TKS SERIES

Paddle Wheel Flow Meter

Quick Start Operating Manual



ICON™ PROCESS CONTROLS

Corrosion-Free
Instrumentation Equipment

Table of Contents

Safety Information 03
Technical Specifications 04
Exploded View 05
General Terms 05
Wiring Diagram 05
Programming TKS Model 06
Programming Relay 06
Relay Settings 07
K-Factors for TK 07
Flow Rates 07
Pressure vs. Temperature Psi H_2O | Non-Shock 07
Procedure to Rotate Display 08
Dimensions 08
Installation Positions 09
Warranty, Returns and Limitations 10

ICON™ PROCESS CONTROLS
Corrosion-Free Instrumentation Equipment

Safety Information

1. De-pressurize and Vent System Prior to Installation or Removal.
2. Confirm Chemical Compatibility Before Use.
3. DO NOT exceed Maximum Temperature or Pressure Specifications.
4. ALWAYS Wear Safety Goggles or Face-shield During Installation and/or Service.
5. DO NOT Alter Product Construction.

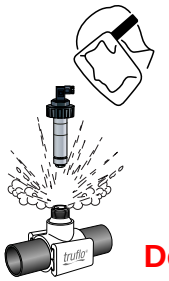
Warning | Caution | Danger
Indicates a potential hazard. Failure to follow all warnings may lead to equipment damage, injury, or death

Hand Tighten Only
Overtightening 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.

WARNING!



Failure to follow these instructions may result in the sensor being ejected from the pipe!

If leaking is observed from the retaining cap, it indicates defective or worn o-rings on the sensor. Do not attempt to correct by further tightening.

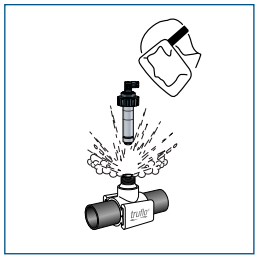
Do Not Remove Under Pressure

Please ensure that the Instruments are not to be subject to water hammer or pressure spikes! Always Pressure Test System with H_2O Prior to Initial Start-Up

Before 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 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



Personal Protective Equipmet (PPE)

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

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.

Min 10x Pipe Diameters Upstream 3x Pipe Diameters Downstream.

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

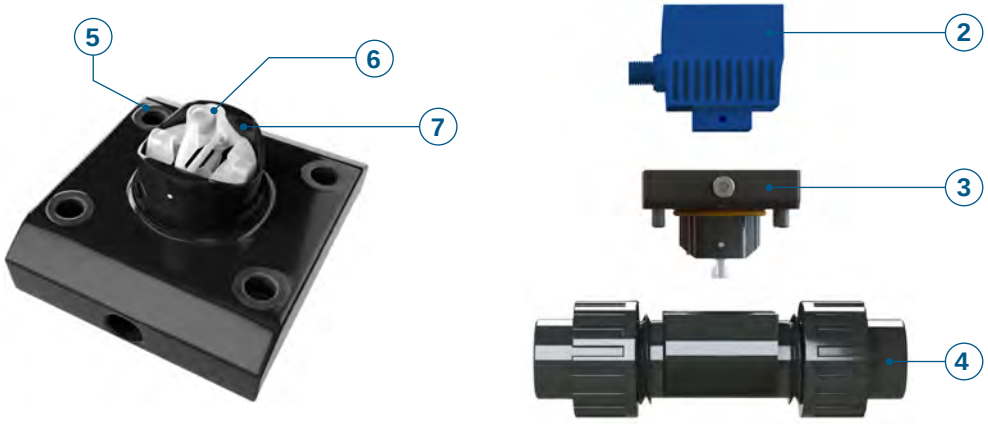
Technical Specifications

General				
Operating Range	0.3 to 33 ft/s	0.1 to 10 m/s		
Pipe Size Range	½ to 4"	DN15 to DN100		
Linearity	±0.5% of F.S @ 25°C | 77°F			
Repeatability	±0.5% of F.S @ 25°C | 77°F			
Fluid	Liquid - Viscosity Range <.5-20 centistokes			
Accuracy	> ±5% of F.S. @ 68°F | 20°C | Repeatability 0.5 of Full Scale			
Max Flow Velocity	32.8 ft/s max | 10 m/s max			
Min Flow	0.8 ft/s min | 0.3 m/s min			
Operating Press	225psi			
Turndown	33:1			
Response Time	Real Time			
Electronics	122°F °C			
Current Draw	60mA Max			
Wetted Materials				
Sensor Body	PVC (Dark) | PP (Pigmented) | PVDF (Natural)			
O-Rings	FKM | EPDM* | FFKM*			
Rotor Pin | Bushings	Zirconium Ceramic | ZrO_2			
Paddle | Rotor	ETFE Tefzel®			
Electrical				
Frequency	49 Hz per m/s nominal		15 Hz per ft/s nominal	
Supply Voltage	5 to 24 VDC ±10% regulated		3 VDC	
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
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	
Outputs				
TKS Series	Frequency Pulse + 1 Amp Relay			
Standards and Approvals				
CE | FCC | RoHS Compliant				

Optional*

Exploded View

1. Polycarbonate Cover
2. Flow Controller
3. Hall Pickup Sensor
4. Redesigned Rotor Assembly
5. Body | PVC | PP | PVDF *
6. Re-inforced Inserts
7. Shearpro Contoured Rotor
8. Zirconium Rotor Pin & Bearings





4" ◄——————————— ½" Same Controller | Rotor Assembly for All Sizes

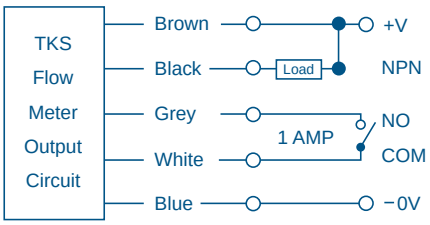
General Terms

1	K: Coefficient of Flow Volume
2	NPN: Transistor Relay

Note : Factory Set Do Not Change

Wiring Diagram

TKS - NPN Pulse | Relay



Brown	10 - 30 VDC (+)
Blue	0V (-)
Black	Flow Rate Pulse Output (NPN)
White	COM
Grey	NO

Programming TKS Model

STEPS	DISPLAY	OPERATION	24V DC POWER ONLY
Step-1 Home Screen Press SET + F Key 3 sec (Together) (HOLD)		**TKS Series Only** Power Up Flow Meter with VDC Power **000.0**	
Step-2 Programming Lock-Out Press SET Key		Programming Lock-Out Security Feature **Lk = 10 Unlocked Status - | Default** Changing Number will Lock Flow Meter **LK.10 | Default Enter 10 to Unlock** If any other Number is entered the Programming will be restricted	
Step-3 K-Factor Pre Programmed Press SET Key		K-Factor Range : 0.1-999.9 **Factory Pre-Programmed K-Value Preset - Do Not Change**	⚠
Step-4 Programming Units of Measurement Press SET Key		Program Measured Units Ut = 0 : LPM **Ut = 1 : GPM | Default** SET F Ut = 2 : Kiloliter | KL	
Step-5 Programming Pulse Output Press SET Key		Programming NPN Pulse Output con.E - Output = 1 Pulse/Gal con.F - Paddle Pulse Output 5KHZ MAX **con.E | Default**	
Step-6 Relay Set Point Press SET Key		Programming Relay Set-point Select - ALt.0 ALt.1 ALt.2 ALt.3 **ALt.0 Default** **See Next Page for ALt Settings**	
Step-7 Programming Relay Delay Press SET Key		Programming Initial Start-Up Relay Time Delay Range : 0-99 sec Delay Time to Power on Alarm Output **Relay t.20 Default = 20 Seconds** Initial Start up of Flow Meter or Process | Allows for System Steady State before Relay Switch becomes Active).	

Programming Relay

STEPS	DISPLAY	OPERATION	24V DC POWER ONLY
Step-1 Home Screen Press SET Key 3 sec (HOLD)		Power On Flow Meter Home Screen 000.0	
Step-2 Programming Relay Set Point Press SET Key		Programming Relay Set Point. When Relay Becomes Active Range : 0.1 - 999.9 GPM **100.0 GPM | Default** Relay will Activate when this Set Point or Flow Rate is Reached	
Step-3 Programming Relay Hysteresis Press SET Key		Program Relay Hysteresis - Prevents Relay Chatter - Due to Constant Flow Rate Change around Set Point in Dynamic Flow Process. **d = Delay 0.10 GPM d.0.10 | Default**	

Relay Settings

ALT NO.	DESCRIPTION
ALt = 0	CV > SV ⟶ Relay ON : CV < SV - d ⟶ Relay OFF
ALt = 1	CV < SV ⟶ Relay ON : CV > SV + d ⟶ Relay OFF
ALt = 2	SV + d > CV > SV - d ⟶ Relay ON: CV > SV + d or CV < SV - d ⟶ Relay OFF
ALt = 3	SV + d > CV > SV - d ⟶ Relay OFF: CV > SV + d or CV < SV - d ⟶ Relay ON

CV = Current Display Value = Flow Rate | **SV** = Selected Value = Programmed Value

d = (GPM) Hysteresis Measured around Relay Set Point (± Measured in Gallons)

K-Factors for TK

Size	LPM	GPM
½"	124	471
¾"	72	274
1"	54	171
1 ½"	19	72
2"	10.3	39
3"	4.7	18
4"	2.1	8

⚠ **K-Factor is Pre-Programmed**

Flow Rates

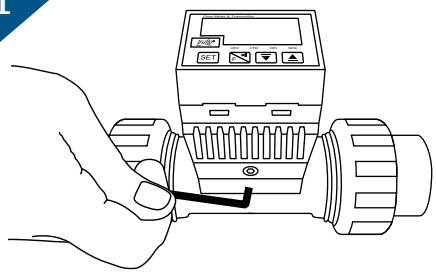
Pipe Size (O.D.)	LPM | GPM	LPM | GPM
	0.3m/s min.	10m/s max.
DN15 (½")	3.5 | 1.0	120 | 32
DN20 (3/4")	5.0 | 1.5	170 | 45
DN25 (1")	9.0 | 2.5	300 | 79
DN40 (1 ½")	25.0 | 6.5	850 | 225
DN50 (2")	40.0 | 10.5	1350 | 357
2 ½	60.0 | 16	1850 | 357
DN80 (3")	90.0 | 24	2800 | 739
DN100 (4")	125.0 | 33	4350 | 1149

Pressure vs. Temperature Psi H_2O | Non-Shock

NOMINAL SIZE		PVC				PP				PVDF				
INCHES	mm	30° F 70° F	71° F 105° F	106° F 120° F	121° F 140° F	- 5° F 85° F	86° F 120° F	121° F 140° F	141° F 175° F	- 5° F 70° F	71° F 105° F	106° F 140° F	141° F 175° F	176° F 210° F
½-2	15-50	150	120	100	30	150	110	90	55	150	125	100	85	55
2-½	65	150	120	100	NA	150	95	70	40	150	125	100	85	55
3	80	150	120	100	NA	150	95	70	40	150	125	100	85	60
4	100	150	120	100	NA	150	95	70	40	150	125	100	85	60

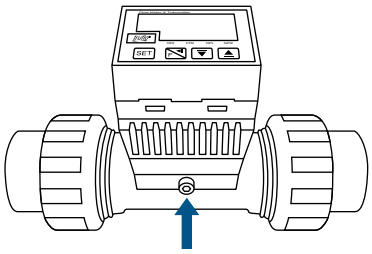
Procedure to Rotate Display

1



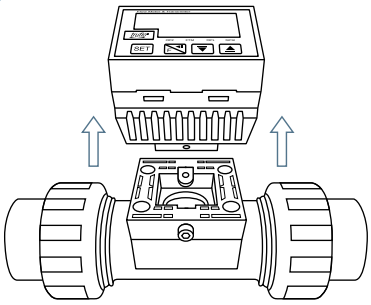
Using an allen key loosen the 2 screws located on either side of the display

2



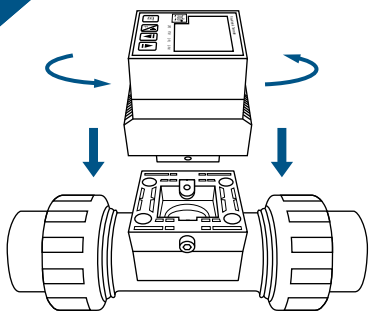
Pull the screws | Do Not Remove

3



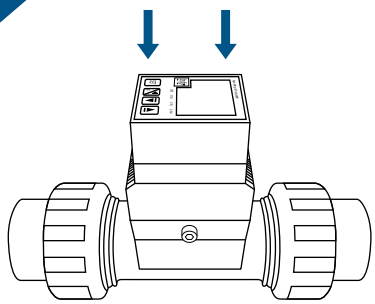
Lift the Display

4



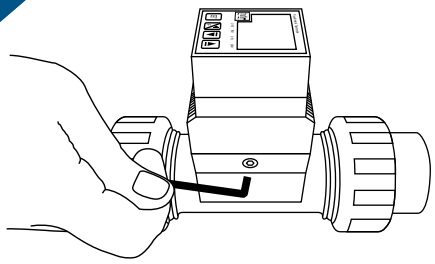
Rotate Display - 90 Degrees

5



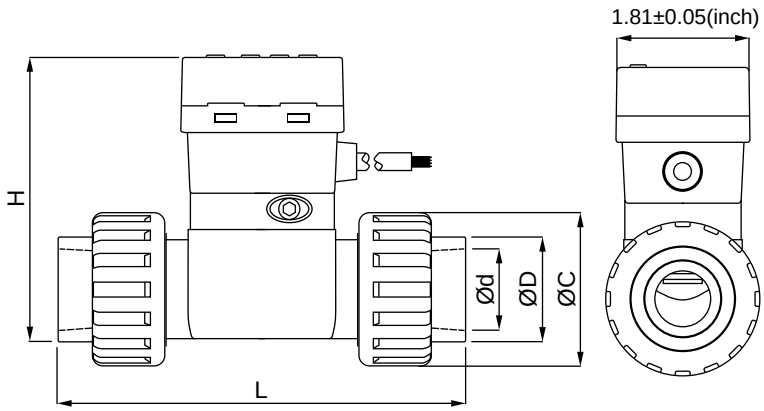
Lower Display

6



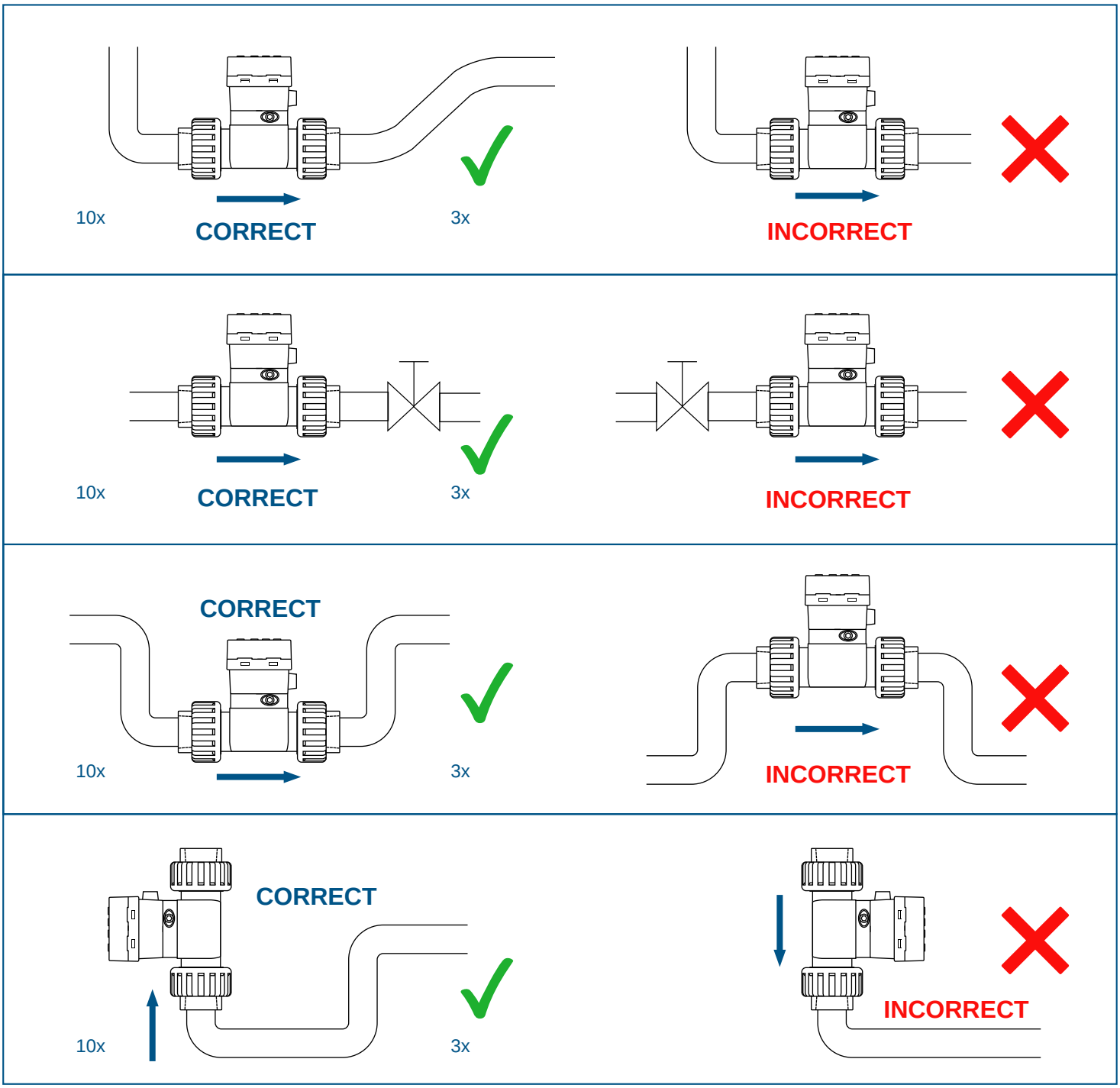
⚠ Tighten the Allen screws | Snug Tight
Do Not Over-Tighten

Dimensions



Pipe Size	H (inch)	L (inch)	Ød (inch)	ØD (inch)	ØC (inch)
(½") DN (15)	4.09±0.05	5.48±0.05	0.84±0.05	1.07±0.05	1.61±0.05
(¾") DN (20)	4.17±0.05	6.12±0.05	1.05±0.05	1.36±0.05	2.08±0.05
(1") DN (25)	4.30±0.05	6.76±0.05	1.32±0.05	1.68±0.05	2.36±0.05
(1-½") DN (40)	5.02±0.05	7.66±0.05	1.91±0.05	2.33±0.05	3.26±0.05
(2") DN (50)	5.56±0.05	8.39±0.05	2.38±0.05	2.86±0.05	4.33±0.05

Installation Positions



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 years 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 I**con 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** 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 I**MPLIED 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. I**N 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.

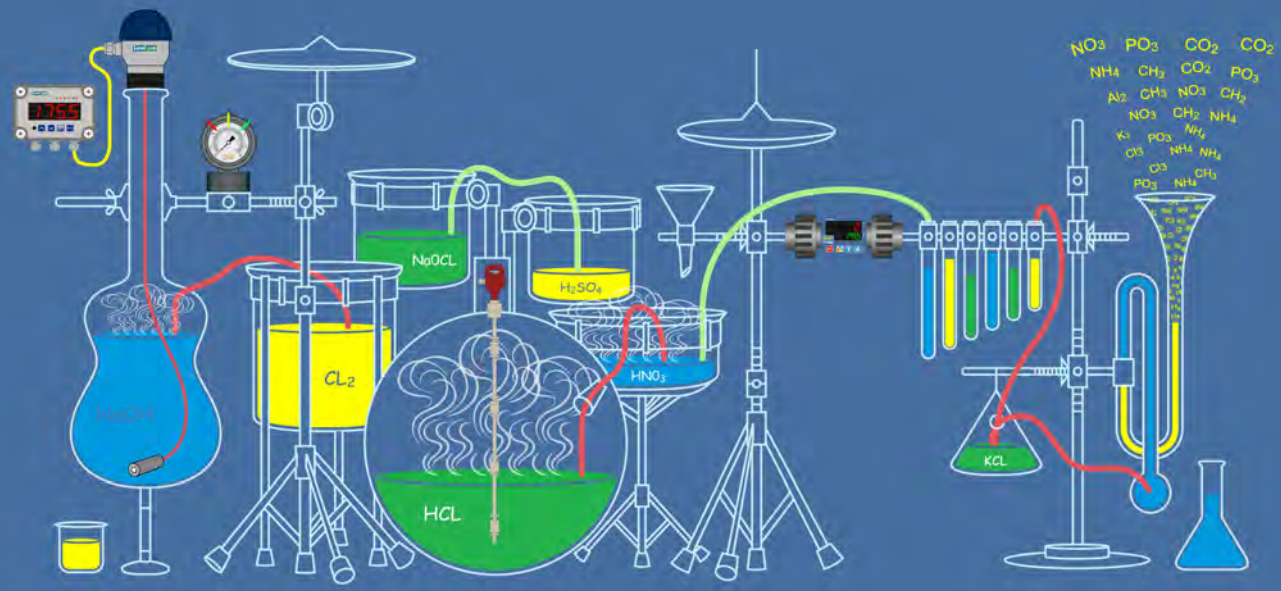
If any portion of this warranty is held to be invalid or unenforceable for any reason, such finding will not invalidate any other provision of this warranty

For additional product documentation and technical support **visit www.iconprocon.com | e-mail: sales@iconprocon.com support@iconprocon.com | Ph: 905.469.9283**

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Corrosion-Free
Instrumentation Equipment

~~CORROSION~~



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