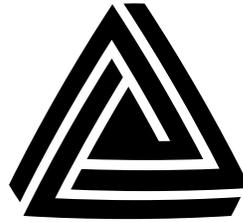


Instruction Manual

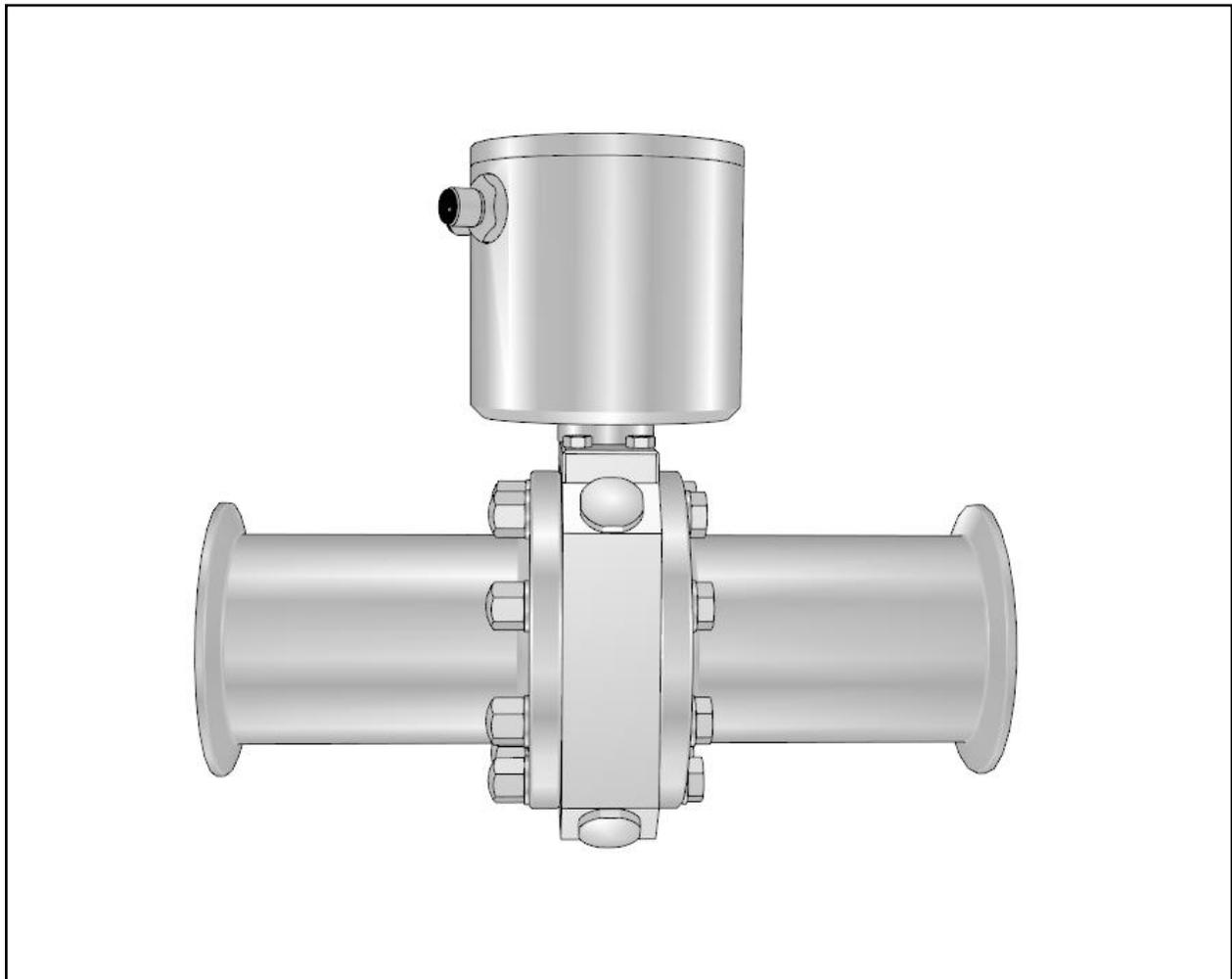


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ANDERSON-NEGELE

Instrument Model Number _____

Instrument Serial Number _____



"ITM-4" 4-Beam Turbidity Meter

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Section 1 - General

1.1 - Description

The ITM-4 turbidity meter has been specifically designed for placement in Dairy, Food and Beverage applications where accurate turbidity measurement is required. The ITM uses a two light/two receiver system that measures the affect that particle presence in a liquid has on the 90 degree reflection and absorption of light across the measurement tube. The meter takes these measurements and calculates the result in NTU (Nephelometric Turbidity Units) or EBC (European Brewing Conference) units. The calculated value is then displayed on the meter along with the creation of an analog output representing the measurement based on an internally selected range. In addition to the display and analog output, the ITM also offers a switched output that can be used to take action on a user assigned set point. The resulting signals may be interfaced with Anderson Digital Indicators, Anderson recording devices or Customer supplied instrumentation including programmable logic controllers. Multiple sizes are available to allow adapting a variety of piping sizes. The ITM-4 is 3-A authorized with all wetted parts constructed of 316L stainless steel, Peek, sapphire glass and EPDM elastomers. 3 Push buttons allow for programming changes that can affect the analog and switched output operation.

1.2 - Specifications

Process Connection: 1.5", 2", 2.5", 3"
 Materials Connection Head: SS 1.4305 (303 Stainless) 89 mm dia.
 Fitting: SS 1.4404 (316L)
 Optical Block: PEEK
 Lens: Sapphire

Temperature Ranges

Ambient: -10-60 °C (14-140°F)
 Process: 0-100 °C (32-212°F)
 CIP/SIP-Cleaning: up to 130 °C (266°F) 30 psi max
 Operating Pressure: 85 psi maximum
 Measurement Principle: acc. to EN 7027 4-beam-altern. light Wave Length: acc. to EN 7027 860 nm ± 60 nm
 LCD-Indicator with Illumination: 2 x 8-digit
 Accuracy: see table below

| | | |
|-----------------|--|---------------------------------|
| Accuracy | at the calibration points (20; 200; 2000 NTU) | ± 2% |
| Offset drift | | < ± 0.3NTU (± 0.075EBC) |
| Slope accuracy | Range 0-1000 NTU | (0-250 EBC) < 3 % |
| | Range 1001-2000 NTU | (250-500 EBC) < 4 % |
| | Range 2001-5000 NTU | (500-1250 EBC) < 6 % |
| Reproducibility | Range 0-1000 NTU | (0-250 EBC) < 2 % |
| | Range 1001-2000 NTU | (250-500 EBC) < 3 % |
| | Range 2001-5000 NTU | (500-1250 EBC) < 4 % |
| Resolution | Range 0-100 NTU | (0-25 EBC) 0.1 NTU (0.025 EBC) |
| | Range 100-1000 NTU | (25-250 EBC) 1 NTU (0.25 EBC) |
| | Range 1001-5000 NTU | (250-1250 EBC) 10 NTU (2.5 EBC) |

Electrical Connection: Cable Entry: 2 x PG (M16 x 1.5)
 Cable Connection: 2 x M12 plug-in(SS 316), (1) 4 pin, (1) 5 pin
 Supply Voltage: 24  (18-36 V DC) 160 mA maximum
 Input Range Switching: E1 and E2 24  (18-36 V DC) DC decoupled Output
 Analog: 4-20 mA active
 Short Circuit Proof: DC decoupled
 Switching: 24  80 mA maximum respectively to GND of power supply
 Measurement Ranges NTU: 0-5; 10; 20; 50; 100; 200; 500; 1000; 2000;4000; 5000 EBC: 0-1; 2; 5; 10; 20; 50;100; 200; 500; 1000;1250
 Damping Time: 0; 1; 2; 4; 8; 16; 32; 64; 128 seconds (adjustable)
 Environmental Protection: Design and tested to IP69k; intended for use in wet environments at up to 100% relative humidity
 Approvals: ETL Listed
 Conforms to UL Std 61010-1 3rd Ed (with Display option B only)
 Certified to CSA Std C22.2 61010-1 3rd Ed (with Display option B only)

1.3 - General Safety

These safety instructions have to be strictly observed in order:

- To not endanger the safety of persons and environment
- To avoid any damages to the measuring instrument
- To prevent any faulty product as a result of use

The electric connection may only be carried out by qualified persons who have the necessary electrical knowledge and have been authorized by the owner to do so. The wiring of the voltage supply and the inputs and outputs of the control circuits has to be carried out professionally in consideration of current electrical design and regulation. Also refer to chapter 3 "Installation"/"Electrical" for more information.

In particular, the following references have to be observed:

- Safety instructions
- Electrical connection information
 1. All persons who are involved in the installation, commissioning, operation, service, and maintenance of the meter have to be qualified accordingly.
 2. This instruction manual has to be strictly observed. The user of the meter has to assured that the personnel concerned has read and fully understood the instruction manual.
 3. All work done must be carried out by authorized and trained personnel only.
 4. The instruction manual should be kept in close proximity to the device for reference to the operators.
 5. Before starting any cleaning, conversion, service or maintenance work, the measuring device has to be switched off and disconnected from the power. This requires a device for separating all live wires, e.g. a 2-pole main switch in the control cabinet. The associated device has to be protected against unauthorized switching-on.
 6. Before starting any service and maintenance work, the system has to be flushed with water and emptied. If the meter has to be removed from the pipe system, all pipelines will have to be emptied prior to removal and protected by a maintaining an opening to atmosphere or a shut-off method to prevent refilling.
 7. Never remove or put out of action any safety devices through modification of the meter.
 8. Do not touch any part of the meter while the measuring instrument is cleaned as there is a risk of getting burned!
 9. To minimize the danger of injury, the working area around the meter should have sufficient free space.
 10. The technical data according to the instruction manual, nameplate needs to be considered against the requirements of the application.

If damage is done to the meter, all warranties are void.

Dangers not resulting from the functionality of the device, but from the ambient and operating conditions present at the place of application, have to be referred to in appropriate instructions to the operators and by the use of danger signs. The user of the device is exclusively responsible for the compliance with these instructions!

1.4 - Intended Use

The ITM-4 turbidity meter is only to be used for the application that it has been designed, dimensioned and built. The electrical connection must be made to a direct current network (see the nameplate).

The intended purpose of the turbidity meter is the measurement of liquid turbidity in the food processing, beverage, pharmaceutical and chemical industries. This meter is not suitable for the measurement of hazardous, explosive, and combustible liquids of PED group.

Any modifications to the measuring device that might have an influence on the function and the safety devices of the meter are only allowed to be carried out by authorized persons of Anderson Instrument Company. Possible misuse including any use in contradiction to the above-mentioned application is an indication of misuse of the measuring instrument!

In such a case Anderson does not assume any responsibility for safety.

Section 2 - Application Requirements

2.1- Conditions required for the meter

The meter has to be installed in the product line with power supplied for operation. When selecting the place for the installation of the meter you should ensure that the housing can be opened for service work whenever needed and that the meter can be simply removed, if necessary. In order to protect the electronics from damage, select an installation location so that:



Warning! Do not subject this sensor to pressure that exceeds the specified upper range limit. Over-pressure may cause premature failure, incorrect output signal, or possible human injury.

- Product temperature is always kept within the admissible temperature

Caution: Do not expose the sensor to process or ambient temperatures that exceed the rated specifications. Physical damage, incorrect output signal, or premature failure may result.

- Piping is securely mounted (e.g. to avoid vibration)
- Meter can be emptied if there is a risk of freezing
- Connection housing is not permanently exposed to dripping water

2.2 - Mounting Position

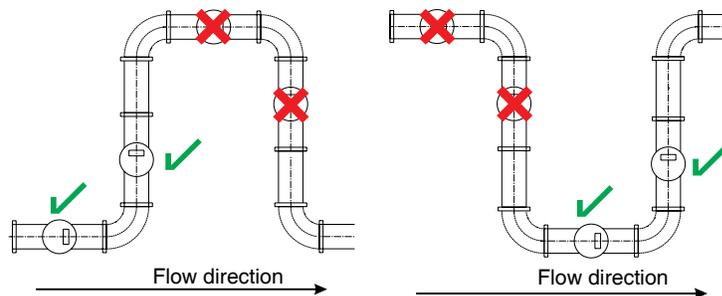
Ensure that the mounting position of the turbidity meter guarantees that the measurement tube is always full with media. Air or air bubbles are measured like turbidity.

Correct installation:

- In or in front of ascending pipes

Wrong installation:

- In or in front of descending pipes
- Into the highest point of a pipe. Air or air bubbles will concentrate there. Refer to drawings below for examples.



Section 3 - Installation

3.1 - Mounting in the line

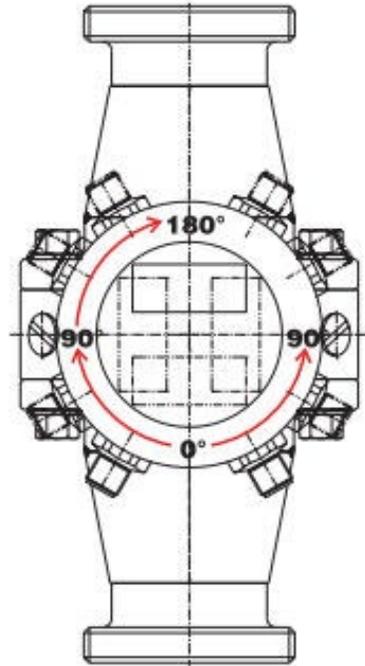
Caution: Handle with care during installation to avoid damage to the sensor. Physical damage, especially to the sensing surface can cause incorrect output signal or premature failure.

The ITM is designed to be installed in a supported pipeline. Under no circumstances should the meter be installed in a line that imparts stresses on the meter.

Caution: For proper mounting of this sensor, verify that the fitting connection type, size, gasket or seal, and holding ring or clamp match the process connection it is being mounted to. Improper mounting can cause process leakage, reduced pressure ratings, and/or contamination issues.

3.2 - Rotating the display

In instances where the mounting location orients the display to an awkward position, it is possible to rotate the display to improve the viewing by loosening the screws pictured below and rotating the electronics housing. It is important to note that the display should be rotated by 90 degree increments to ensure the screws return fully back into their retention holes when retightened.



3.3 - Electrical

3.3.1 - Cabling and Connections

Anderson recommends the use of molded five wire molded cord sets to provide the best protection in wet environments. Wire should be 18-24 AWG, 5 conductor cable to power the ITM-4 and provide a return for the analog output signal. In addition, it should be foil shielded with a continuous drain wire. The ITM is provided with M12 quick disconnect electrical connectors that will prevent moisture from entering the electronics housing. The drain (ground) wire should be attached to ground at only the receiving device end.

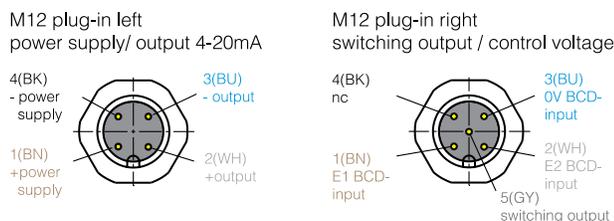
WARNING: To prevent signal interference, do not run signal cable closer than 12" to AC wiring.

3.3.2 - Power and Wiring



Warning! This unit accepts DC voltage only, connection to AC voltage can cause failure of the sensor and/or risk of electrocution

The ITM requires 24 VDC (18-36 VDC) at 160mA current for proper operation. The diagram below illustrates the pin assignments for the M12 connectors used on the ITM



The left connector offers the connection for input power and the analog output. If more features are to be utilized connection to the right connector will need to be done using a second cable with 5 conductors. On this connector the switching output is available for use to control a low voltage light or input to a PLC (80 mA max.) If the output current is higher than the specified current (80 mA) an electronic fuse switches off the output. To reset the switch output, disconnect the output (or deactivate and activate the turbidity meter).

There are also two inputs to select from multiple pre-programmed range choices. The turbidity meter is delivered with measurement range 1 (0...1000 NTU / 0-1000 EBC = 4...20 mA). Other ranges can be selected by applying 24 VDC to the inputs identified below.

Range 2 (E1=24 VDC (18-36 V DC), range 3 (E2=24 VDC (18-36 V DC) and range 4 (E1=24 VDC (18-36 V DC) and E2=24 VDC (18-36 V DC) can be chosen by means of the rated signal 24 VDC (18-36 V DC) at the inputs on pin 7, 8 and 9. Please take note of the connection plan and the table below. If these inputs are not connected, measurement range 1 always will be active!

| E1* | E2* | Meas. range |
|-----|-----|-------------|
| 0 | 0 | 1 |
| 1 | 0 | 2 |
| 0 | 1 | 3 |
| 1 | 1 | 4 |

*0 = 0 V DC / 1 = 24 VDC (18-36 V DC) The digital inputs E1 and E2 are DC decoupled to the power supply. Reference ground: pin 9

Section 4 - Commissioning

Following mounting and electrical connections the device can now be turned on for use. With an empty measurement tube the signal will indicate a value around 1200NTU. This reading is not a concern as the optics have been design for the measurement of liquids not gasses. Once filled with clear liquid such as distilled water the measured value should be around 5 NTU depending on the purity of the water used. The ITM-4 is factory calibrated and ready to use once installed. If a check of performance is desired it is recommended that Hach brand Stabcal solutions be used at the desired turbidity points.

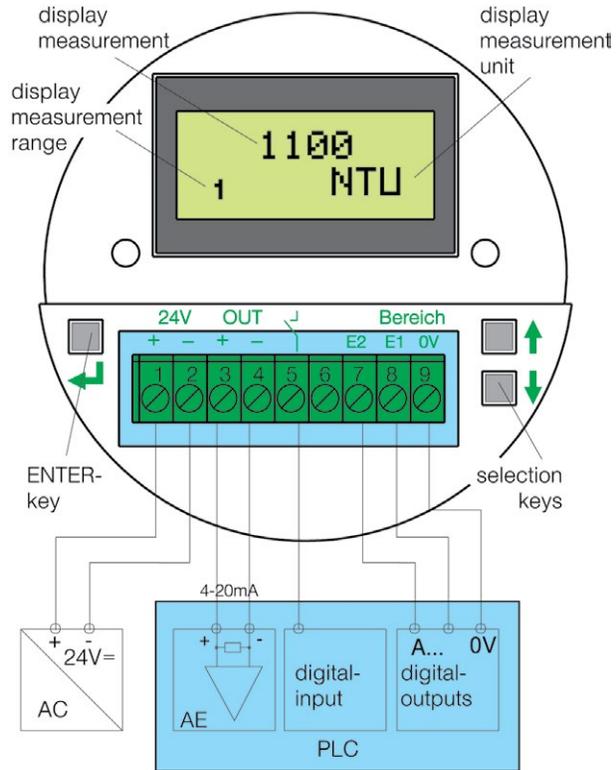
Section 5 - Operation

Once commissioned there is no further need to interact with the ITM other than reading the display to view the turbidity measurement as the measurement is continuous and automatic.

Section 6 - Parameterization

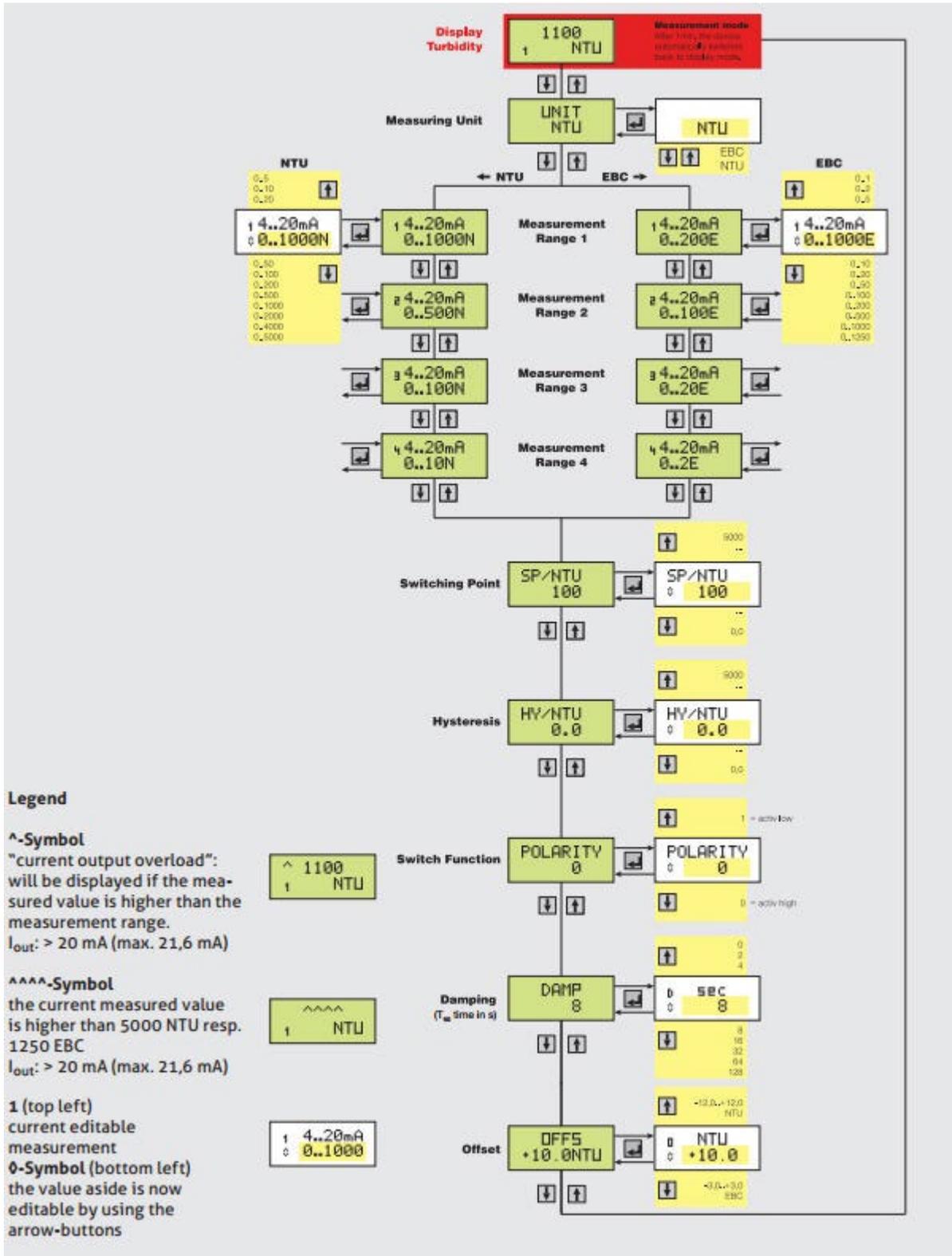
If the factory settings do not meet the requirements of a specific application it may be necessary to alter the meters operation through parameter change. This is done using the display and the three keys on either side of the terminal strip pictured below. To access these it will be necessary to open the enclosure by unscrewing the windowed cap.

Caution: Do not open the sensor enclosure in wet or spray-down environments. Moisture ingress can cause premature electronics failure.



Through the use of the “enter” and “selection” keys navigation of the programming routine below can be accomplished.

Caution: Improper changes to programmed parameters following installation and commissioning can result in incorrect output signal.



Starting at the top of the programming menu in red is the starting point for a meter that has been turned on. Using either the up or down keys one can scroll to the following parameters starting from the bottom of the menu and working up:

OFFS-Offset value used to adjust the meters reading based on a measurement to a known liquid such as a calibration standard

DAMP-Dampening value in seconds of time that slows the response of the meter. This is used in operations that have higher variability in the measurement that needs to be averaged into a more stable output.

POLARITY- Change the status of the switch output between active when high or active when low.

HY/NTU-Hysteresis for the switch output, sets the span in NTU between the switch on point and the switch off point.

SP/NTU- Set point for the Switched output in NTU

X4-20mA-Range selection parameter for the 4-20mA output where X is between 1 and 4

UNIT- Selection of the measuring units between NTU and EBC

Section 7 - Troubleshooting

| Symptom | Diagnosis | Action |
|---|--|--|
| Display does not light up | -Unit is miss wired -No power to meter | -Correct wiring -Correct power issue |
| Display lights no analog output | Analog output has failed | Return to factory for service |
| Switched output does not operate | -Setpoint is incorrectly set -Output has been damaged by over current | -Adjust setpoint to correct value -Correct electrical problem and power cycle meter |
| mA output stays at >21mA but display indicates measurement | Range selection is too low | Reconfigure range for a higher value |
| mA output stays at >21mA and display indicates ^^^^^^^ | Turbidity greater than 5000NTU | Contact factory |
| Reading on display and output are higher when flowing than when flow is stopped | Air/gasses are being introduced into the process liquid | Find and correct source for air/gasentrainment |

Caution: Attempting to disconnect or change wiring to this sensor during process operation can cause loss of signal to the control system!

Section 8 - Maintenance and Cleaning

The ITM requires no regular maintenance other than the periodic changing of process connection gaskets. This should be done annually or at the same intervals as your plant gasket maintenance. The product contact and exterior of the ITM is designed to be cleaned under the same conditions as required in food and pharma processing facilities including CIP cleaning methods. High pressure hoses, abrasive brushes or pads and harsh detergents should not be used to clean the ITMs product contact and external surfaces.

Service 9 - Service and Calibration

9.1 - Service



Warning! Do not remove this sensor from the process while it is operating. Removal while the process is operating can contaminate the process and could cause human injury.

Caution: Improper replacement of components during service can result in process leakage, reduced pressure rating, system cleanability issues, incorrect output signal, or error code(s).

There are no serviceable electronic or optical components in the ITM. All required repairs require returning the device to the factory.

9.2 - Calibration

Caution: Improper calibration can cause incorrect output signal.

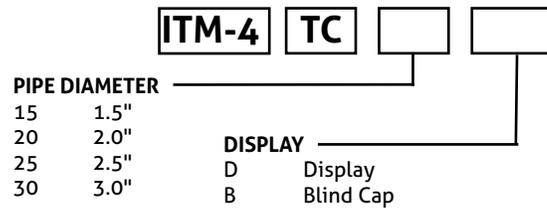
Although a full calibration of the ITM requires the device to be returned to the factory, if during regular accuracy checks a point is discovered to be slightly off it can be corrected using the OFFS parameter. This parameter will directly change the reading of the ITM by the value that is entered. When doing so make sure that the integrity of your reference solutions are sufficient to determine an error.

Section 10 - Spare Parts

There are two replaceable o-rings used on the ITM and are listed below. For the process flange one size is used for all units.

| Description | Part Number | quantity required |
|-----------------------------------|------------------|-------------------|
| Window cap o-ring | 36241N0017807900 | 1 |
| 5mm Flange o-ring | 45669A0065 | 2 |
| Shielded cordset w/25' cable | 42117H0025 | |
| Shielded cordset w/50' cable | 42117H0050 | |
| Shielded cordset w/100' cable | 42117H0100 | |
| Field Wireable Connector-Straight | 42119B0000 | |
| Field Wireable Connector-90° | 42119A0000 | |

Section 11 - Product Matrix



Warranty and Return Statement

These products are sold by The Anderson Instrument Company (Anderson) under the warranties set forth in the following paragraphs. Such warranties are extended only with respect to a purchase of these products, as new merchandise, directly from Anderson or from an Anderson distributor, representative or reseller, and are extended only to the first buyer thereof who purchases them other than for the purpose of resale.

Warranty

These products are warranted to be free from functional defects in materials and workmanship at the time the products leave the Anderson factory and to conform at that time to the specifications set forth in the relevant Anderson instruction manual or manuals, sheet or sheets, for such products for a period of one year.

THERE ARE NO EXPRESSED OR IMPLIED WARRANTIES WHICH EXTEND BEYOND THE WARRANTIES HEREIN AND ABOVE SET FORTH. ANDERSON MAKES NO WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE PRODUCTS.

Limitations

Anderson shall not be liable for any incidental damages, consequential damages, special damages, or any other damages, costs or expenses excepting only the cost or expense of repair or replacement as described above.

Products must be installed and maintained in accordance with Anderson instructions. Users are responsible for the suitability of the products to their application. There is no warranty against damage resulting from corrosion, misapplication, improper specifications or other operating condition beyond our control. Claims against carriers for damage in transit must be filed by the buyer.

This warranty is void if the purchaser uses non-factory approved replacement parts and supplies or if the purchaser attempts to repair the product themselves or through a third party without Anderson authorization.

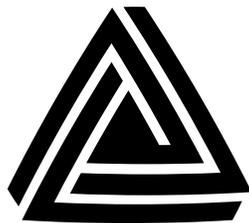
Returns

Anderson's sole and exclusive obligation and buyer's sole and exclusive remedy under the above warranty is limited to repairing or replacing (at Anderson's option), free of charge, the products which are reported in writing to Anderson at its main office indicated below.

Anderson is to be advised of return requests during normal business hours and such returns are to include a statement of the observed deficiency. The buyer shall pre-pay shipping charges for products returned and Anderson or its representative shall pay for the return of the products to the buyer.

Approved returns should be sent to: ANDERSON INSTRUMENT COMPANY INC.
156 AURIESVILLE ROAD
FULTONVILLE, NY 12072 USA

ATT: REPAIR DEPARTMENT



ANDERSON-NEGELE

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