

# DW-739 Series User Manual

Drinking Water Ultra-Low Turbidity Panel



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# **DW-739 Series**

# Ultra-Low Turbidity Inline Analyzers for Drinking Water

**User Manual** 

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# **Related Statements**

The manufacturer shall not be liable for direct, indirect, special, incidental, or consequential damages resulting from any deficiency or omission in this manual. The manufacturer reserves the right to make changes to this manual and the products described in it at any time without notice or liability. Revised versions can be found on the manufacturer's website.

# Safety Information

Please read this manual completely before unpacking, installing and operating this equipment. In particular, pay attention to all dangers, warnings and precautions, otherwise, it may cause serious personal injury to the operator or damage to the equipment.

# **Use of Danger Information**



Indicates a potentially or urgent dangerous situation that, if not avoided, will cause death or serious injury.

Warning

Indicates a potentially or very dangerous situation that, if not avoided, may cause serious personal injury or death.

Warning

Indicates a potentially dangerous situation that may cause a certain degree of personal injury.

#### Attention

Indicates conditions that if not avoided, will cause damage to the instrument. This is information that needs special emphasis.

# Warning Label

Please read all labels and marks attached to the instrument. Failure to follow the instructions on these safety labels may result in personal injury or damage to the instrument.

	If this symbol appears in the instrument, it means refer to the operation and/or safety information in the instruction manual.
A	If there is this mark on the instrument housing or insulator, it means there is a risk of electric shock or death from electric shock.
	Static electricity can damage the delicate internal electronic components, resulting in reduced performance or eventual failure of the instrument.
X	Electrical equipment marked with this symbol cannot be disposed of through the European public waste system after August 12, 2005. In order to comply with European regional and national regulations (EU Directive 2002 / 98 / EC), European electrical equipment users must now return abandoned or expired equipment to the manufacturer for disposal without any cost.





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# **Warranty Information**

#### Confidentiality

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#### **Standard Limited Warranty**

Pyxis Lab warrants its products for defects in materials and workmanship. Pyxis Lab will, at its option, repair or replace instrument components that prove to be defective with new or remanufactured components (i.e., equivalent to new). The warranty set forth is exclusive and no other warranty, whether written or oral, is expressed or implied.

#### **Warranty Term**

The Pyxis warranty term is thirteen (13) months ex-works. In no event shall the standard limited warranty coverage extend beyond thirteen (13) months from original shipment date.

#### **Warranty Service**

Damaged or dysfunctional instruments may be returned to Pyxis for repair or replacement. In some instances, replacement instruments may be available for short duration loan or lease.

Pyxis warrants that any labor services provided shall conform to the reasonable standards of technical competency and performance effective at the time of delivery. All service interventions are to be reviewed and authorized as correct and complete at the completion of the service by a customer representative, or designate. Pyxis warrants these services for 30 days after the authorization and will correct any qualifying deficiency in labor provided that the labor service deficiency is exactly related to the originating event. No other remedy, other than the provision of labor services, may be applicable.

Repair components (parts and materials), but not consumables, provided during a repair, or purchased individually, are warranted for 90 days ex-works for materials and workmanship. In no event will the incorporation of a warranted repair component into an instrument extend the whole instrument's warranty beyond its original term.

#### **Warranty Shipping**

A Repair Authorization (RA) Number must be obtained from Pyxis Technical Support before any product can be returned to the factory. Pyxis will pay freight charges to ship replacement or repaired products to the customer. The customer shall pay freight charges for returning products to Pyxis. Any product returned to the factory without an RA number will be returned to the customer. To receive an RMA you can generate a request on our website at https://pyxis-lab.com/request-tech-support/.

#### **Pyxis Technical Support**

Contact Pyxis Technical Support at +1 (866) 203-8397, service@pyxis-lab.com, or by filling out a request for support at <u>https://pyxis-lab.com/request-return-or-repair</u>.





# **1** Introduction

The DW-739 series are single parameter inline turbidity analyzers specifically designed as a 'Turn-Key' monitoring solution for clean water applications including drinking water networks and secondary water supply networks. The DW-739 series offers highly accurate, real-time measurement, display and data-logging of Ultra-Low Turbidity utilizing proprietary Pyxis Lab smart sensor technology, coupled with the Pyxis touch screen display and data logging terminal. The DW-739 series is offered in a convenient and easy to integrate panel mounted format for rapid installation and simple maintenance.

## 1.1 Main Features

The DW-739 includes the following features:

- The DW-739 series analyzer integrates the LT-739 ultra-low turbidity sensor installed in the FR-100 flow reservoir.
- The LT-739 sensor offers a unique flat surface distal end in a quartz glass plate, allowing for extended cleanliness, easy maintenance and prevention of air bubble interference.
- Detection range of up to 40 NTU and an industry low resolution of 0.001 NTU, the LT-739 sensor is designed for optimal accuracy and performance with a wide range of turbidity water samples from raw influent to treated effluent.
- The LT-739 uses 900 surface scatter configuration and Warm White Light (LED) or InfraRed (LED) and is EPA-180.1 and ISO-7027 compliant respectively.

#### **Typical Applications**

- Drinking Water
- Domestic Water
- Secondary Water Supply
- Sanitary Water





# 2 Specifications

ltem	DW-739	DW-739B	DW-739-G	DW-739B-G	
P/N	42143	42144	42145	42146	
Turbidity Wavelength	Warm White	860nm	Warm White	860 nm	
Light Source	LED				
Turbidity Dual Range		0.001 – 10 / 1	0 - 40.00 NTU		
Turbidity Accuracy		<u>+</u> 0.005 NTU	or 2% <10NTU		
Turbidity Repeatability		<u>+</u> 0.001 NTU c	or 0.5% <10NTU		
Measurement Accuracy		0.001NTU or ±	± 1% Full Scale		
Minimum Resolution		0.001	. NTU		
Response time		4 seconds after im	mersion - Turbidity		
Compliance	EPA-180.1	ISO-7027	EPA-180.1	ISO-7027	
Measurement Interval		Continuous	Measurement		
Display	7-inc	h LCD Color Industr	ial Capacitive Touch	n Screen	
Storage Capacity	Built-In 4GB	of Ram for Storing ι	up to 1-Million Data	/Event Records	
Power Requirement		96-260VAC / 50-60	Hz; 10A Fuse; 200	N	
Output	2 x 4	-20 mA / RS-485 M	odbus - RTU / Modl	ous TCP	
Input		2 x 4-20 mA / RS	-485 Modbus - RTU		
USB	1 x USE	8 host, for data dow	nloading and scree	n upgrade	
Internet		RJ-45 socke	t, Modbus-TCP		
Panel Operational Temperature		40 - 113	°F (4-45 °C)		
Storage Temperature	Instrument:	-4 – 131°F (-20 – 55	<sup>o</sup> C) / Sensors 32 – 1	L22°F (0 – 50°C)	
Sample Water Temperature		40 - 104	•°F (4-40°С)		
Sample Water Pressure		7.25 – 30 psi	(0.05 – 0.2MPa)		
Installation	FR-100 Self-Re	egulating Flow Rese	rvoir w/Rotameter	& PRV - Included	
FR-100 Minimum Flow Rate		200 m	L/minute		
FR-100 Maximum Flow Rate		400 m	L/minute		
FR-100 Sample Inlet		1⁄4 - i	nch OD		
FR-100 Sample Outlet		20mm	- To Drain		
FR-100 Drain		½ - ir	nch NPT		
Rating		IP-65 Panel-Disp	olay / IP-67 Sensors		
Regulation		CE /	/ RoHS		
Relative Humidity		20% - 90% (N	o Condensation)		
Altitude	<6,561 feet (<2,000 Meter)				
Dimensions (HxWxD)	Panel (DW-739) 790H x 450W x 231D mm				
Approximate Product Weight	DW-739 ~ 15 kg				
Pyxis 4G CloudLink <sup>™</sup>		NA	Inc	luded	
CloudLink <sup>™</sup> Bands		NA	G	lobal	
			(B1/2/3/4/5/7/1	2/13/14/20/28/66/7	
CloudLink <sup>™</sup> Protocols		NA	IP/TCP/UDP/HT	TP/HTTPS/Modbus	





# 3 Unpackaging

The package includes the following items:

- One DW-739 Ultra-Low Turbidity Panel Complete with 110VAC Power Supply Cord
  - o UC-100A Touch Screen Display/Data Logger with Pyxis Sensors Prewired in RS-485 (RTU)
  - o FR-100 Sensor Flow Reservoir
  - o LT-739 (Warm White Light) or LT-739B (InfrRed) Ultra-Low Turbidity Sensor (as selected)
  - Pyxis CloudLink<sup>TM</sup> 4G Gateway (as selected models ending in "G")

# 4 System Layout and Features

The DW-739 series are single channel inline turbidity analyzers specifically designed as a 'Turn-Key' monitoring solution for clean water applications including drinking water networks, secondary water supply and decorative/swimming water applications. The DW-739 series offers highly accurate, real-time measurement, display and data-logging of Ultra-Low Turbidity utilizing proprietary Pyxis Lab smart sensor technology in both EPA-180.1 and ISO-7027 compliant formats, coupled with a Pyxis touch screen display and data logging terminal. The DW-739 series is offered in a convenient and easy to integrate panel mounted format for rapid installation and simple maintenance.



Figure. 1 - DW-739 Series





#### DW-739 Series Features

- Pyxis Lab's advanced research and development sensor technologies to achieve highly accurate and stable measurement of Turbidity with ultra-low resolution.
- Pyxis LT-739 (EPA) and LT-739B (ISO) ultra-low resolution turbidity sensors offer a detection light source using warm white LED in 90-degree surface scatter format in accordance with USEPA 180.1 standards or Infra-Red 860nm in accordance with ISO-7027.1 standards. The turbidity sensors are mounted in the unique Pyxis FR-100 flow reservoir enabling the highest resolution possible of 0.001NTU with unmatched stability. The LT-739 and LT-739B offers simple calibration via the Pyxis LT-SOLID-CAL Solid State Turbidity Calibration Kit (no Formazin required) or the Pyxis L-CAL Portable Turbidity Calibration Kit (uses 500mL Formazin per calibration).



- Pyxis FR-100 Single-Sensor flow reservoir provides sample calming for dissipation of air-bubbles and settling of suspended solids, foam or other impurities commonly observed in drinking water influent. This unique flow reservoir design results in the highest level of turbidity resolution on the market and greatly extends the maintenance cycle of the sensor while providing a large buffer capacity to mitigate pressure fluctuations. The minimum inlet pressure of FR-100 flow reservoir is only 7.5 psi (0.05mpa) making it highly suitable for the end of pipe networks and secondary supply influent sampling.
- Turbidity sensor offers a self-cleaning flat electrode design making them easy to maintain and clean.
- Simple sensor removal and replacement. LT-739 sensors is connected to the display/data logger via RS-485 modbus (RTU) allowing for integrated sensor calibration interface and diagnostics within the display screen.
- Convenient and simple to install Back-Panel (DW-739 Series) for rapid and easy installation. Truly a plumb and power to go platform with intense factory setup, testing and sensor calibration prior to shipment.
- 7-inch touch screen display/data logger interface with sensor calibration integrated. Display/data logger offers 2x 4-20mA I/O as well as RS-485 for signal passthrough to any PLC or DCS network. Pyxis CloudLink<sup>™</sup> 4G Gateway version available.
- For NSF Certified Applications the DW-739 discharge flow of approximately 200-400mL/minute may be sent to sanitary drain or returned to the inlet of the pretreatment system.



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# 5 Dimension and Mounting

#### DW-739 Series Panel Dimensions (mm)





DW-739 Series UC-100A Controller Dimensions (mm)





## DW-739 Series FR-100 Flow Reservoir Dimensions (mm)







## DW739 Series Sensor Dimensions (mm)







# 6 Installation

### 6.1 Installation Requirements

Power Supply: 100~240VAC 50/60Hz

**Water Supply:** Inlet water pressure should be from 7.25 – 30 psi (0.05-0.2MPa) with an inlet feedwater line diameter of ¼-inch O.D. Tubing. The DW-739 is provided with an inlet Rotameter and PRV for sample water inlet flow control and limited pressure regulation. Depending on sample water quality, these items may be installed on the application needs and user desire. The range of inlet flow for the FR-100 <u>should be</u> <u>consistently maintained between 200 and 400 mL per minute</u>.

**Drainage:** The FR-100 outlet tube (20mm Tubing) located on the bottom of the FR-100 <u>should be</u> <u>connected</u> to a discharge drain via gravity flow.

**Wall Mount Space:** The DW-739 analyzer panel size is roughly 790H x 450W x 235D (mm) in dimension. Please accommodate sufficient space for mounting.

Wall Mount Weight: Approximately 15kg. Please use appropriate mounting hardware.

**3G/4G Network**: Make sure your mobile network is a CMCC/CUCC 3G/4G compatible network. Ensure the signal strength is sufficient in the installation eara.

## 6.2 Tube connection

- 1. Inlet Water: Connect the ¼-inch inlet water tubing to the quick adapter provided. \*NOTE\* The inlet flow meter is shipped as a loose item and may be installed as desired by the user. If feedwater water quality is poor, users may desire to not install this flow meter. Consistent flow of 200-400mL is required.
- Outlet Line: Connect 20mm tubing to the outlet drain. This is the sample water outlet flow. This line
  must be diverted to drain.







Figure. 2 - FR-100 Connections



## 6.3 Terminal Wiring

The DW-739 analyzer has universal AC power supply equipment allowing users simply to plug the power supply into a 100~240V AC 50/60Hz power outlet for normal operation.

	A0-	A2	2 A	AO-	20m.A
0 @ 0 8	A02+			A02+	4:5
D B	AO-			A0-	CH
en en	401+		<u> </u>	A01+	-4-20
DAI	DO		<u>E</u>	DO DO	-►S E
о <b>Э</b>	<u>B2</u>	₩ E	Ê ()	BZ	RS48
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	AI-	Ωř.	ř.	AI-	
<sup>3</sup> D2	AI2+	Щ <u>ё</u>	žĂ.	AI2+	4-20
	AI-			AI-	
5 0	AI1+			AI1+	-20m4
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E C					
			E E	101	
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õ.	200			200	1 0
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		B KIIS		B B B	B B B (4.48) (3.48)
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	DI		ости віли віда на село село село село село село село село	B B B B	B B B B B B B B B B B B B B B B B B B
а 8 8 9 9 9 9	B1	жиз жиз жиз	жие жили жиза жила	B B B B	
α ω Φ	B1			B B B B A	
ω <sup>ee</sup> ω	B1			B B B B A A	
e se	B1			B B B A A A	
	B1			B B B A A A A A	
α α	B1 A1	ц жп2 ж13 ж14 ж15 ж16 ж17 ж18 ж20		B B B A A A A A A	
9 <sup>29</sup>	B1 A1	жи жиз жиз жиз жиз жиз жиз жиз жиз		B B B A A A A A A A	A A A B B B B B B B B B B B B B B B B B
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	B1 A1			B B B A A A A A A A	A A A B B B B B B B B B B B B B B B B B
9 9 9 9 9 9 9 9	B1 A1			B B B A A A A A A 24V+	WP+         A         A         B
S B B B B B B B B B B B B B B B B B B B	B1 A1			B B B B A A A A A A 24V+ 24V+	4+ 240+ 4+ 240+ 34 4+0 (4-20) (4-20) (4-20) (2-40) (4-10) (4-40) (4-
S S S S S S S S S S S S S S S S S S S	B1 A1			B B B B A A A A A A A 24V+ 24V+ 24V+	+ 247+ 247+ A A A B B B B B B B B B B B B B B B B
e e	B1 A1			B B B B A A A A A A A 24V+ 24V+ 24V+	+ 2444- 2444 - 4444 - A A A B B B B B B B B B B B B B B B B
101 7 8 6.39 6.439 6.439	B1 A1			B B B B A A A A A A A A 24V+ 24V+ 24V+ 24V+	2474-2474-2474-2474- 2474-2474-2474-441 4.18) (4.28) (4.28) (4.28) (4.28) (4.18) (4.28
101 7 8 6.3% 6.3%	B1			B B B B A A A A A A A A A 24V+ 24V+ 24V+ 24V+	2474-2474-2474-2474- 2474-2474-2474-2474
101 7 8 6.38 6.38	B1 A1			B B B B A A A A A A A A A 24V+ 24V+ 24V+ 24V+ 24V+ 24V+	2000- 2444-2444-2444- A A A A B B B B B B B B B B B B B B B
	B1 A1			B B B B A A A A A A A A A 24V+ 24V+ 24V+ 24V+ 24V+ 24V+ 24V+ 24V- 24V-	А. 200- 200- 240- 240- 240- 240- 240- зыкам алма В В В В В В В В В В В В В В В В В В В
	B1 A1			B         B         B         B         A         A         A         A         A         A         A         24V+         24V+         24V+         24V+         24V+         24V+         24V+         24V-         24V-         24V-         24V-         24V-         24V-         24V-	10 ± 2010 ± 2010 ± 2014 ± 201
	B1 A1 101			B         B         B         B         A         A         A         A         A         A         A         24V+         24V+         24V+         24V+         24V+         24V+         24V-         24V-	2-244-244-244-244+244+244+244+244+244+24

Figure. 3 - Terminal Wiring Diagram



Figure. 4 - Terminal Physical Diagram



The process of electrical connection to contact the 220V single-phase power supply, should be operated by personnel with an electrician's license. Failure to operate according to the electrical code of practice may result in electric shock injury or even death.

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# 7 Touch Screen Operation

## 7.1 Main Screen

After the system is powered on an initial screen allows the user to log into the system.



Figure. 5 - Main Screen

## 7.2 User Login

After powering on the system, log in with the username and password to be able to change system settings. Click the "User Login" button, select the user "pyxis", enter the password: "888888" in the user password field. A new user can be added via "User Management" in interface of the menu.

🖀 User login	×
User login	
🖸 pyxis	User password:
	Logout way: <ul> <li>Online timeout</li> <li>Idle timeout</li> </ul>
	Online time: 0 Minutes
	User description:
	USB login Login Cancel

Figure. 6 - User Login Screen



If you do not need a password, or want to change the user, you can enter the system and "Manage" in the "User Management" screen of the menu. See 6.11 for details.

## 7.3 Real-Time Monitoring

Click the "Enter System" button on the main interface to enter the real-time monitoring screen of the system. The data detected by the Pyxis sensors will be displayed in real-time. See a functional overview of each section of this screen highlighted below. (numbers 1-4)



Figure. 7 - Real-time monitoring screen

Section Number	Functional Overview
1	The blue area will scroll any alarm information in real time until the alarm is cleared.
2	Real-time display of the current sensor's 4-20mA signal value.
3	Real-time display of current sensor measurement value.
4	Historical data is recorded as a live curve, with the horizontal coordinate being the time and the vertical coordinate being the measured value.

Table 1 - Main interface functional overview



Press and hold the curve area for 2 seconds and then let go, the Y-axis curve range setting dialog box will appear. Users may change the display value range of Y-axis for each measurement index curve. Click the outter area of the screen to save and exit the setting screen after modifications are made.



Figure. 8 - Curve Range Setting

### 7.4 Menu Bar

Click the button in the upper left corner of the screen to enter the system's menu interface, where the user can select to enter the desired operation interface.



Figure. 9 - Menu Bar



## 7.5 Configurable Parameters

Click the "Parameter" button in the menu bar. Here you can select to enter "Alarm Parameters" and "4-20mA Output" setting interface etc.

Parameter		4-20mA Oi	utput	etecti	on Sy	stem	202	1-10-22	16:17:43
Calibration			linne						
Ø		Sensor Set	ungs						
Alarm		Comm Se	etup	<b>).</b> 4	3.	5			
Data									NTU
Curve									
USER									
	15:51	15:54	15:57	16:00	16:03	16:06	16:09	16:12	16:15

Figure. 10 - Parameter Settings

## 7.5.1 4-20mA Output Parameters Setting

Click "4-20mA Output " to enter the 4-20mA output parameter setting interface. The 4mA and 20mA output values should corresponds to the lower and upper limits of the sensor range. \*NOTE\* The closer the value is set to the measurement value the more accurate the data.

슈 Water Qual	4-20mA Output		Х	2021-10	-22 16:17:	53
	CH1		~			
Turbidity						
CH1 CH2	4mA Output:	0				
	20mA Output:	0				
					NT	U
1000	CH2		~			
800						
600	4mA Output:	0				
400	l					
200	20mA Output:	0				
0 15:48 15:51				19 16	:12 16:15	_

Figure. 11 - 4-20mA Output Setting



## 7.5.2 Sensor Settings

The sensor setting can configure the sensor model. The sensor has been configured before the device leaves the factory, and the customer does not need to configure it during normal use.

Parameter \$		4-20mA Oເ	ıtput	etecti	on Sy	stem	202	1-10-22	16:17:43
Calibration		Sensor Set	lings						
Alarm		Comm Se	tup	).4	133	3			
Data									NTU
	15:51	15:54	15:57	16:00	16:03	16:06	16:09	16:12	16:15

Figure. 12 - Sensor Settings

#### 7.5.3 Communication Setting

DCS communication parameters generally do not need to be changed. If the DCS communication station number and other parameters need to be changed on site, they can be changed on this interface.



Figure. 13 - Communication Parameters Setting



Figure. 14 - Modbus RTU Setting



Figure. 15 Modbus TCP Setting

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## 7.6 Calibration

Click on the "Calibration" button in the menu bar and select the sensor to be calibrated.



Figure. 16 - Sensor Calibration

## 7.6.1 Turbidity Calibration

The LT-739 Series Ultra Low Turbidity Sensor is rigorously calibrated at the Pyxis Lab factory. If the sensor is kept clean, the user will not need to calibrate the sensor for one year of operation. However, the user may calibrate the sensor as desired. Prior to performing a calibration, the user can perform a diagnostic check on the sensor to determine if the sensor needs to be calibrated. To complete this task, the user must drain the FR-100 flow reservoir and then wipe the FR-100 flow cell and sensor surfaces with a dust-free cloth or paper towel to thoroughly clean them. Verify that there are no visible contaminants on the vessel walls or sensor surfaces. Once properly drained and cleaned, reinsert the LT-739 Series sensor into the FR-100 flow reservoir. Read the turbidity sensor display value on the touch screen display/data logger.



🛖 Wa	ater Quality Online Detection System	2021-10-2	2 16:15:09
Turbidity	Turbidity Cal	Х	
CH1 CH2	30.998		
	Sensor Recovery	Recovery	
1000	Low Cal Mid Cal High Cal		NTU
800			
600			
400			
200			
0 15:46	15:49 15:52 15:55 15:58 16:01 16:04	16:07 16:10	16:13

Figure. 17 - Turbidity Calibration Screen

When calibrating, click the corresponding "Low Cal", "Mid Cal", "High Cal", the standard solution value input box will pop up below, enter the standard solution value in the input box to start calibration



Figure. 18 - Enter the standard solution value





#### Low-Range Calibration Procedure with Bubble Free DI Water in the FR-100 Flow Reservoir:

Empty the FR-100 flow cell and wipe the FR-100 flow cell walls and turbidity sensor surfaces with a dust-free cloth or dust-free paper towel and verify that no contaminants are evident. Fill the FR-100 flow cell with deionized water, then drain the contaminated deionized water. Repeat the cleaning operation as needed to ensure optimum cleanliness of the FR-100 walls and sensor surfaces has been achieved. Then fill the FR-100 flow cell with bubble-free deionized water. Allow the sensor to stabilize and after the displayed data is stable, enter "0.05" for the low-range calibration value and click on "Low Range Calibration", a dialog box will pop up to confirm whether to perform this operation. Click "OK", if the calibration is successful, the dialog box will show "Calibration successful". **\*NOTE\*** Because there is no global standard for zero turbidity in the industry, Pyxis recommends 0.05 NTU as a target for Low-Point Calibration while using Bubble-Free DI Water.



Figure. 19 - Awaiting execution Screen of Turbidity Calibration

#### Mid-Range Calibration using the FR-100 Flow Reservoir:

After the low range calibration has been completed, fill the FR-100 flow reservoir with known turbidity standard solution between 5NTU and 10NTU for mid-range calibration. After the displayed data is stable, enter the medium turbidity standard solution value and click on "Mid-Range Calibration", a dialog box will pop up to confirm whether to perform this operation. Click "OK", if the calibration is successful, the dialog box will show "Calibration successful".





#### High-Range Calibration using the FR-100 Flow Reservoir:

If a high-range calibration is not required, the user does not need to perform a high-range calibration of the LT-739 series sensor. If a high calibration is required, proceed by filling the FR-100 flow reservoir with known turbidity standard solution between 20NTU and 40NTU for high-range calibration. After the displayed data is stable, enter the high turbidity standard solution value and click on "High Range Calibration", a dialog box will pop up to confirm whether to perform this operation. Click "OK", if the calibration is successful, the dialog box will show "Calibration successful".

#### Troubleshooting Calibration Failed Messages

If you receive a "Calibration Fails" message during the calibration steps above, the following items should be checked:

- 1) Ensure your source of Deionized water is not contaminated with turbidity
- 2) Ensure your turbidity calibration standard solutions has not been contaminated
- 3) Ensure the LT-739 sensor distillate end is not contaminated with debris or other substances
- 4) Ensure the FR-100 flow reservoir is not contaminated or circulation blocked by debris or other materials.





#### LT-739 Calibration using L-CAL Portable Turbidity Calibration Kit

As an alternative to using the FR-100 flow reservoir for LT-739 sensor calibration, Pyxis Lab has developed a portable and reusable liquid-state turbidity calibration kit for rapid calibration of the all LT-73X Series inline ultra-low turbidity sensors. The L-CAL calibration kit allows users to calibrate all LT-73X Series ultra-low turbidity sensors using <u>smaller volumes of Formazin</u> turbidity calibration standards providing an affordable and reusable solution for long term sensor reliability. The unique design of the L-CAL liquid calibrated with the sensor in a horizontal position, allowing air bubbles to be evacuated through the integrated airvent line ensuring superior accuracy of the sensor calibration. The L-CAL has an easy to remove lid allowing users to fill and empty the calibration kit with DI water for vessel/sensor cleaning and Formazin calibration standards for sensor calibration.



L-CAL Liquid Turbidity Calibration Kit (P/N 53247)

#### **Turbidity Calibration Principals & Considerations**

The precision, resolution and the low detection limit of the LT-73X Series sensors are not affected by the calibration method, regardless of using certified Formazin standards and the L-CAL kit. The calibration only affects the turbidity sensor accuracy. The nature of turbidity measurement makes an absolute turbidity value not easily obtainable for any sensor manufacturer although proper standards and methods are followed. For example, turbidity values greater than 1.0 NTU measured on real-world samples with different sensors, even from the single manufacturer, could differ significantly. For ultra-low turbidity (less than 0.3 NTU) measurement using the same methods (ISO-7027 or EPA-180.1), it is likely that the values from different sensors can agree within 0.05 NTU. As such, the user should choose a calibration method and remain with the same calibration method for consistency.

#### L-CAL Specifications

Item	L-CAL Portable Liquid Formazin Calibration Kit
P/N	53247
Sensor Name	LT-739 / LT-739B
Calibration	Recommended Calibration Standard Solution Range
Low-Range (0.05NTU Recommended for Calibration)	Bubble Free DI Water or Sample < 0.1 NTU
Mid-Range	5 – 10 NTU
High-Range	20 – 40 NTU



### L-CAL Portable Liquid Formazin Calibration Kit Use Method

After removing the LT-73X sensor, gently wipe off the flat distal end with a soft cloth to ensure it is clean. The LT-73X Sensor should then be calibrated using the L-CAL portable liquid calibration kit using the following steps, and wirelessly calibrated via the uPyxis Mobile or Desktop APP. Please refer to LT-73X Series Operation Manual for details.



Preclean by adding DI-Water (200mL)



**Gently Shake Then Empty Contents** 





You Tube watch procedure video <u>https://www.youtube.com/watch?v=1MuJM5Q5VB4</u>



#### LT-739 Calibration using LT-SOLID-CAL Solid State Turbidity Calibration Kit

Pyxis Lab has developed reusable solid-state turbidity calibration kits for rapid calibration of the Pyxis LT-739 Series inline ultra-low turbidity sensors. The LT-739 Series ultra-low turbidity sensors are factory calibrated on Formazin liquid standards. The LT-SOLID-CAL calibration kits represent an alternative to Formazin calibration for routine field calibration only. The Pyxis solid-state calibration kits provide a consistent and reproducible method to calibrate Pyxis inline LT-739 series turbidity sensors, overcoming the challenges associated with the liquid standard calibration.

ltem	LT-SOLID-CAL 739	LT-SOLID-CAL 739B
P/N	53228	53238
Sensor Calibrated	LT-739	LT-739B
Quantity Adapters Included		3
Turbidities Included	0.10±0 8.0±0 25.0±1	).05NTU ).8NTU 2.5NTU

#### LT-SOLID-CAL Specifications

The sensor should be removed from process flow, cleaned gently with a soft towel, inserted into the appropriate LT-SOLID-CAL adapter and wirelessly calibrated via the uPyxis Mobile or Desktop APP to the designated NTU value assigned to the LT-SOLID-CAL adapter. Each LT-SOLID-CAL kit comes complete with Low, Mid and High Range calibration adapters specific to that LT-73X Series sensor.





## 7.7 Recovering Data

Click the restore button in the calibration interface of each sensor to restore the data of the turbidity sensor. If a user error is made during calibration and other operations, you may restore the factory settings of the sensor through the restore function.



Figure. 20 - Data Recovery Screen



## 7.8 Alarm View

Alarm			X
Number	Date	Time	Alarm description
			~
Delet	te	Query	Previous Next

Click the "Alarm View" button on the main screen to enter the alarm view screen.



In this screen users can browse all logged alarms. Drag the right scroll bar up and down to view the history of alarms. Click "Previous" and "Next" to advance to the next page. Click "Query" then enter the alarm number in the pop-up box to query that alarm.

Alarm				Х
Number	Date	Time	Alarm description	^
				~
Delet	te	Query	Previous	

Figure. 22 - Alarm Data Query Screen

The Delete button in the lower left corner will delete all alarm records. After clicking delete, you must exit the screen and reenter before the historical data within the data report will be cleared.



# 7.9 Historical Data

Data    Turb	oidity		Х
Number	Time	Data	^
1	2021-10-22 16:10:20	56.347	
2	2021-10-22 16:10:19	56.347	
3	2021-10-22 16:10:18	56.347	
4	2021-10-22 16:10:17	56.347	
5	2021-10-22 16:10:16	56.347	
6	2021-10-22 16:10:15	56.347	
7	2021-10-22 16:10:14	56.347	
8	2021-10-22 16:10:13	56.347	
9	2021-10-22 16:10:12	56.346	
10	2021-10-22 16:10:11	56.346	
11	2021-10-22 16:10:10	56.346	
12	2021-10-22 16:10:09	56.346	
< 12	2024 40 22 40 40 00	50.040	<b>&gt;</b>
Delete	Previous	ext Periodicity 0	Query

Click the "Historical Data" button in the menu bar to enter the data report interface.

Figure. 23 - Historical Data Screen

In the data report, the user can view the stored data of all parameters. The system records sensor readings every 4 seconds by default but this can be edited by the user if desired. Drag the scroll bar on the right to slide up or down or click "Previous" and "Next" to view historical data records. The data record can save up to 100,000 data entries. New data will overwrite the previously saved data after recording 100,000 data entries. The user can click the "Periodicity" button to change the data recording time interval.

Data    Turb	idity		Х
Number	Time	Data	^
1	2021-10-22 16:10:44	56.346	
2	2021-10-22 16:10:43	56.346	
3	Data St	orage Period	
4			
5			
6			
7	Periodicity	60S	
8	· · · · · · · · · · · · · · · · · · ·		
9			
			~
<			<b>&gt;</b> :
Delete	Previous	Next Periodicity Que	ry

Figure. 24 - Data Storage Cycle Time Setting



Click "Delete" in the lower left corner. After entering the retention time, click the "Delete" button to clear all historical data within the retention time range.

Historical Data Deletion						
	Retention Time					
	0	h				
	Delete					
-						

Figure. 25 - History Data Deletion Screen

Click the "Query "button in the lower right corner, enter the start time and end time and then click the "Query" button. Note that the start time and end time must be filled in exactly and completely according to the system time format.

Data    Turb	idity						Х
Number	Time		Data				^
1	2021-10-22 16:10:44		56.346				
2	Histo	orical Dat	a Query/Expo	ort			
3		2024 40	22.46.11.00				
4	Current Time	2021-10	-22 16:11:00				
5	Start Time		0				
6					Query		
7	END Time		0				
8							
9	Quantity		0		Data		
	State		Prepare		Export		
							$\sim$
<						>	.::
Delete	Previous	N	ext	Period	dicity	Quer	y

Figure. 26 - Historical Data Query and Export Screen

Insert a USB disk behind the display screen and enter the time range of the data to be exported in the query area. Click on the "Data Export" to download the data to the USB disk. The data quantity will be shown as a positive number if data export is successful. If the data export was not successful, please check whether the time format is correct.



## 7.10 Historical Data Curves

Click the "Historical Curve" button in the menu bar to enter the trend curve interface. You can click the buttons below the X-axis to browse and view the values in a different time range. Click on Y-axis Range to change the minimum and maximum Y-axis values for a proper range.



Figure. 27 - Historical Data Curves



Figure. 28 Y-axis Range Setting



- The curve will scroll forward (to the right of the X-axis) half the page of the curve
- The curve will scroll forward (to the right of the X-axis) one page
- A dialog box will pop up to reset the starting time of the curve

Curve	Turbidity	· · · · · · · · · · · · · · · · · · ·	(
1000.000		Set time range	٦
800.000		O Recent time     Ok       1     Hour	
600.000		Cancel	
400.000		Given time	_
200.000		2021         Year         10         Month         22         Day	
0.000	10-22 15:09	10-22 15:21 10-22 15:33 10-22 15:45 10-22 15:57 10-22 16	:09
	₩ 4	✓     ► </th <th></th>	

Figure 29 - Button Function Review

Figure 30 - Time Setting Screen



#### 7.11 User Management

Click the "User Management" button on the menu bar and then you can select "Login", "Logout" and

"Manage" operations.



Figure 31 - User Management

Logout enables the user to log out of the logged-in state and only view the real-time readings but cannot perform operations such as parameter settings. Click "Manage" to enter the user management interface, where you can add users, change passwords and other operations. Users can set their own username and password and select the user group they belong to. Only users in the administrator group can set parameters such as calibration.



Figure 32 - User Management Screen



<u>Modify Password:</u> Select the user you want to change, then click Modify User button, enter the user's own password in the User Password column and Confirm Password column, and click Confirm to modify successfully. **\*NOTE\*** *If you do not want to set the password, you can delete the password and save it.* 

🖀 User member management	×
User name: pyxis User password: •••••• Attached to user group	User description: Re-enter Password: •••••• Alternative user group

Figure 33 - Modifying the User Screen





# 8 Maintenance

# 8.1 Correspondence Address

Serial Number	Definition	Address	Format	Mode	Unit	Note
1	Channel 1 display	1	float	Read Only	NTU	Data format ABCD
2	Channel 2 display	3	float	Read Only	NTU	Data format ABCD
3	Channel 3 display	5	float	Read Only	NTU	Data format ABCD
4	Channel 4 display	7	unit	Read Only	NTU	Data format ABCD
5	Channel 5 display	9	unit	Read Only	NTU	Data format ABCD
6	Channel 6 display	11	unit	Read Only	NTU	Data format ABCD
7	The sensor communication in channel 1 is abnormal	13	unit	Read Only		0=Normal 1=Alarm
8	The sensor communication in channel 2 is abnormal	14	unit	Read Only		0=Normal 1=Alarm
9	The sensor communication in channel 3 is abnormal	15	unit	Read Only		0=Normal 1=Alarm
10	The sensor communication in channel 4 is abnormal	16	unit	Read Only		0=Normal 1=Alarm
11	The sensor communication in channel 5 is abnormal	17	unit	Read Only		0=Normal 1=Alarm
Communication	Protocol: Standard Modbus-RT	J				
Communication Parameters: Baud Rate - 9200, Data Bit - 8, Stop Bit - 1, Parity Bit - Even						
Station Number	:: 100					

 Table 2 - Correspondence Address





#### 8.2 Operation and Maintenance

After the analyzer is installed by a qualified technician, it can begin to monitor water quality. The DW-739 inline detection system is designed to be simple to operate, but still requires some regular maintenance. Actual system maintenance may vary depending on the installation conditions and usage. Please refer to the table below as a general recommended maintenance schedule guideline. Minimal operator intervention is required during normal operation.

Required Services	Recommended Frequency
Cleaning DW-739 Inlet Water Filter	Monthly or Cleaned As Needed
Cleaning of FR-100 Flow Reservoir and Photoelectric Pole	Monthly
Turbidity Calibration	Every 6 Months

Table 3 - Maintenance Intervals



## 8.3 Instrument Alarms and Descriptions

Please refer to the instrument alarms and descriptions table when troubleshooting the DW2100P inline inspection system issues an alarm or indicates abnormal measurement data.

Alarms	Description	Symptoms	Solutions/Recommendations
PLC Communication	PLC without		Check if the wiring inside the PLC and control box is loose
Turbidity Sensor Communication Abnormality	Turbidity Sensor without Communication	No Turbidity Measurements	Check the connection between the sensor and the circuit board. If the problem persists, contact Pyxis.
Turbidity Upper Limit Alarm	Turbidity above the Alarm Setting	Information Only	Compare with manual measurement readings. Check and
Turbidity Lower Limit Alarm	Turbidity below the Alarm Setting	Information Only	the sensor is clean.
Turbidity Calibration Failure Code 259	Low Calibration Standard Solution out of Range	Turbidity Calibration Failure	
Turbidity Calibration Failure Code 260	Mid Calibration Standard Solution out of Range	Turbidity Calibration Failure	
Turbidity Calibration Failure Code 261	High Calibration Standard Solution out of Range	Turbidity Calibration Failure	Check that the flow cell and sensor are clean and that the standard solution is not contaminated
Turbidity Calibration Failure Code 262	Slope f1 out of Range	Turbidity Calibration Failure	
Turbidity Calibration Failure Code 263	Slope f2 out of Range	Turbidity Calibration Failure	

Table 4 - Common Alarms



Pyxis

# **Order Information**

	P/N
DW-739 (Drinking Water Turbidity Analyzer for EPA-180.1 Compliant Markets)	42143
DW-739B (Drinking Water Turbidity Analyzer for ISO-7027 Compliant Markets)	42144
DW-739-G (DW-739 with optional Pyxis CloudLink™ 4G Gateway)	42145
DW-739B- G (DW-739B with optional Pyxis CloudLink™ 4G Gateway)	42146
<b>Optional / Replacement Accessories Information</b>	P/N
UC-100A Display/Data Logging Terminal	43054
LT-739 Ultra-Low Turbidity Sensor (Warm White LED 0.000-40. 00 NTU)	53221
LT-739B Ultra-Low Turbidity Sensor (InfraRed 860nm LED 0.000-40. 00 NTU)	53225
FR-100 Single Sensor Flow Reservoir Assembly	50779
FRP-100 (Motorized Brush Cleaning Module for FR-100)	50700-A16
FRP-100-1 (Replacement Brush for FRP-200)	50700-A14
LT-SOLID-CAL 739 (Solid State Calibration Kit for LT-739 - 0.1 / 8.0 / 25 NTU)	53229
LT-SOLID-CAL 739B (Solid State Calibration Kit for LT-739B - 0.1 / 8.0 / 25 NTU)	53239
L-CAL (Portable Liquid Formazin Calibration Kit for LT-73X Series Sensors)	53247
Pyxis Turbidity Calibration Std – 10.0 NTU (4,000mL)	57010-10L

Table 5 Order Information

# 10 Contact Us

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