truflo TKM Series In Line Paddle Wheel Flow Meter Sensor User Manual

Contents

Truflo TKM Series In Line Paddle Wheel Flow Meter Sensor

Specifications

- **Operating Range:** 0.3 to 33 ft/s, 0.1 to 10 m/s
- **Pipe Size Range:** DN08 to DN100
- **Linearity:** Provided
- **Repeatability:** Provided
- **Fluid:** Water or Chemical Liquid- Viscosity
- **Range:** 0.5-20 centistokes

Product Usage Instructions

- **Safety Information**
  Before installation or removal, ensure to depressurize and vent the system. Confirm chemical compatibility before use, and do not exceed maximum temperature or pressure specifications. Always wear safety goggles or face shield during installation and service, and do not alter product construction.
- **Personal Protective Equipment (PPE)**
  Always use appropriate PPE during installation and servicing of the Truflo products.
- **Pressurized System Warning**
  Ensure to vent the system before installation or removal toprevent equipment damage or serious injury. Pressure test the system with water before initial start-up.
- **Please Ensure Full Pipe**
  Install the TK Series in a horizontal or vertical direction with sufficient straight pipe length to avoid turbulent flow that may affect readings. Follow the minimum pipe diameter requirements upstream and downstream as specified.
- **Filtering Device Recommendation**
  Install a Bag Filter or Y Strainer upstream to protect the paddle wheel from damage by solids or fibers. Ensure the particle size does not exceed 10% and avoid flushing the pipe withcompressed air after installation as it may damage the ceramic shaft.

Safety Information

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

Please ensure that the Instruments are not to be subject to water hammer or pressure spikes! Always Pressure Test System with H2O Before 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 affect 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 the warranty.

Product Description

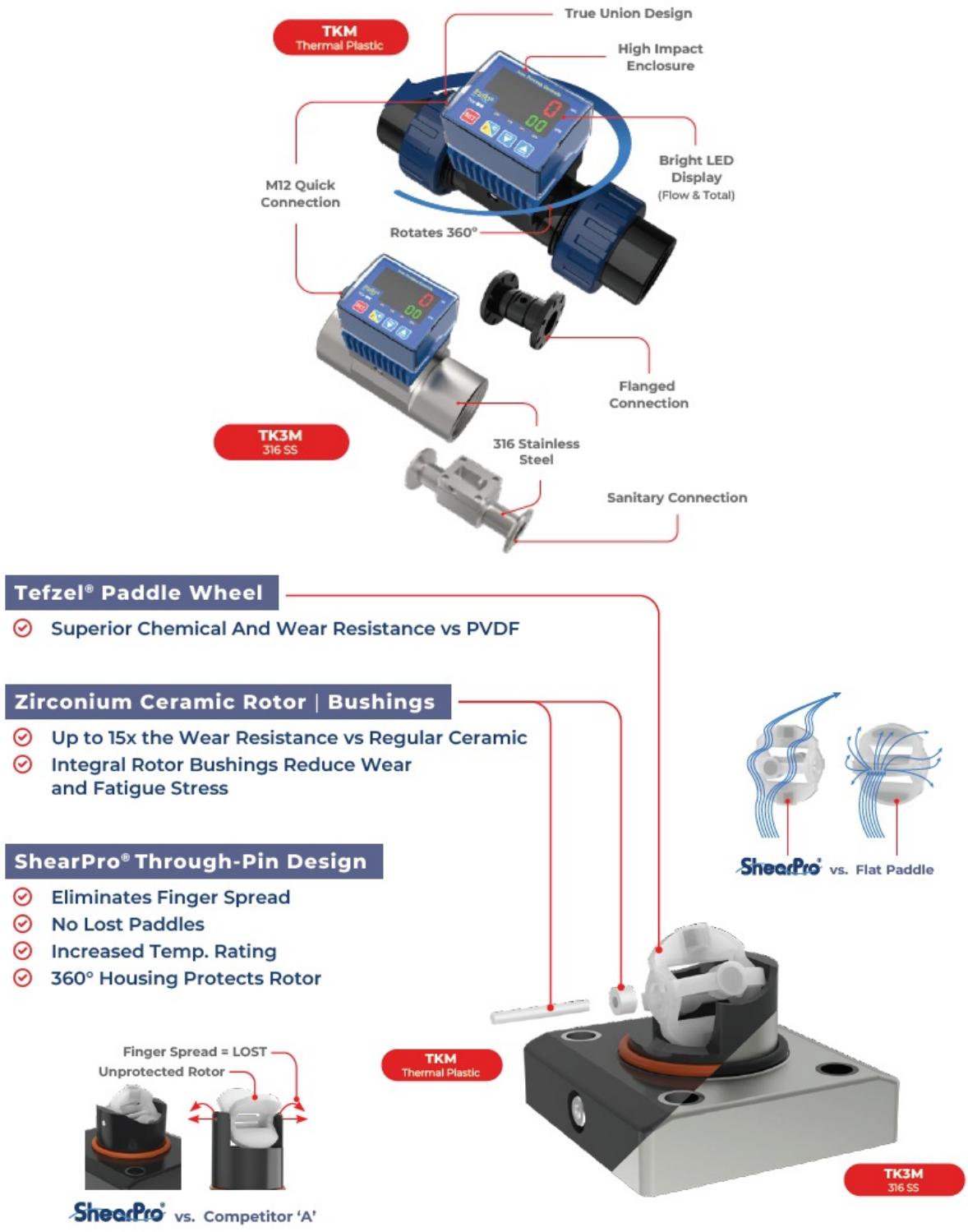
- The TK Series in-line plastic paddle wheel flow meter has been engineered to provide long-term accurate flow measurement in tough industrial applications.
- The paddle wheel assembly consists of a engineered Tefzel® paddle and micro-polished zirconium ceramic rotor pin and bushings. High performance 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”



Technical Specifications

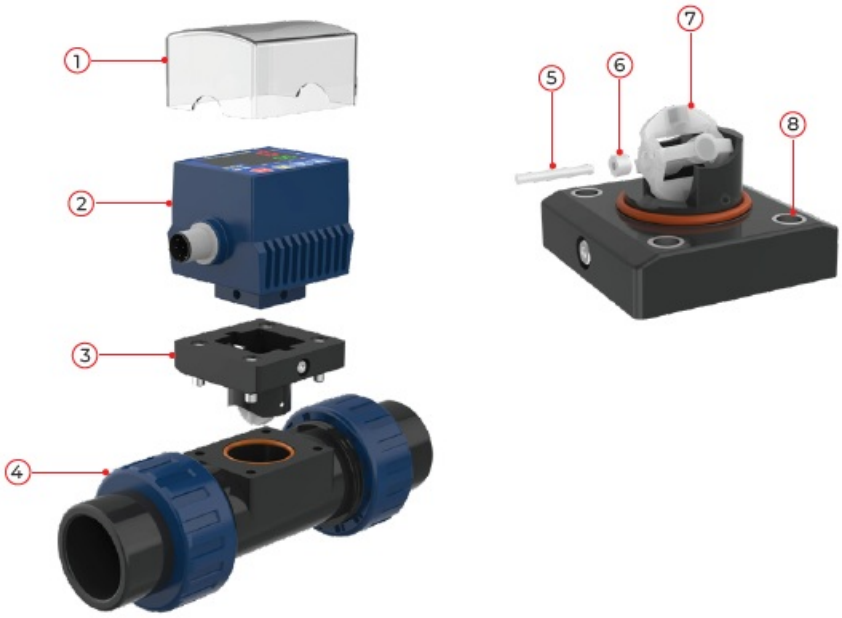
General		
Operating Range	0.3 to 33 ft/s	0.1 to 10 m/s
Pipe Size Range	¼ to 4″ **	DN08 to DN100

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	Consult Factory	
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 149°C
Outputs		
TKM Series	NPN Pulse | 4-20mA Outputs	
Standards and Approvals		

CE | FCC | RoHS Compliant

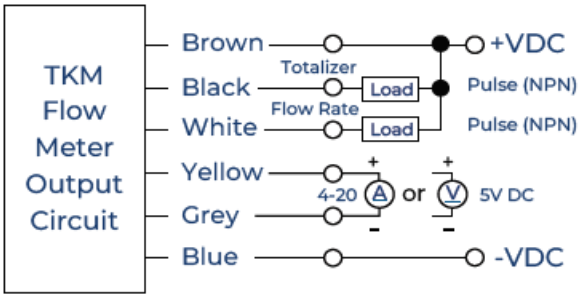
See Temperature and Pressure Graphs for more information

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

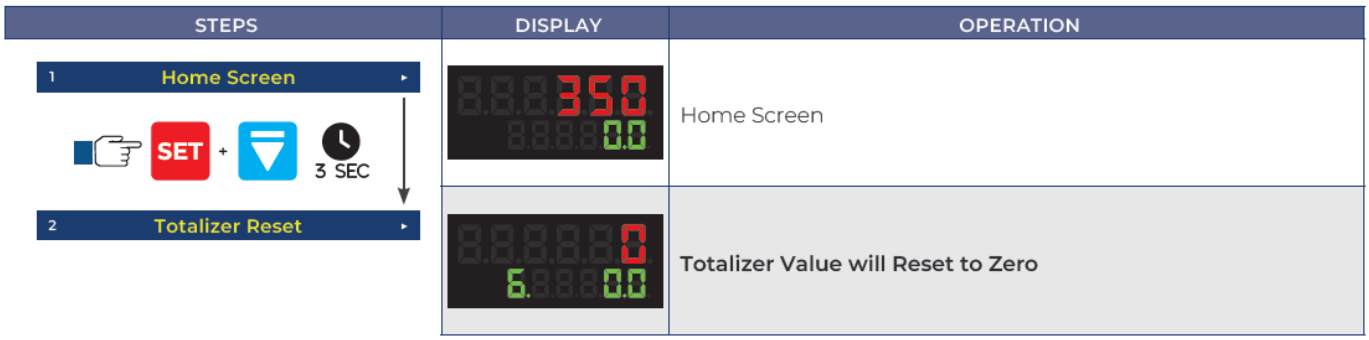
Wiring Diagram



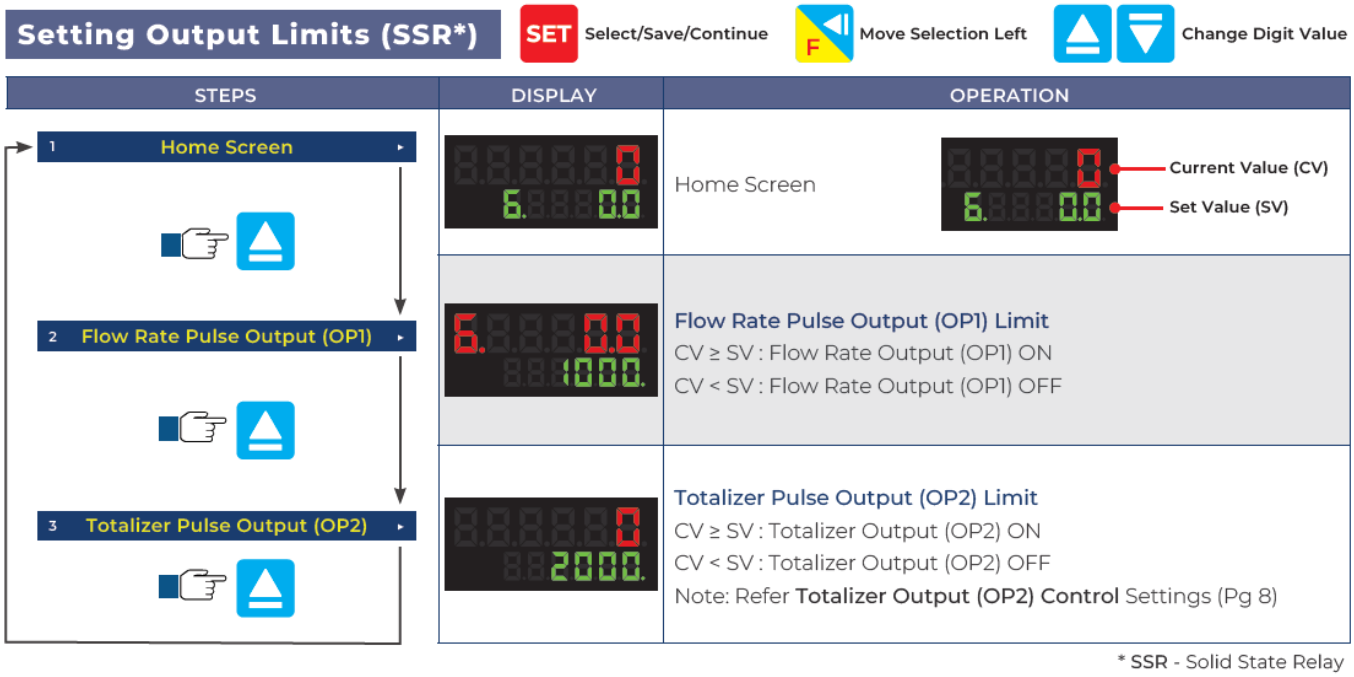
Wire Color	Description
Brown	+ 10~30VDC
Black	Totalizer Pulse Output (OP2)
White	Flow Rate Pulse Output (OP1)
Yellow	+ 4-20mA | 0-5V*
Grey	– 4-20mA | 0-5V*
Blue	-VDC

Programming

Totalizer Reset



Setting Output Limits SSR



* SSR - Solid State Relay

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

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

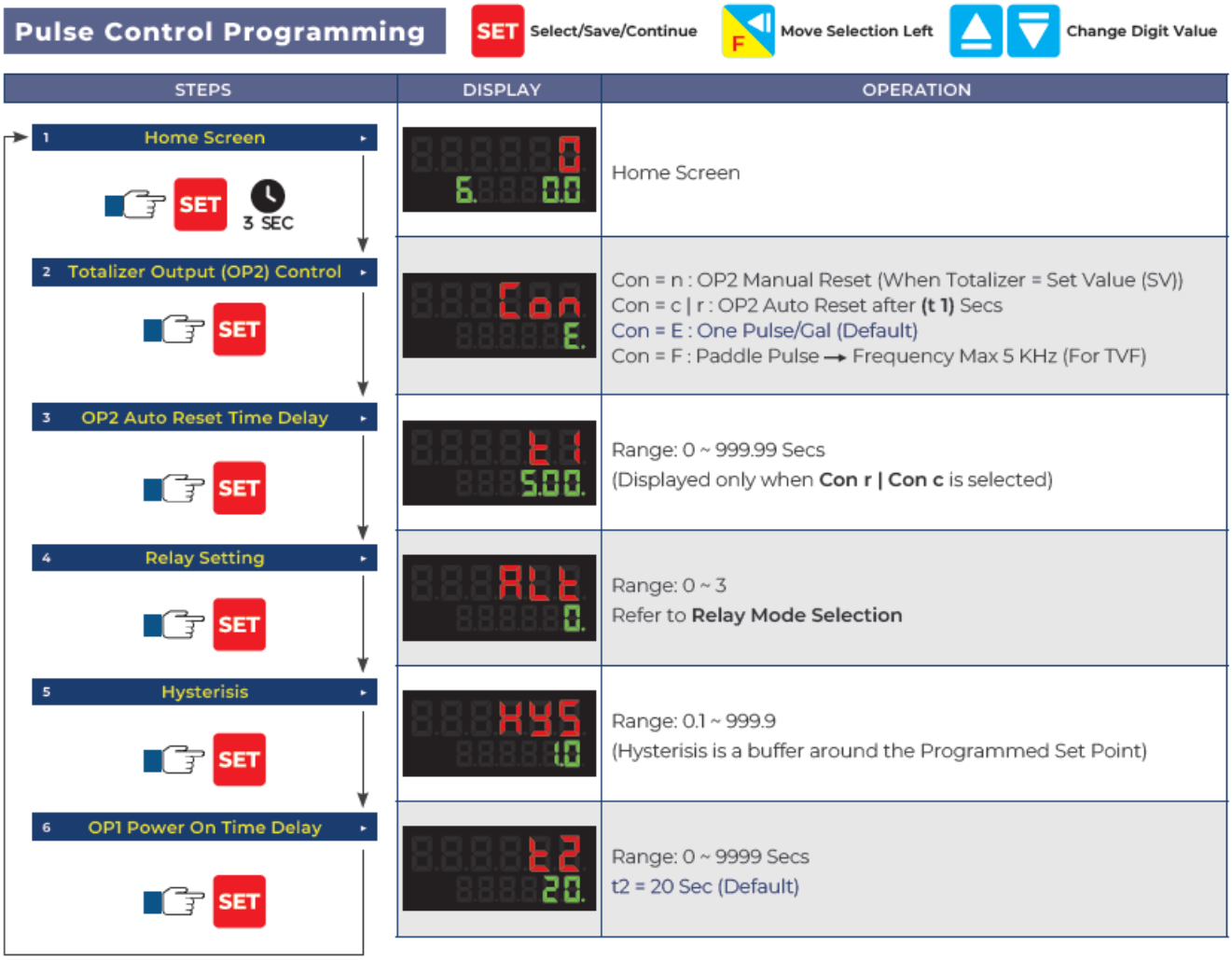
Wiring – One Pulse/Gal | Con E

Set “Con E” in Totalizer Output (OP2) Control (Refer Pulse Control Programmming, Page 8)

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

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

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



Relay Mode Selection

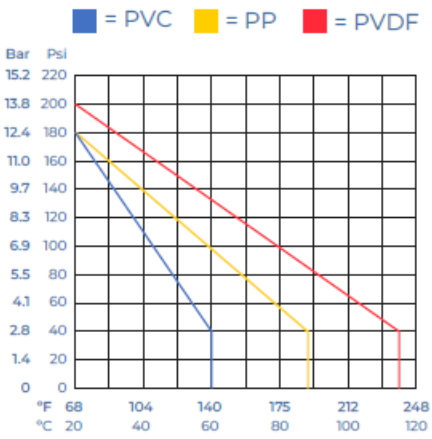
ALt No.	Description
ALt = 0	CV ≥ SV ⟶ Relay ON | CV < [SV – Hys] ⟶ Relay OFF
ALt = 1	CV ≤ SV ⟶ Relay ON | CV > [SV + Hys] ⟶ Relay OFF
ALt = 2	[SV + Hys] ≥ CV ≥ [SV – Hys] ⟶ Relay ON : CV > [SV + Hys] or CV < [SV – HyS] ⟶ Relay OFF
ALt = 3	[SV + Hys] ≥ CV ≥ [SV – Hys] ⟶ Relay OFF: CV > [SV + Hys] or CV < [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

Model Selection

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

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

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

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

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

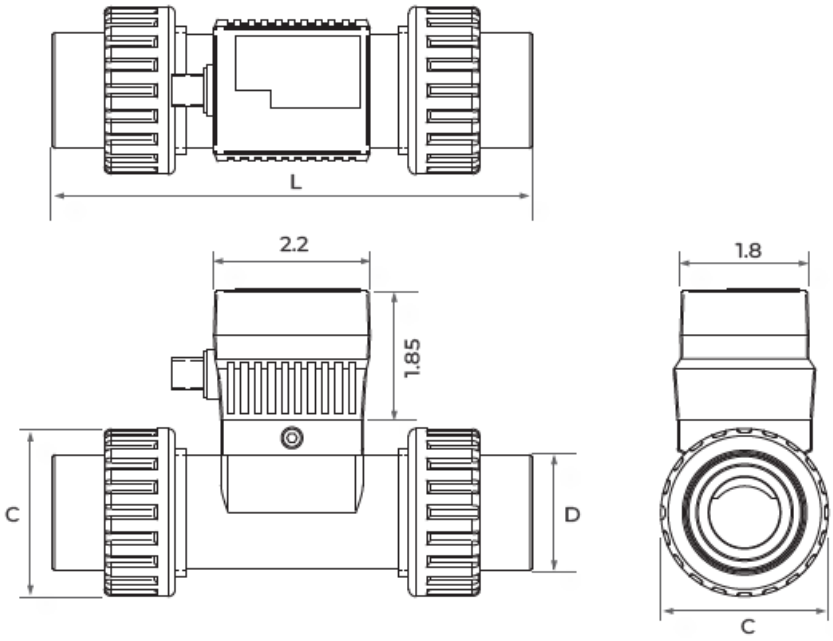
Add 2nd Suffix (seals):
FKM (std, no suffix required)

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

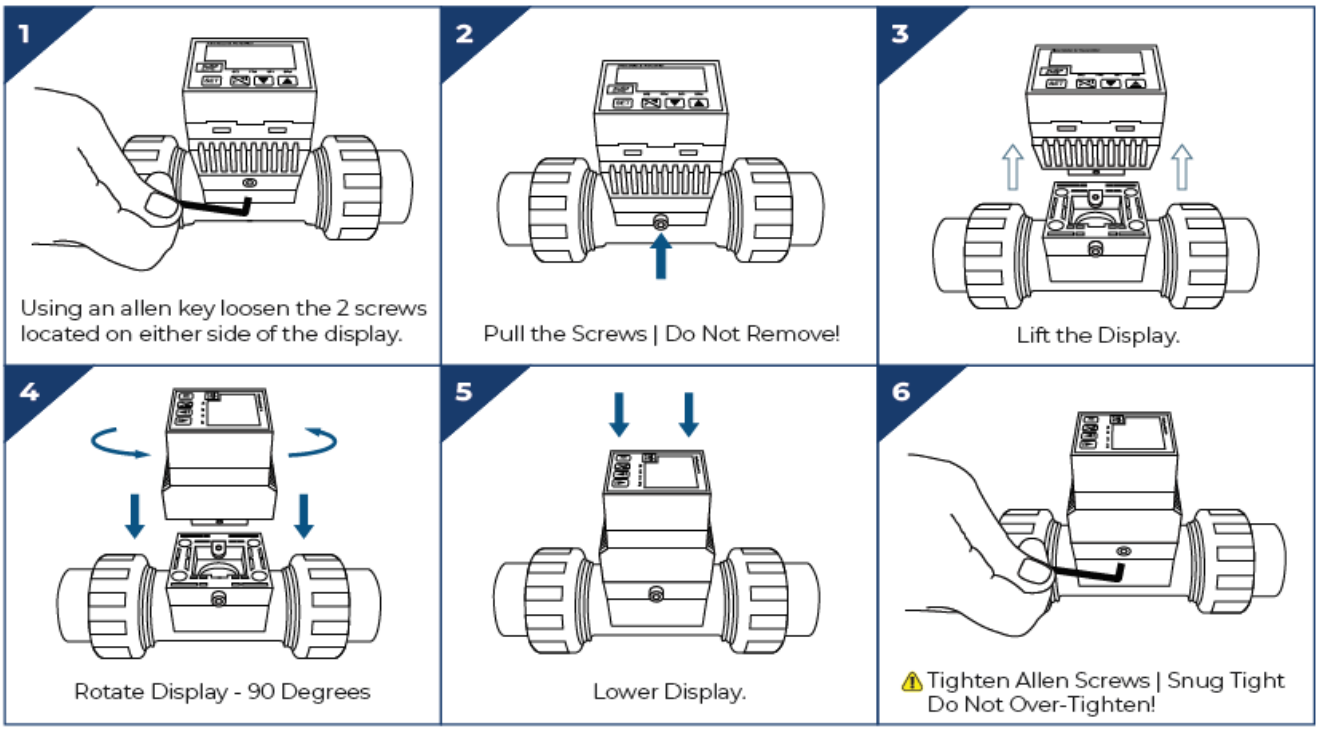
Add 1st Suffix (end connection):

- T ▶ NPT End Connectors (on PVC)
- B ▶ Butt Fusion End Connections for PP or PVDF
- F ▶ Flange ANSI 150lb – Consult Factory

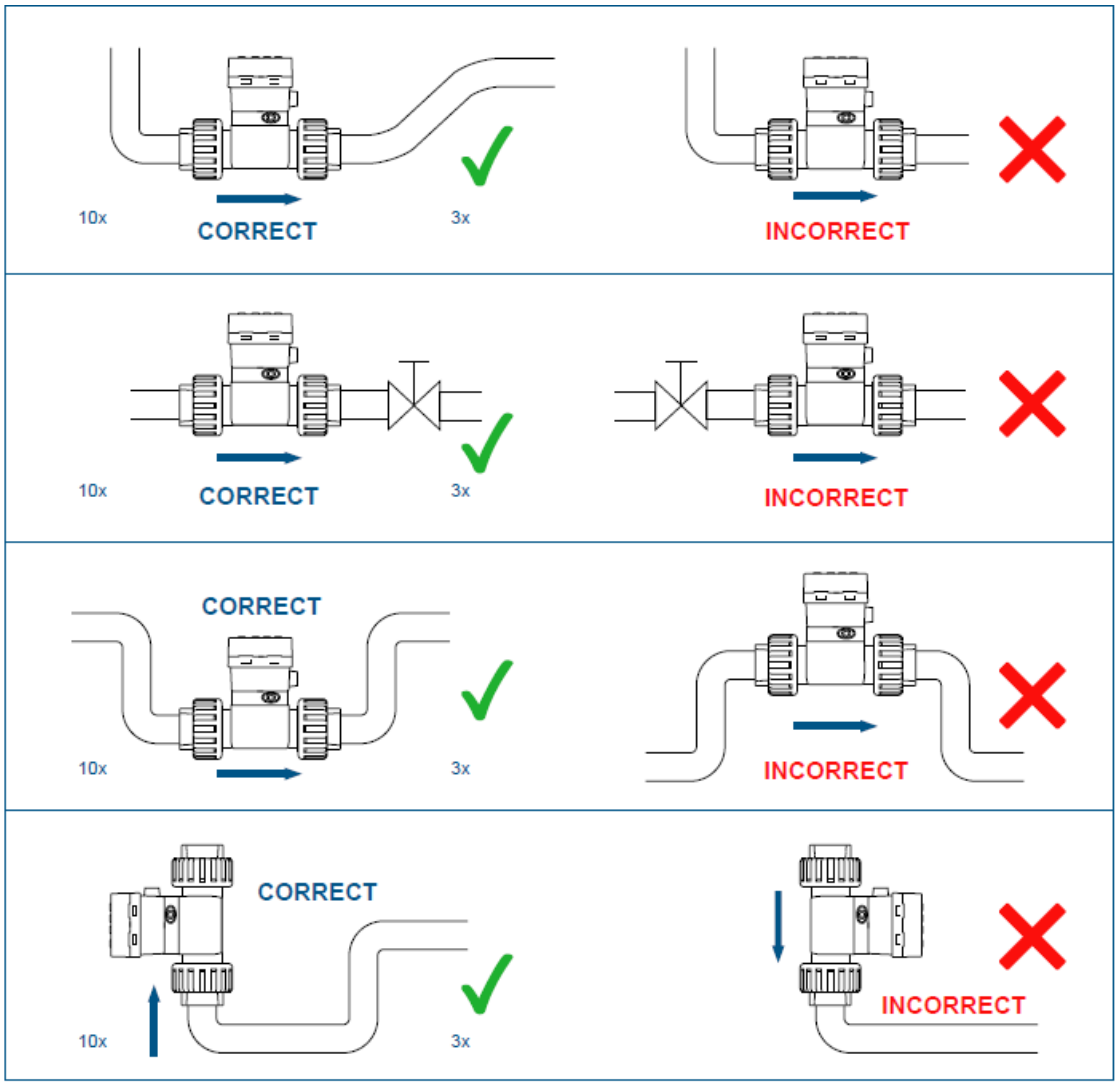
Dimensions



Procedure to Rotate Display



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 by instructions furnished by Icon Process Controls Ltd for one year from the date of sale of such products. Icon Process Controls Ltd's obligation under this warranty is solely and exclusively limited to the repair or replacement, at Icon Process Controls Ltd's option, of the products or components, which Icon Process Controls Ltd's examination determines to its satisfaction to be defective in material or workmanship within the warranty period. Icon Process Controls Ltd must be notified under 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 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, 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 has 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 under 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:

Products Online at:

FAQs

- **Q: What is the operating range of the flow meter?**
  A: The operating range is from 0.3 to 33 ft/s or 0.1 to 10 m/s.

- **Q: What type of fluids can be measured with this flow meter?**

  A: The flow meter is suitable for water or chemical liquids within a viscosity range of 0.5-20 centistokes.
- **Q: How should I protect the paddle wheel from damage?**

  A: Install a filtering device upstream such as a Bag Filter or Y Strainer to prevent damage from solids or fibers, ensuring the particle size does not exceed 10% and avoid flushing the pipe with compressed air after installation.

Documents / Resources

	truflo TKM Series In Line Paddle Wheel Flow Meter Sensor [pdf] User Manual tkm-20-pf-b-e, tk3m-80-ss, TKM Series In Line Paddle Wheel Flow Meter Sensor, TKM Series, In Line Paddle Wheel Flow Meter Sensor, Paddle Wheel Flow Meter Sensor, Flow Meter Sensor, Meter Sensor, Sensor

References

- User Manual