# SPECIFICATION SHEET

# **TURBIDITY ANALYZER**



# **TUF-1690**

Measure the turbidity in the wash water using the 90 degree scattered light method.

## Features

- OHas the ability to ensure stable measurement by pressurization of the measurement tank, which minimizes bubble occurrence and eliminates as many scattering points as possible.
- OReduces susceptibility of influence from ripples and floating objects on the water surface. This is due to the measurement detector being submerged into the water.
- OLED (light-emitting diode) enables long service life of the light source. Reduces susceptibility of ambient light and sample water color, due to the use of infrared light.
- OWater jet washing removes stains to increase measurement stability.
- OSupports the RS485 communication method (Modbus protocol), easy to build network.

#### **Standard Specifications**

Product name	Turbidity Analyzer	
Model	TUF-1690	
Measurement Object	Turbidity of city water	
Measurement	90 degree light scattering method	
Method	(infrared light 870nm)	
Measurement	Single range; $0$ to $2$ , $0$ to $5$ , $0$ to $10$	
Ranges	Dual ranges ; 0 to 2 / 5, 0 to 5 / 10	
	Three ranges ; 0 to $2 / 5 / 10$	
Measurement Units	Select one of these ranges. Then, select	et
	NTU, ppm, degree, mg/L, or FTU as the	he
	unit of measurement.	
Range Switching	Automatic/manual/remote	
Display	LCD display	
Transmission output	$4 \mbox{ to } 20 \mbox{ mA DC},$ a resistive load of $600$	Ω
	or less	
Output points	6 points (a contact 5 points, c contact 1	1
	point)	
Assignment possible from the followi		
	9 items (duplicate assignment possible	e)
	1 Power off (c contact fixed), 2	
	Instrument error (zero calibration	
	error, stability determination error,	
	communication error, hard error, set	
	value error), 3 During maintenance, 4	



	Concentration upper limit warning, 5			
	Range 1, 6 range 2, 7 Range 3, 8			
	During cleaning (in case of optional			
	automatic cleaning), 9 During			
	calibration (during automatic			
	calibration)			
Contact capacity	30 VDC, 0.1 A resistance load			
Contact input signal	input points; 3 points (no-voltage			
	ON resistance 50 Q or loss short			
	airquit aurrent maximum $10 \text{ m}$ open			
	circuit voltage 24 VDC			
	Assignable from the following 4 items			
	1. Specify "Range 2" Select with			
	closed contact reception			
	2. Specify "Range 3" Select with			
	closed contact reception			
	Range 1 is selected when "Range 2"			
	and "Range 3" are both opened or closed			
	3 Washing command Closed contact			
	(nulse width of 100 m sec or more)			
	4 Calibration command Closed			
	contact (pulse width of 100 m sec or more)			
Communication	Interface RS-485 compliant (isolated)			
method	Communication speed Select from			
	1200/2400/4800/9600/19200/38400/			
	57600 bps			
	Protocol Modbus / RTU			
	Data length 8 bits			
	Parity NONE / ODD / EVEN			
	selection			
	Stop bit 1 bit			
	Data order BIG ENDIAN			

Analog signal input	: 4 to 20 mA DC (for external analog
	instrument)
	It can be converted to an arbitrary
	scale and read out by Modbus
	communication.
Power supply	: 100 to 240 VAC $\pm$ 10% 50/60 Hz
Power consumption	: Max. Approx. 60 VA
<b>-</b>	Average: Approx 15 VA (100 VAC)
	Approx $30 \text{ VA} (220 \text{ to } 240 \text{ VAC})$
Sample water	: Temperature: $0$ to $40$ °C
condition	Prossure: 0.1 to 0.5 MPa (fluctuation
condition	width within 0.3 MPa)
	Elemente: Constant flow note of 1 to 4 L/
	riow rate, Constant now rate of 1 to 4 L
M/ 11 11 1	min (fluctuation range within 1 L/min)
washing method	Manual water washing (standard)
	Automatic water washing (option)
Washing water	: Temperature; 2 to 30 °C
condition	Pressure; 0.1 to 0.3 MPa
	Flow rate; 2 to 4 L / min (fluctuation
	width within 1 L / min)
	Water quality; city water (turbidity 2
	degrees or less, chromaticity 5 degrees
	or less)
Construction	: indoor self-supporting rack type
	Transmitter; IP65
	Detector; IPX 3
Material	: Transmitter; aluminum die casting
	Detector Parts; Aluminum plate
	Wetted Parts; hard PVC, soft rubber
	tube, 304SS
Painting color	: metallic silver
Piping Connections	Sample water inlet; socket nominal
	diameter 16
	Drain outlet: socket nominal diameter
	25
	City water inlet: socket nominal
	diamotor 16
Cable connections	: 6 apple glands for external diameter (a 6
Cable connections	$\cdot$ 0 cable grands for external drameter $\psi$ 0
	(One place is for transmitten and
	(One place is for transmitter and
	detector)
	When the cable gland is removed, G $1/2$
Ambient temperature / humidity	: -5 to 50°C, 85%RH or less
Weight	: Approx. 25 kg
Performance	: Linearity ; Within $\pm$ 5% FS (in formazine
	solution)
	Repeatability; within $\pm$ 1% FS (in
	formazine solution)
	Stability; Zero drift $\pm 2.5\%$ FS /
	within week (with zero water)
	Span drift ± 2.5% FS per week (in
	formazine solution)

### **Calibration method**

Zero calibration	: Automatic zero calibration by lamp off or manual calibration using purified water		
Span calibration	: Manual calibration using formazine, kaolin, or polystyrene (PSL) solution		

## Option

Automatic washing	: Performing water jet washing with the		
unit	measuring tank empty.		
	Start mode; automatic depending on		
	internal timer		
	Washing cycle; 1 to 24 hours (can be set)		
	Washing time; 1 to 5 minutes (can be		
	set)		
	Standby time after cleaning; 0 to 30		
	minutes (can be set)		
	; Remote Closed contact input from		
	outside		
	; Execute immediately with manual		
	key operation		

#### **Principle of Operation**

When sample water enters the measurement tank, particles in the water, which cause turbidity, reflect light emitted from the LED.

The scattered light reaches the light receiver, which is positioned 90 degrees relative to the incident light.

The scattered light is then converted into an electrical signal. If the amount of light from the light source is constant, the intensity of the electrical signal increases proportionally to the number of particles.

This intensity is calculated as turbidity by arithmetic processing.

Because its optical system is under water, this instrument is not susceptible to influence from ripples and floating objects on the water surface.

Its measurement tank is pressurized to eliminate bubbles, resulting in stable measurements.



### Flow Diagrams

• Standard Specifications



Symbol	Name	Remarks
BV1	Drain valve	1 to 4 L/min
BV2	Washing water flow rate control valve	
BV3	Washing water flow rate control valve	
RG	Pressure reducing valve	
NV1	Needle valve	
CV1	Check valve	
CV2	Check valve	
М	Pressure meter	

Normally open
Normally closed

### • Automatic Washing (Option)



Symbol	Name	Remarks
BV1	Sample water flow rate control valve	1 to 4 L/min
BV2	Washing water flow rate control valve	1 to 4 L/min
SV1	Sample water supply solenoid valve	
SV2	Drainage water solenoid valve	
SV3	Washing water supply solenoid valve	
RG	Pressure reducing valve	
NV1	Needle valve	
CV1	Check valve	
CV2	Check valve	
Μ	Pressure meter	

Normally open

External Terminals





\*These contact input/output signals are assigned factory-set values.



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- 1. Instrument installation conditions
- $Please \ install \ in \ a \ place \ that \ meets \ the \ following \ conditions$
- a) Places where rain, wind, direct sunlight does not reach
- b) Where the temperature, pressure, etc. of the sample water can supply the water quality conforming to the "sample water condition" below
- c) There is no vibration
- d) Where there are no devices that become electrical noise sources
- e) where maintenance space can be secured and work can be easily done
- 2. Sample water supply piping
  - a) Provide a stop valve as shown in the figure.
  - b) Use piping materials with good corrosion resistance such as rigid PVC (VP16) or PVC pressure-resistant hose (VP16 equivalent diameter).
- 3. Drain piping
  - a) Drain into the pit or the like with open air release piping.
  - b) Use piping materials with good corrosion resistance such as rigid PVC (VP25) or flexible PVC hose (VP25 equivalent diameter).
- 4. Sample water supply piping
  - a) Provide a stop valve / strainer (40 to 100 mesh) as shown in the figure. Also, please put in the union etc. in the vicinity of the equipment, and enforce it so that you can disconnect (disconnect) the piping from the equipment.
  - b) Use piping materials with good corrosion resistance such as rigid PVC (VP16) or PVC pressure-resistant hose (VP16 equivalent diameter).
- 5. Wiring
  - a) Refer to the standards shown in each figure for each cable.
  - b) For grounding of the instrument, please install D grounding of earth screw on the lower side of the converter or E terminal of internal terminal (earth resistance of 100  $\Omega$  or less).
  - c) When conduit piping (conduit pipe) is used, remove the cable gland and connect it to G 1/2 screw.

#### Product code

TUF1690A-0-	
TUF1690B-0-	
TUF1690C-0-	
	Measurement range
A	For each range, select from the table below *1
to	to
	Measurement Units*2
1.	Degree
2	Mg/L
3	nnm
4	NTU
5	FTH
	Calibration Standards
Δ	Formazine
B	Kaolin
	Polystyrong (PSI) 0 to 2 dogroos only for single range
č	Data momony
0	None
1	Available *2
1	Available 2
0	Automatic water wasning
1	None (Manual water washable)
1	Available
	Markings
A	Japanese (Standard)
В	English Language
γ	Other specification

\*1. The measurement range of each range is as shown in the table below.

Product code
Range specification
Pilk in the first digit

TUF1690A-0-		TUF1690B-0-		TUF1690C-0-		
Single range		2 range switching		3 range switching		
А	0 to 2	Α	0 to 2 / 5	Α	0 to 2 / 5 / 10	
В	0 to 5	В	0 to 5 / 10			

- C 0 to 10 \*2. This function is to save measured data for 3 months with sampling every 5 minutes. The saved data can be read by RS-485 communication.
- Note 1. Automatic zero calibration by lamp off is standard equipment.

When purified water (water that can be regarded as zero turbidity) can be prepared, zero calibration with zero water and span calibration with span solution are performed manually using each solution using the accessory calibration vessel.

- Note 2. In addition to the transmission output DC 4 to 20 mA, the digital output RS-485 is equipped as standard, so it can correspond to new digital instrumentation by Modbus communication (exchanging data and information with the upper DCS etc). For details of communication specification etc., please contact the dealer.
- Note 3. Besides manual switching, automatic ranging switching and remote range switching function are provided as standard in Dual ranges and Three-ranges specifications.
- Although factory setting is manual switching, you can change the setting arbitrarily.
- Note 4. The power supply voltage is a free power supply of 100 to 240 VAC 50/60 Hz.



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Please read the operation manual carefully before using producuts.