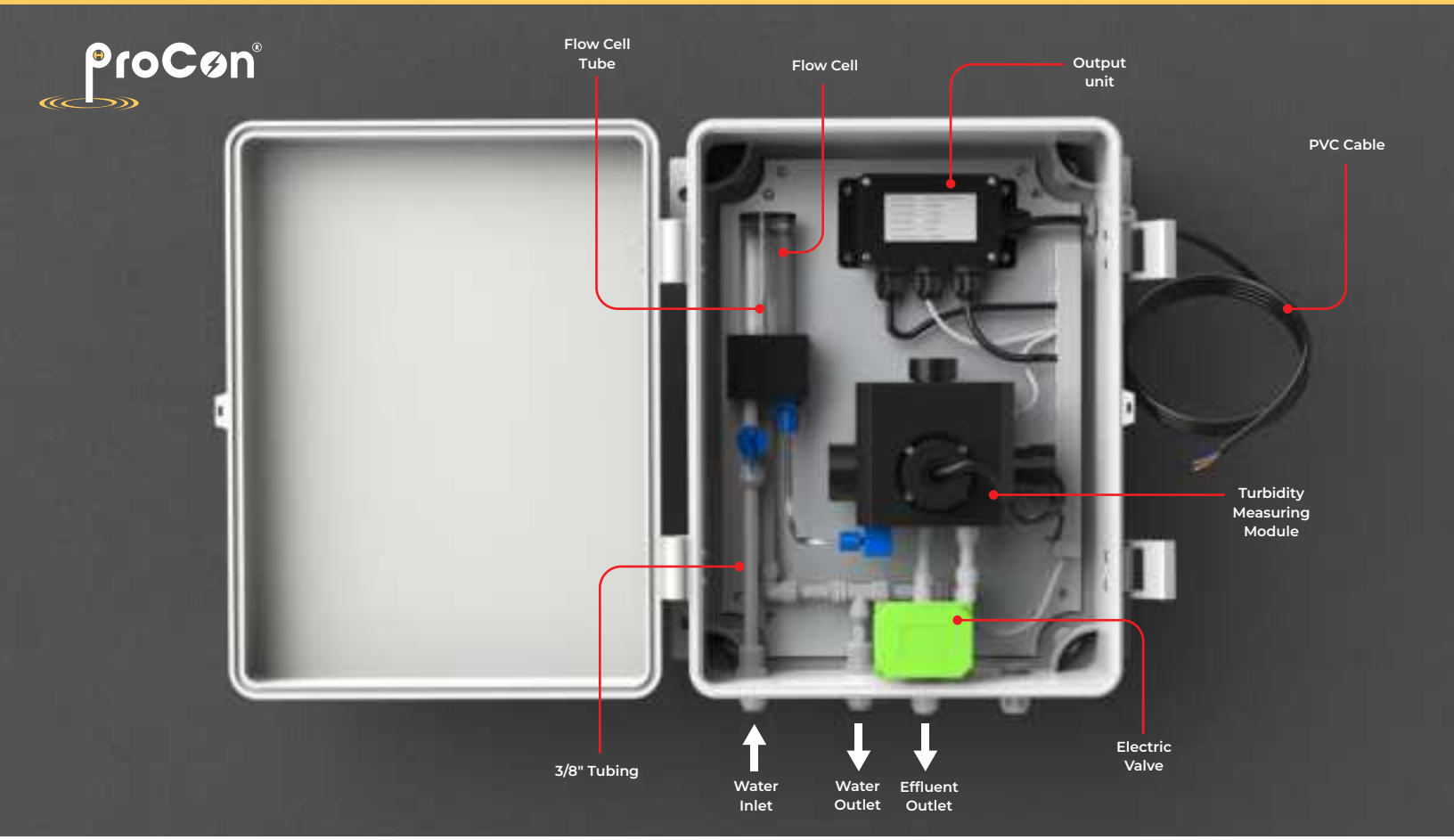
Quick Start Manual

RoHS Compliant CE

ICON™ PROCESS CONTROLS Corrosion-Free Instrumentation Equipment™

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



The turbidity sensor is based on infrared scattered light technology .The infrared light emitted by the light source will be scattered when it passes through the sample under test during transmission. The intensity of the scattered light is directly proportional to the turbidity. The turbidity sensor is equipped with a scattered light receiver in a 90° direction. The turbidity value is obtained by analyzing the intensity of the scattered light. It can be widely used for turbidity monitoring in sewage plants, water plants, water stations, surface water as well as other industrial applications.

Installation

Place the sensor in a suitable location to ensure accurate measurements. Choose an easily accessible spot for convenient cleaning and maintenance. Install the sensor near a site that provides a reliable and representative sample.

1. The inlet pipe, outlet pipe and effluent pipe must be provided by the user. These pipes should be PE pipes.
2. The package includes three 10 cm PE pipes (3/8") that can connect directly to the quick bayonet fitting for an 8x12 mm silicone hose.
3. It is recommended to install a pressure-reducing valve and a standard valve at the inlet pipe's front end to regulate water pressure and flow, preventing overflow.

Sequence of Operation

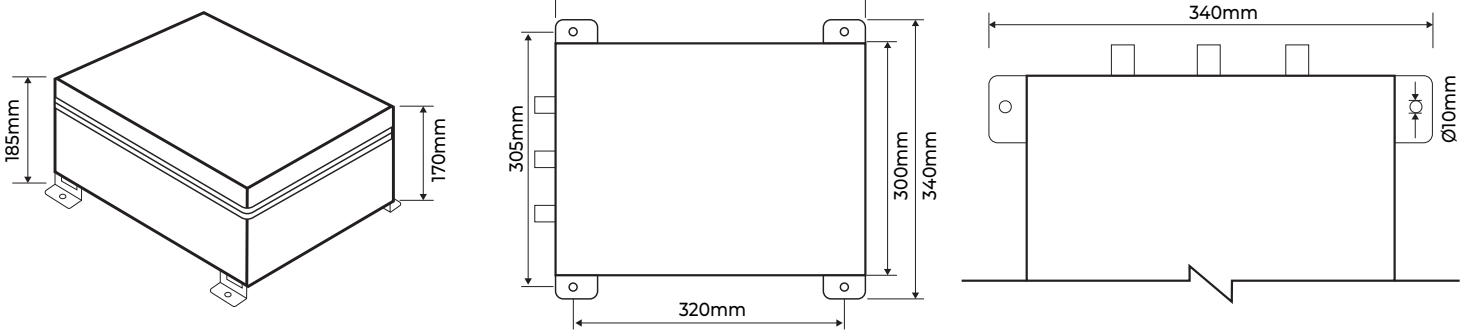
Water flows from the **inlet** to the **flow cell**. When the water level in the flow cell reaches the height of the **flow cell tube** (in the middle of the cavity), the water will be automatically discharged through the white tube to the **water outlet**. Other water will flow into the **turbidity measuring module** via the transparent tube, then pass through the turbidity sensor, and then gather at the **water outlet** for discharge.

The **effluent/measured fluid outlet** is a drainage connection; when the **electric valve** is activated, it will empty all the water in the turbidity measuring module.

Technical Specifications

Model No.	TB800
Range	0-20NTU
Flow Rate	300ml/min ~ 500ml/min | 4.75 GPH ~ 7.92 GPH
Power Supply	9-36VDC
Accuracy	±2%
Pressure Range	≤43.5psi
Operating Temperature	32 - 113°F | 0 - 45°C
Output	MODBUS RS485
Resolution	0.001 NTU | 0.01 NTU | 0.1 NTU | 1 NTU ; Based on Measured Range
Protection Class	IP65
Tubing	3/8" PE tubing
Dimensions	400 x 300 x 170 mm

Dimensions



Wiring

Connect the wires from the turbidity sensor to the controller as follows:

Color	Description
Red	+9-36 VDC
Black	-VDC
Green	RS485A
White	RS485B
Blue	Relay
Yellow	Relay

TB800 Series
Turbidity Controller

Note: Refer Page 8 for Electric Valve connection

Communication Protocol

The sensor is equipped with MODBUS RS485 communication function.

Sensor Read Address Function Code 04 | Communication Configuration: 9600 N 8 1					
Add	**Items**	**Value**	**Authority**	**Data Type**	**Description**
0	Reserved				
2	Temperature		Read-Only	Single Float	
4	Turbidity		Read-Only	Single Float	
6	Voltage of Temperature		Read-Only	Single Float	
8	Voltage of Turbidity		Read-Only	SIngle Float	
Sensor Calibration Address | Function Code 03					
Add	**Items**	**Value**	**Authority**	**Data Type**	**Description**
0	Address	1	Read-Write	Integer	1
1	Buffer Coefficient Grade	2	Read-Write	Integer	0-4

Sensor Calibration Address | Function Code 0x03 Read | Read Function code 0x10 Fix					
Add	**Items**	**Range**	**Authority**	**Data Type**	**Description**
100	First Calibration Point	According to the Range	Read-Write	Single Float	
102	Fifth Calibration Point		Read-Write	Single Float	
104	Eighth Calibration Point		Read-Write	Single Float	
106	Tenth Calibration Point		Read-Write	Single Float	
108	First Voltage		Read-Write	Single Float	
110	Fifth Voltage A		Read-Write	Single Float	
112	Fifth Voltage B		Read-Write	Single Float	
114	Eighth Voltage A		Read-Write	Single Float	
116	Eighth Voltage B		Read-Write	Single Float	
118	The Tenth Voltage		Read-Write	Single Float	
120	Dynamic Correction	0.000	Read-Write	Single Float	
122	Linear Compensation	1.000	Read-Write	Single Float	
124	Temperature Correction	0.000	Read-Write	Single Float	
126	Temperature Setting	25.0	Read-Write	Single Float	
128	Second Calibration Point		Read-Write	Single Float	
130	Third Calibration Point		Read-Write	Single Float	

132	Fourth Calibration Point		Read-Write	Single Float	
134	Sixth Calibration Point		Read-Write	Single Float	
136	Seventh Calibration Point		Read-Write	Single Float	
138	Ninth Calibration Point		Read-Write	Single Float	
140	Second Voltage		Read-Write	Single Float	
142	Third Voltage		Read-Write	Single Float	
144	Fourth Voltage		Read-Write	Single Float	
146	Sixth Voltage		Read-Write	Single Float	
148	Seventh Voltage		Read-Write	Single Float	
150	Ninth Voltage		Read-Write	Single Float	
200	Factory Calibration	60	Write Only	Integer	Only Calibration Values are Restored

Sensor Calibration

1. Sensor Read

Connect the digital turbidity sensor to the computer through the MODBUS RS485, and open the MODBUS debugging software: mbpoll.exe, Set the address 1,9600, N, 8,1, then select "Float" at "Display", as shown in the figure (a); where 00002 shows the temperature value, that is, the ambient temperature of the turbidity sensor is **14.5°C**, 00004 shows the turbidity value, where the aqueous solution in which the turbidity sensor is located is **20.7 NTU**.

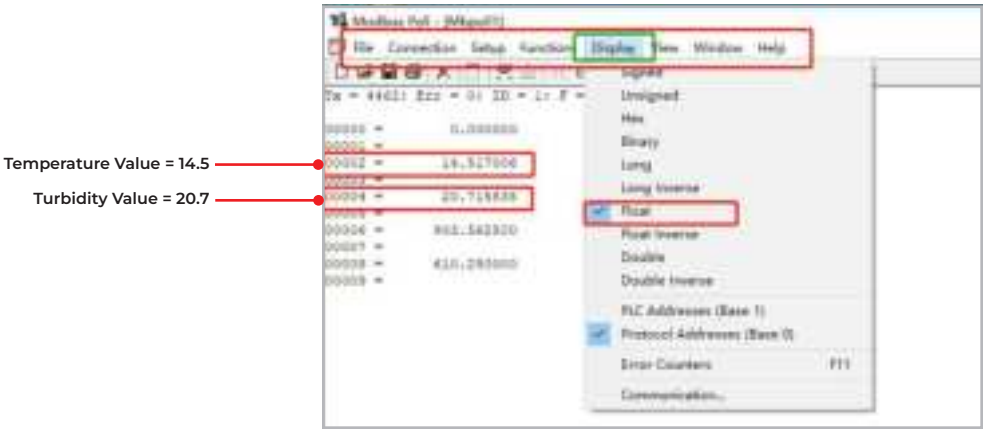


Fig.(a)

2. Sensor Calibration

Connect the turbidity sensor to the computer. Select "Setup- -Poll Definition", then select 03 function code, Address: 100, Length: 60. Prepare the known concentration of the standard solution, stir well. Pour the solution into the flow cell and double-click the calibration point address on the computer to view the dialog box. Input the standard liquid value. After confirming the sensor will begin to automatically calibrate, the calibration result is the corresponding voltage address bit data. The calibration is complete after 10s voltage stabilization.

Example : To calibrate the turbidity sensor of range 0-400 NTU, the calibration solution prepared is 250 NTU. Select the 06 function code, Address input is 00138, that is, the 9th calibration point, then enter 250 in the Value. After the voltage value of the 00150 is stable, the calibration is completed.

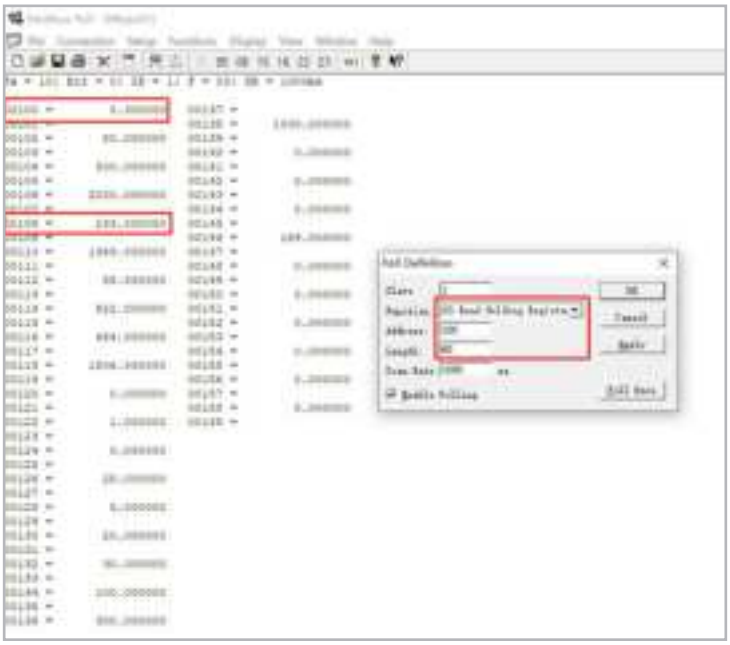


Fig.(b)

3. Read Instruction Parsing

The communication protocol adopts MODBUS (RTU) protocol. The communication content and address can be changed according to the customer's needs.

The default configuration is network address 01, baud rate 9600, no parity, one stop bit. Users can set the changes.

Function code 04 instruction for example:

Temperature value =14.8°C, Turbidity value=17.0NTU;

Host sent: FF 04 00 00 00 08 XX XX

Slave reply: FF 04 10 00 00 00 00 3E 8A 41 6D F9 6B 41 87 9C 00 44 5E XX XX

Explanation:

[FF] Represents the sensor address
[04] Represents function code 04
[10] Represents have 16 bytes of data
[3E 8A 41 6D]=14.8; | Temp. value; parsing order:41 6D 3E 8A
[09 18 41 88]=17.0; | Turbidity value; parsing order:41 88 09 18
[XX XX] Represents the CRC 16 check code.

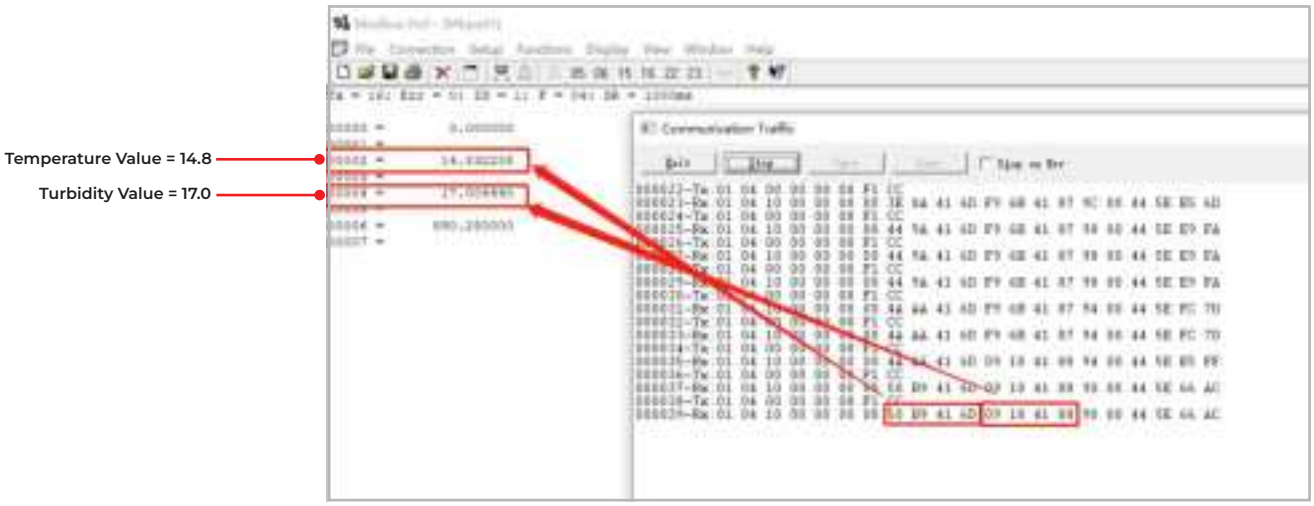


Fig.(c)

4. Restore Factory Calibration (Only necessary if calibration is required)

If the digital turbidity sensor calibration is wrong during the calibration process, select "06" function code, enter "200" in "Address" , "60" in "Value" , click "Send". A pop-up display "Response OK" appears.

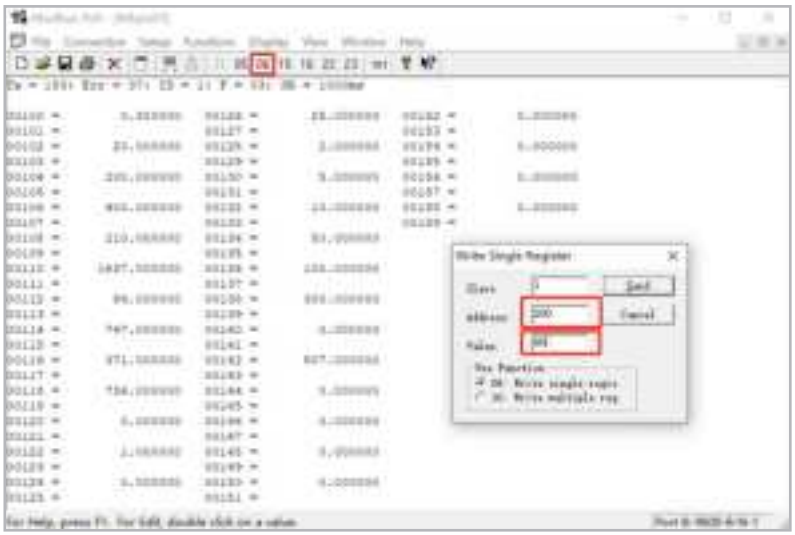


Fig.(d)

Preparation Method (Turbidity Standard Liquid 200mL 4000NTU) :

Serial No.	Material	Ammonium Chloride
A	Hydrazine Sulfate, $N_2H_6SO_4$ (GR)	5.00g
B	Hexamethylenetetramine, $C_6H_{12}N_4$ (AR)	50.00g

1. Accurately weigh 5.000g of Hydrazine Sulfate (GR) and dissolve it in zero turbidity water. The solution is then transferred to a 500ml volumetric flask, diluted to scale, shaken and filtered (filtered with 0.2μm aperture, same below).
2. Accurately weigh 50.000g of Hexamethylenetetramine (AR), dissolve it in zero turbidity water and transfer it into a 500ml volumetric flask, dilute to scale, shake well.
3. Preparation of 4000NTU Formazine Standard Solution: Transfer 100ml of each of the above two solutions into a 200ml volumetric flask which is placed in a 25 ± 1°C incubator or constant temperature water bath. Let stand for 24 hours to make 4000NTU standard solution.

Turbidity Standard Solution

The total preparation volume was 100ml.

No.	Concentration (NTU)	400NTU Absorb Quantity (ml)	4000NTU Absorb Quantity (ml)
1	10	2.5	–
2	100	25	2.5
3	400	–	10
4	700	–	17.5
5	1000	–	25

Formulation Formula: A=K*B/C

A: Absorb quantity (ml)
B: Concentration of the solution required to be formulated (NTU)
C: Proto-standard liquid concentration (NTU)
K: Total amount of preparation (ml)

Example: 10 NTU turbidity standard solution configuration method

Dissolve 2.5ml (the concentration was 400 NTU) solution transfer to a 100ml volumetric flask, add deionized water or distilled water and dilute to a 100ml scale line, shake well and use to measure.

Electric Valve Connection

Connect the wires from the turbidity sensor to the controller as follows:

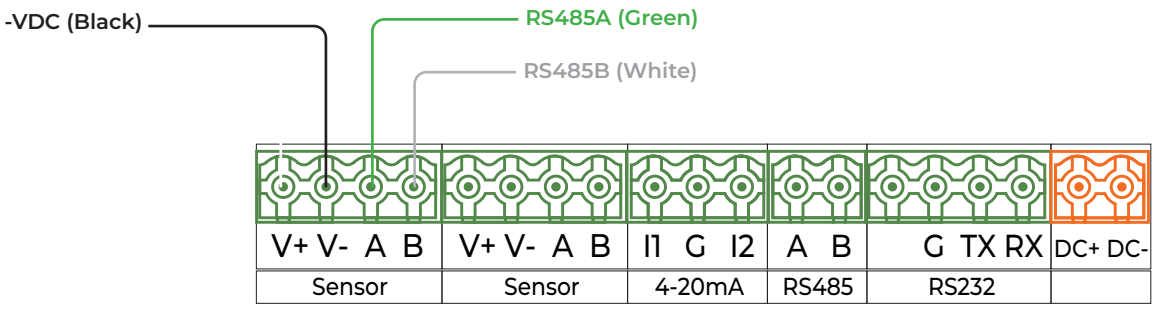
Color	Description
Red	+9-36 VDC
Black	-VDC
Green	RS485A
White	RS485B

Connect the **yellow wire** to the controller positive terminal of the power supply.

Use another wire to connect the positive terminal of the power supply to the left terminal of Relay 1 in series.

Connect the negative terminal of the power supply to the right terminal of Relay 1.

TB800 Series Sensor – Controller Wiring



Configuring Auto-Clean Mode in the TB800 Controller

Access the Menu:
Go to Menu > Alarm

Set Auto Clean Parameters:
Auto Clean: Select "Auto clean".
Duration of Clean: Set it to 1 minute (the time the electric valve remains open).
Off Time: Set it to 60 minutes (the time the electric valve remains closed).

Select Relay:
If the wire is connected to Relay 1, choose Relay 1.

Configure Clean Mode:
Clean Mode: Choose "Hold".
Enter Time: 50 seconds

Result
The electric valve will open every 60 minutes for 1 minute, keeping the turbidity value unchanged during this period.

Maintenance

To ensure the best measurement results, regular maintenance is essential. This includes cleaning the sensor, checking for damage, and assessing its operational status.

Sensor Cleaning

Perform routine cleaning based on usage conditions to maintain measurement accuracy

Inspection of Sensor Damage

Examine the sensor for any visible damage. If damage is detected, promptly contact ICON at 905-469-7283 . This prevents potential issues caused by water ingress due to sensor damage.

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.

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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.

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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:

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