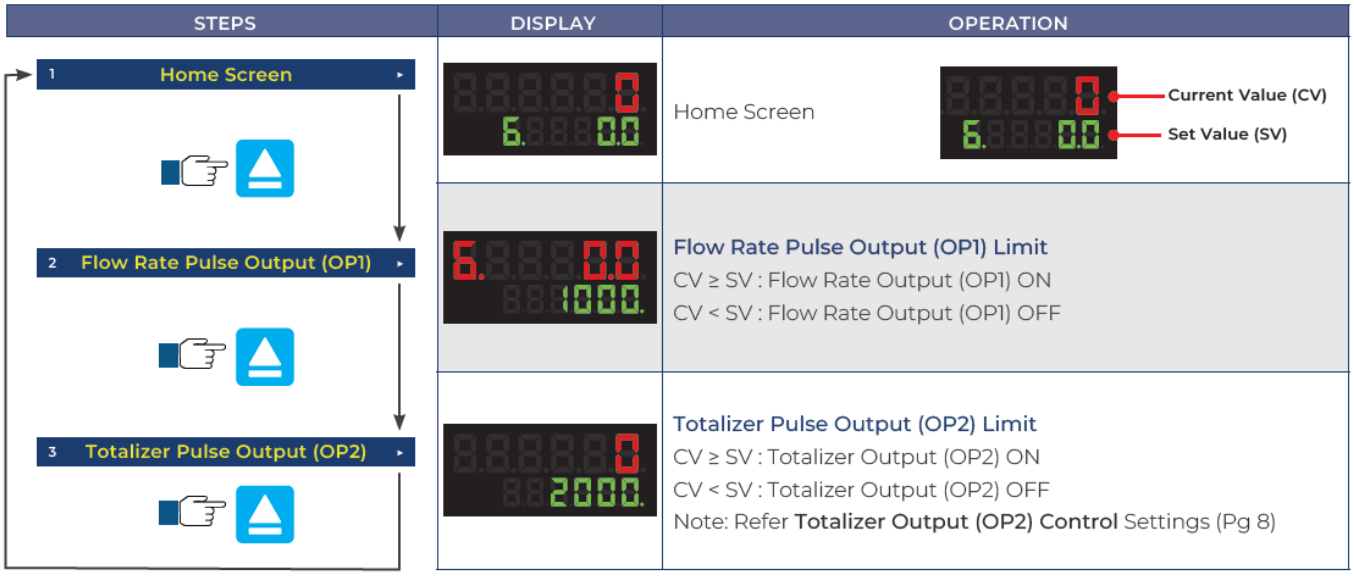
Programming

STEPS	DISPLAY	OPERATION
1 Home Screen SET + F 3 SEC		Home Screen
2 Password SET		Factory Default: Lk = 10 Otherwise meter will enter **Lockout Mode*** Press ▼ / ▲ to change Press SET to save
3 Units of Flow SET		Ut.0 = Liter | Ut.1 = Gallon (Factory Default) | Ut.2 = Kiloliters Press ▲ to change Press SET to save
4 K Factor SET		Enter K Factor Value Refer to Page 9 for K-Factor Values
5 Transmitter Range SET 3 SEC		Factory Default — 4mA = 0 | 20mA = 100** (Max. Flow Rate) **This can be changed to suit application
6 Transmitter Span SET		Range : 0.000 ~ 9.999 Factory Default: SPn = 1.000 (**Span** : Difference between Upper Range (UPV) & Lower Range (LRV))
7 Transmitter Offset SET		Range : 0.000 ~ 9.999 Factory Default: oSt = 0.000 (**Offset** : Actual Output - Expected Output)

Totalizer Reset

STEPS	DISPLAY	OPERATION
1 Home Screen SET + ▼ 3 SEC		Home Screen
2 Totalizer Reset		**Totalizer Value will Reset to Zero**

Setting Output Limits (SSR*)



Wiring – SSR* (For Totalizer) | Con n
Set “Con n” in Totalizer Output (OP2) Control (Refer Pulse Control Programming, Page 8)

Wire Color	Description
Brown	+ 10~30VDC
Black	Totalizer Pulse Output (OP2)
Blue	-VDC

Wiring – One Pulse/Gal | Con E
Set “Con E” in Totalizer Output (OP2) Control (Refer Pulse Control Programming, Page 8)

Wire Color	Description
Brown	+ 10~30VDC
Black	Totalizer Pulse Output (OP2)
Blue	-VDC

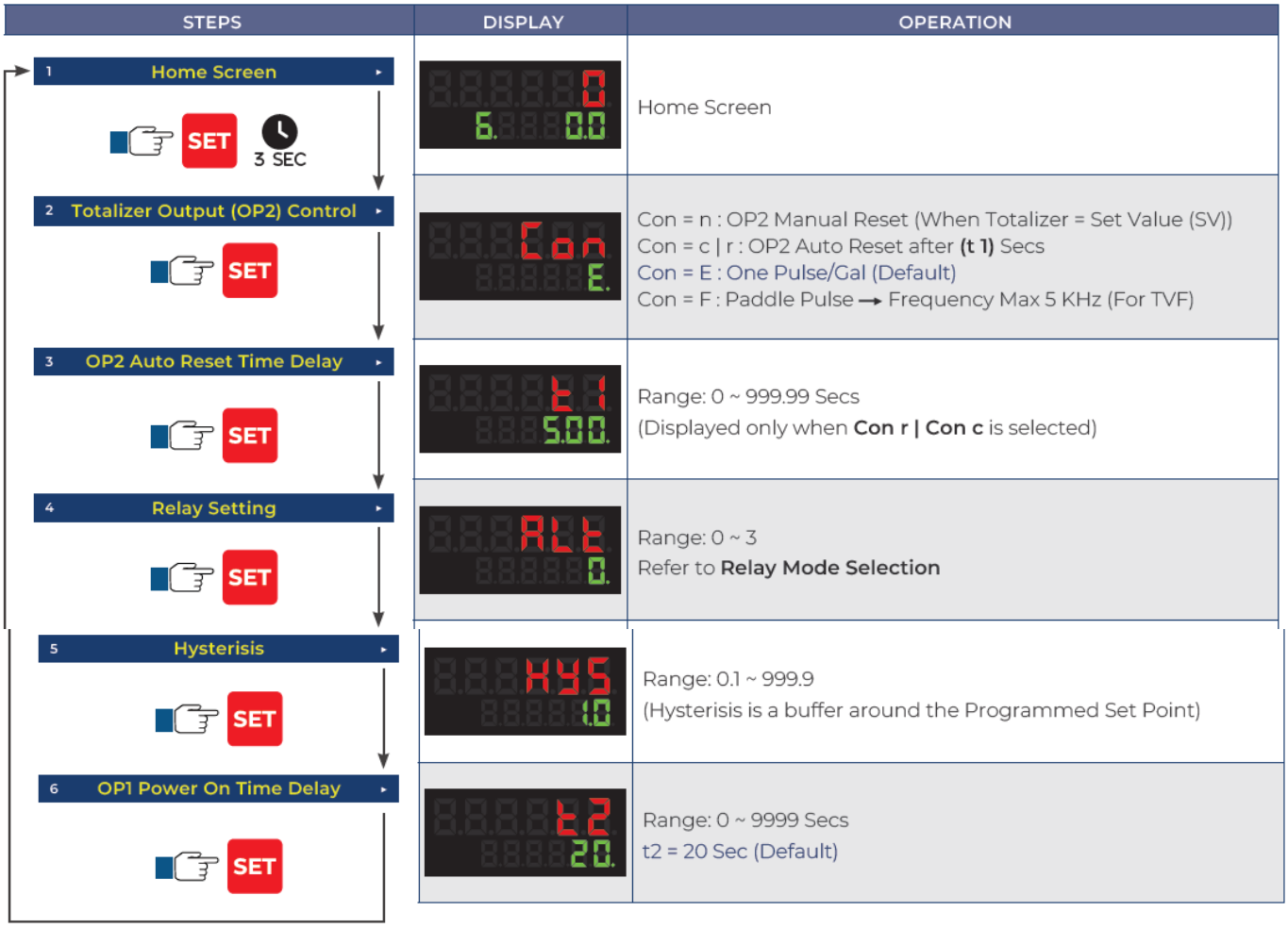
Wiring – SSR* (For Flow Rate) | Con F/E/r/c
Set “Con F/E/r/c” in Totalizer Output (OP2) Control (Refer Pulse Control Programming, Page 8)

Wire Color	Description
Brown	+ 10~30VDC
White	Flow Rate Pulse Output (OP1)
Blue	-VDC

Wiring – To Flow Display | Con F
Set “Con F” in Totalizer Output (OP2) Control (Refer Pulse Control Programming, Page 8)

Wire Color	Description
Brown	+ 10~30VDC
Black	Paddle Pulse
Blue	-VDC

Pulse Control Programming

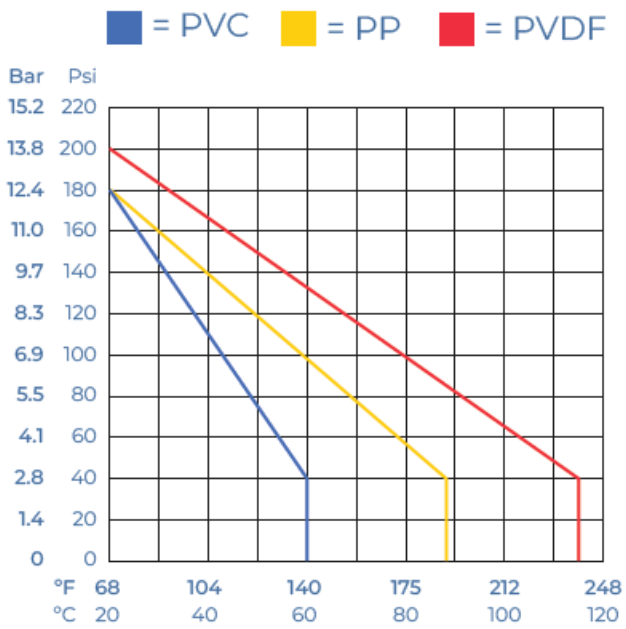


Relay Mode Selection

ALt No.	Description
ALt = 0	CV ≥ SV ⟶ Relay ON | CV < [SV – Hys] ⟶ Relay OFF
ALt = 1	CV ≤ SV ⟶ Relay ON | CV > [SV + Hys] ⟶ Relay OFF
ALt = 2	[SV + Hys] ≥ CV ≥ [SV – Hys] ⟶ Relay ON : CV > [SV + Hys] or CV < [SV – HyS] ⟶ Relay OFF
ALt = 3	[SV + Hys] ≥ CV ≥ [SV – Hys] ⟶ Relay OFF: CV > [SV + Hys] or CV < [SV – HyS] ⟶ Relay ON
Hys = Hysteresis — Acts like a buffer ± around (OP1) pulse output	
CV: Current Value (Flow Rate) | SV = Set Value	

Temperature | Pressure Graphs | Non-Shock
Note: The Pressure/Temperature graphs are specifically for the Truflo® Flow Meter Sensors.

During system design the specifications of all components must be considered.



K-Factors for TK Series (V1)

Size	LPM	GPM
¼”	547	2079
⅜”	300	1140
½”	127.6	484.9
¾”	81.8	310.8
1”	55.1	209.4
1½”	18.8	71.4
2”	10.2	38.8
3”	4.7	18
4”	2.1	8
⚠ K-Factor is Pre-Programmed		

K-Factors for TK Series (V2)

Size	K-Factor
½”	127.6
¾”	81.8
1”	55.1
1½”	18.8
2”	10.2
2½”	6.0

Min/Max Flow Rates

Pipe Size	(O.D.)	LPM |	GPM	LPM	|	GPM
		0.3m/s	min.	10m/s		max.
DN08	(¼”)	0.6 |	0.16	12	|	3
DN10	(⅜”)	1.8 |	0.48	50	|	13
DN15	(½”)	3.5 |	1.0	120	|	32
DN20	(¾”)	5.0 |	1.5	170	|	45
DN25	(1”)	9.0 |	2.5	300	|	79
DN40	(1½”)	25.0 |	6.5	850	|	225
DN50	(2”)	40.0 |	10.5	1350	|	357
DN65	(2½”)	60.0 |	16.0	1850	|	357
DN80	(3”)	90.0 |	24.0	2800	|	739
DN100	(4”)	125.0 |	33.0	4350	|	1149

- SS Only
- SS Only

Model Selection

Note: PVC Socket Ends (Std) PP/PVDF NPT Ends (Std)

Add 2nd Suffix (seals): FKM (std, no suffix required)

- E ▶ EPDM Seals
- K ▶ FFKM | Kalrez® Seals

Add 1st Suffix (end connection):

- T ▶ NPT End Connectors (on PVC)

- B ▶ Butt Fusion End Connections for PP or PVDF
- F ▶ Flange ANSI 150lb – Consult Factory

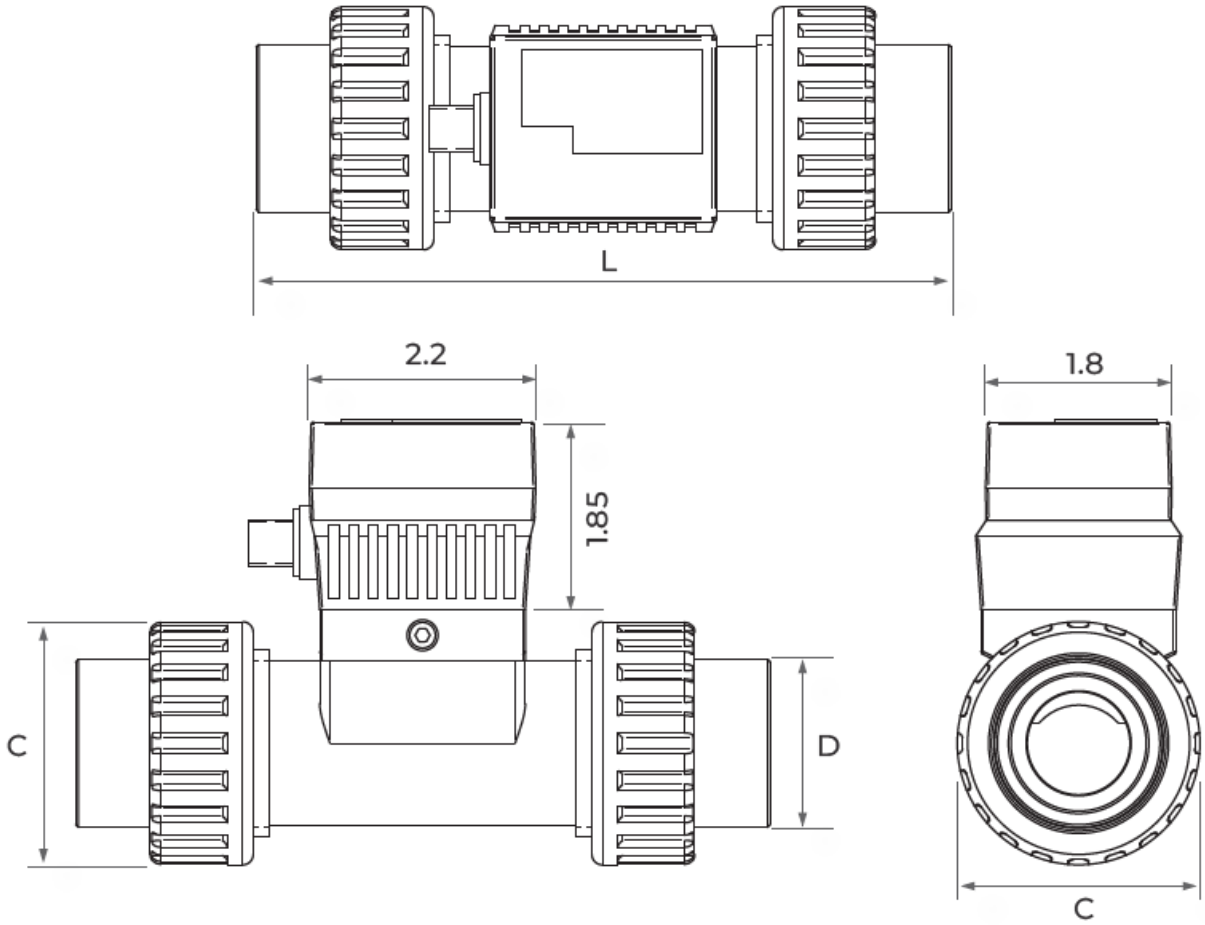
PVC		
Size	End Connections	Part Number
½”	Sch 80 Soc	TKM-15-P
¾”	Sch 80 Soc	TKM-20-P
1”	Sch 80 Soc	TKM-25-P
1 ½”	Sch 80 Soc	TKM-40-P
2”	Sch 80 Soc	TKM-50-P
3”	Flanged	TKM-80-P
4”	Flanged	TKM-100-P

PVDF		
Size	End Connections	Part Number
½”	NPT	TKM-15-PF
¾”	NPT	TKM-20-PF
1”	NPT	TKM-25-PF
1 ½”	NPT	TKM-40-PF
2”	NPT	TKM-50-PF

PP		
Size	End Connections	Part Number
½”	NPT	TKM-15-PP
¾”	NPT	TKM-20-PP
1”	NPT	TKM-25-PP
1 ½”	NPT	TKM-40-PP
2”	NPT	TKM-50-PP
3”	Flanged	TKM-80-PP
4”	Flanged	TKM-100-PP

316 SS		
Size	End Connections	Part Number
¼”	NPT	TK3M-08-SS
⅜”	NPT	TK3M-10-SS
½”	NPT	TK3M-15-SS
¾”	NPT	TK3M-20-SS
1”	NPT	TK3M-25-SS
1 ½”	NPT	TK3M-40-SS
2”	NPT	TK3M-50-SS
3”	NPT	TK3M-80-SS
4”	NPT	TK3M-100-SS

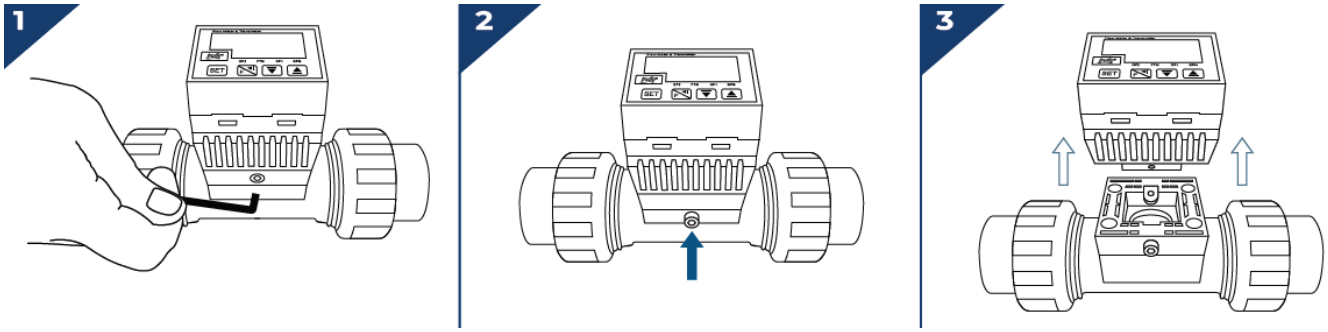
Dimensions



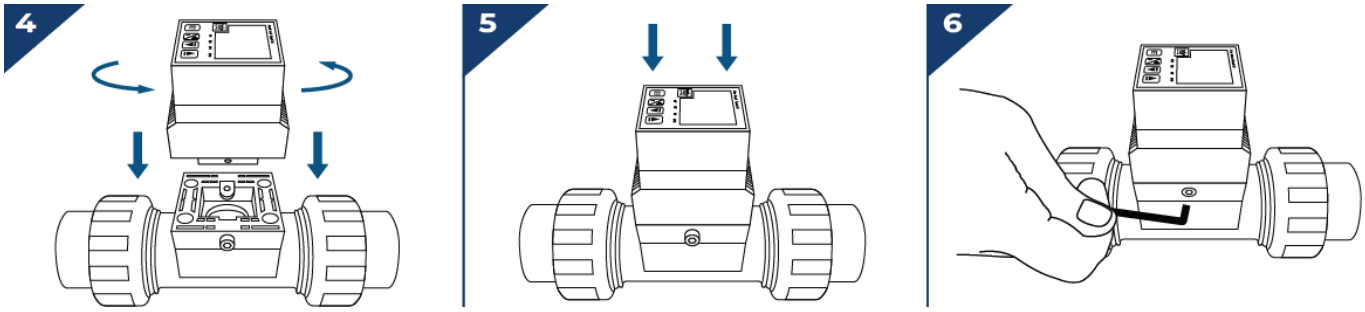
Pipe Size	L (inch)	D (inch)	C (inch)
½” DN (15)	5.48	1.07	1.61
¾” DN (20)	6.12	1.36	2.08
1″ DN (25)	6.76	1.68	2.36
1½” DN (40)	7.66	2.33	3.26
2″ DN (50)	8.40	2.86	4.33

Procedure to Rotate Display

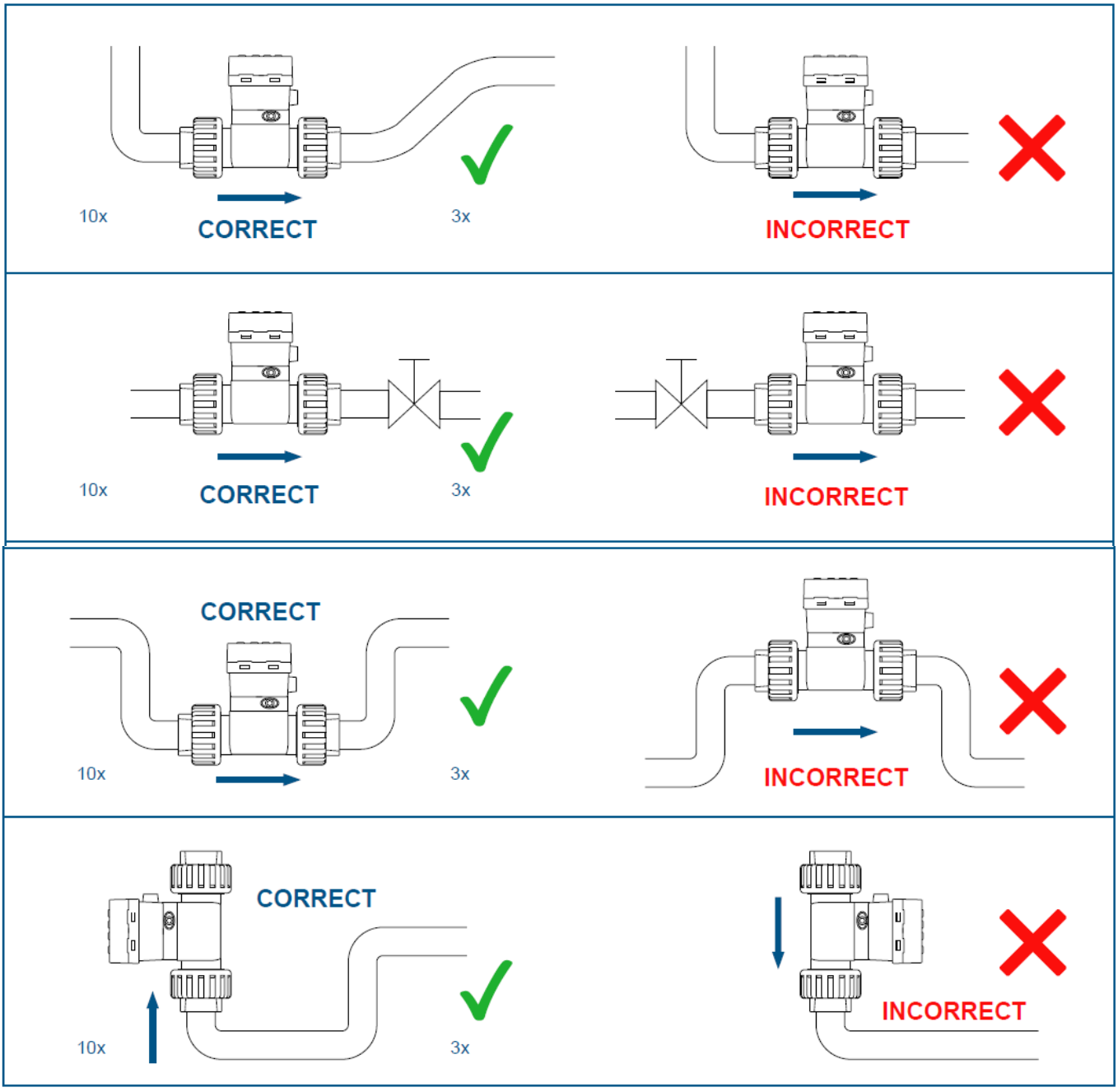
1. Using an allen key loosen the 2 screws located on either side of the display.
2. Pull the Screws | Do Not Remove!
3. Lift the Display.



4. Rotate Display – 90 Degrees
5. Lower Display.
6. Tighten Allen Screws | Snug Tight Do Not Over-Tighten!



Installation Position



Please Ensure Full Pipe

- TK Series can be installed in a horizontal or vertical direction.
- Please ensure enough length of straight pipe to avoid turbulence that can effect readings.
- **Note:** Min 10x Pipe Diameters Upstream 3x Pipe Diameters Downstream.
- A Plastic Basket Strainer, Bag Filter or Y Strainer Filtering Device upstream to Avoid the Paddle Wheel from being damaged by the solids or fibers – max 10% Particle Size – Not to Exceed .5mm Cross Section or Length.
- Please do not flush the pipe after the Flow Meter is installed with Compressed Air this may damage the ceramic shaft and will Void Warranty.

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**, 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

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;
2. or 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**

- **e-mail:** sales@iconprocon.com or support@iconprocon.com
- **Ph:** 905.469.9283
- **Phone:** 905.469.9283
- **Sales:** sales@iconprocon.com
- **Support:** support@iconprocon.com

Frequently Asked Questions (FAQ)

What is the operating range of the In-Line Paddle Wheel Flow Meter Sensor?

The operating range is from 0.3 to 33 ft/s or 0.1 to 10 m/s.

Can the sensor be installed in any orientation?

The sensor can be installed in a horizontal or vertical direction, ensuring proper straight pipe lengths for accurate readings.

What precautions should be taken when installing the sensor?

Ensure system depressurization, proper pipe sizing, chemical compatibility, and use of safety gear during installation to prevent hazards.

How do I protect the paddle wheel from damage?

Use a Bag Filter or Y Strainer upstream to prevent damage from solids or fibers and avoid flushing the pipe with compressed air after installation.

Documents / Resources

	truflo TK3M Series In Line Paddle Wheel Flow Meter Sensor [pdf] Instruction Manual TK3M Series, TK3M Series In Line Paddle Wheel Flow Meter Sensor, In Line Paddle Wheel Flow Meter Sensor, Paddle Wheel Flow Meter Sensor, Flow Meter Sensor, Meter Sensor, Sensor
	truflo TK3M Series In Line Paddle Wheel Flow Meter Sensor [pdf] User Manual TK3M Series, TK3M Series In Line Paddle Wheel Flow Meter Sensor, In Line Paddle Wheel Flow Meter Sensor, Paddle Wheel Flow Meter Sensor, Wheel Flow Meter Sensor, Flow Meter Sensor, Meter Sensor, Sensor

References

- User Manual