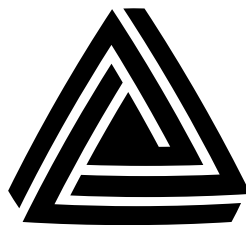


# Instruction Manual



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**ANDERSON-NEGELE**

Instrument Model Number \_\_\_\_\_

Instrument Serial Number \_\_\_\_\_



## **"ITM-3" Relative Turbidity Monitor**



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## Section 1 - General

### 1.1 - Description

The ITM-3 turbidity monitor has been specifically designed for placement in Dairy, Food and Beverage applications where turbidity monitoring is required. The ITM uses a single light/ receiver system that measures the intensity of reflected light from particles present in a liquid. The monitor takes this measurement and calculates the result in % of sensor capacity. The calculated value is then displayed on the monitor 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-3 is 3-A authorized with all wetted parts are constructed of 316L stainless steel, sapphire glass and EPDM elastomers. Three keys 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:	1.4305 (303 Stainless)
Fitting:	1.4404 (316L)
Lens:	Sapphire
O-ring:	3-A compliant elastomer
Window Material:	PMMA/Acrylic
Temperature Ranges	
Ambient:	-10-60 °C (14-140°F)
Process:	0-100 °C (32-212°F)
CIP/SIP-Cleaning:	up to 140°C (284°F) for up to 30 minutes
Operating Pressure:	10bar (150 psi) maximum
Measurement Principle:	Infrared backscatter. Meets EN7027 (wavelength = 860 nm +/- 20 nm)
Minimum Turbidity:	2000 NTU / 5% of 100% scale
Ranges:	0 to 10 / 20 / 50/ 100/ 200% (internally selectable) one remotely selectable
Repeatability:	within +/- 1% of full scale
Response Time:	adjustable 0, 1, 3, 6, 13 and 25 sec.
Display:	backlit LCD, 2 x 8 digit
Electrical Connection:	2 x M12 plug-in (SS 316), (1) 4 pin, (1) 5 pin
Supply Voltage:	24 VDC (18-36 VDC)@ 150 mA
Input Range Switching:	E1=24 VDC (18-36 VDC) DC decoupled Output
Analog:	4-20 mA active
Setpoint:	adjustable 0-100%
Hysteresis:	factory set at 5%, adjustable 0-100%
Measurement Principle:	Infrared backscatter. Meets EN7027 (wavelength = 860 nm +/- 20 nm)
Short Circuit Proof:	DC decoupled
Switching:	24 VDC 80 mA maximum respectively to GND of power supply
Weight:	approx. 1600g. (3.2lbs.)
Environmental Protection:	Designed and factory 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)

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### 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 monitor have to be qualified accordingly.
  2. This instruction manual has to be strictly observed. The user of the monitor 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 monitor 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 monitor.
  8. Do not touch any part of the monitor 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 monitor 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 monitor, 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!

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## 1.4 - Intended use

The ITM-3 turbidity monitor 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 monitor is the measurement of liquid turbidity in the food processing, beverage, pharmaceutical and chemical industries. This monitor 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 monitor 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

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### 2.1 - Conditions required for the monitor

The monitor has to be installed in the product line with power supplied for operation. When selecting the place for the installation of the monitor you should ensure that the housing can be opened for service work whenever needed and that the monitor 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)
- Monitor can be emptied if there is a risk of freezing
- Connection housing is not permanently exposed to dripping water

**2.2 - Mounting Position**

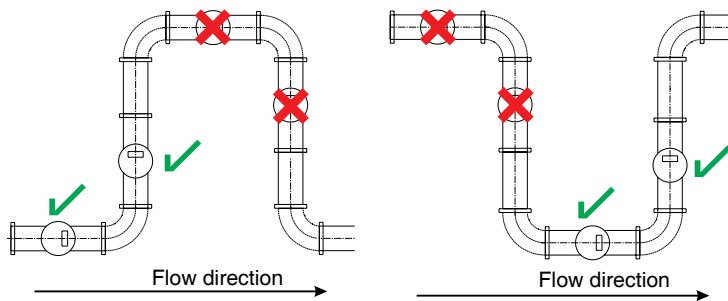
Ensure that the mounting position of the turbidity monitor guarantees that the measurement tube is always full with media. Air or air bubbles are measured like turbidity.

Correct installation:

- In or in front of ascending pipes

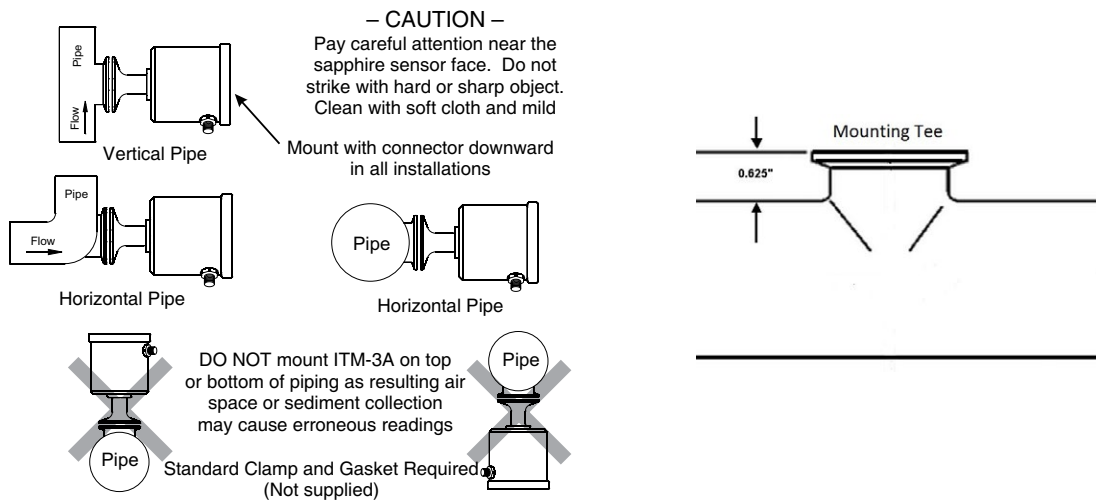
Wrong installation:

- 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.



**2.3 - Mounting in a pipe**

The ITM is designed to be installed in a short outlet tee in the orientations shown below. The distance from the clamping face to the wall of the main pipe should measure at 5/8" (.625")



## 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.

**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 - Electrical

#### 3.2.1 - Cabling and Connections


Anderson recommends the use molded five wire molded cord sets to provide the best protection in wet environments. Wire should be 18-24 AWG, 4 conductor cable to power the ITM-3 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.

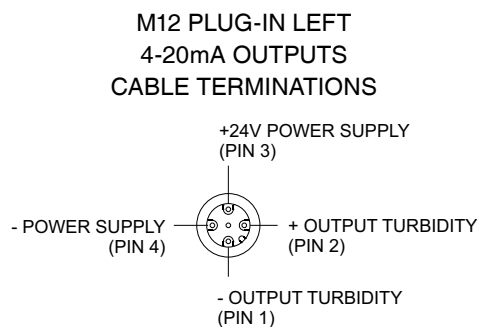
**WARNING:** To prevent signal interference, do not run signal cable closer than 12" to AC wiring.

#### 3.2.2 - 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

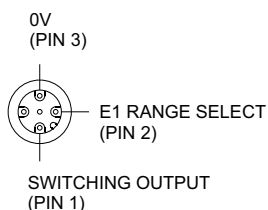
The ITM requires 24  (18-36 VDC) at 150A current for proper operation. The diagram below illustrates the pin assignments for the M12 connectors used on the ITM.



**NOTE:** For 3 wire connection - Power Supply(pin 4) should be tied to - Output(pin 1)



M12 PLUG-IN RIGHT  
SWITCHING OUTPUT  
RANGE CONTROL VOLTAGE  
CABLE TERMINATIONS



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 4 conductors. On this connector the switching output is available for use to control a low voltage light or input to a PLC (0.08 A 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 monitor).

There is also an input to select a second pre-programmed range choice. The turbidity monitor is delivered with measurement range 1 (0...100 % = 4...20 mA). Other ranges can be selected by applying 24V DC to the inputs identified below.

Range 2 (E1=24 V DC (18...36 V DC) can be chosen by means of inputting the rated signal +24 V DC (18...36 V DC) at the input on pin 2. Please take note of the table below. · If this input is not connected, measurement range 1 always will be active!

E1*	Measurement Range
0	1 (factory setting: 0-100 %)
1	2 (factory setting: 0-10 %)

\*0 = 0 V DC / 1 = 24 V DC

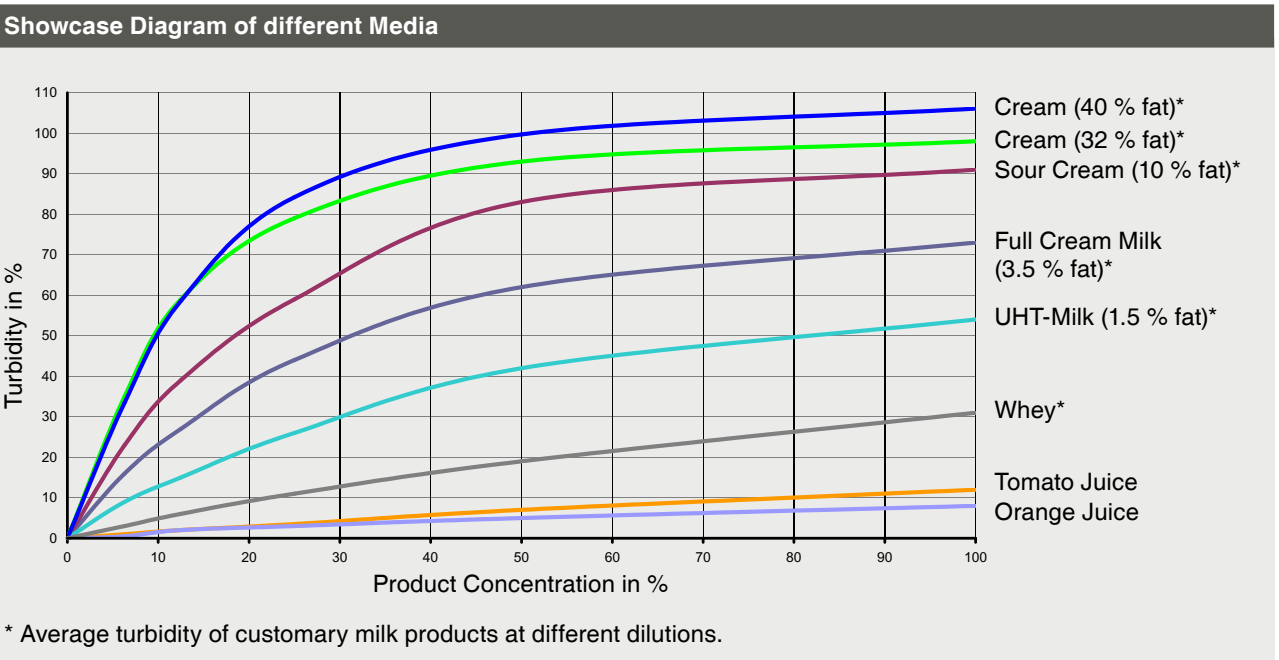
\*0 = 0 V DC / 1 = 24 V DC (18...36 V DC) The digital inputs E1 are DC decoupled to the power supply.  
Reference ground: pin39

## Section 4 - Commissioning

Following mounting and electrical connections the device can now be turned on for use. With an empty measurement pipe the signal will not be expected to read "0". This reading is not a concern as the optics have been designed for the measurement of liquids not gasses. Once filled with clear liquid such as distilled water the measured value should be .4 - .7% depending on the purity of the water used. The ITM-3 is factory calibrated and ready to use once installed. If a check of performance is desired it is recommended a check with distilled water be performed.

## Section 5 - Operation

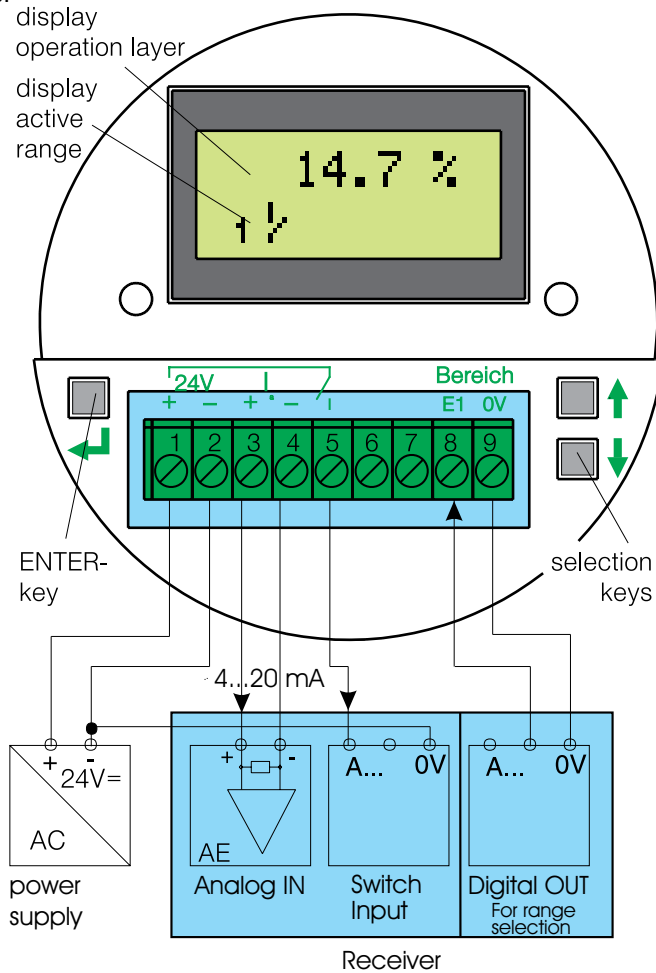
Once commissioned there is no further need to interact with the ITM other than reading the display to view the turbidity measurement as the measurement is continuous and automatic. The response of the ITM to various liquids is dependent on the particle content of the liquid. Below is a graph demonstrating the measurement of the ITM when used with food products and the impact of diluting with water has on the measurement.



## Section 6 - Parameterization

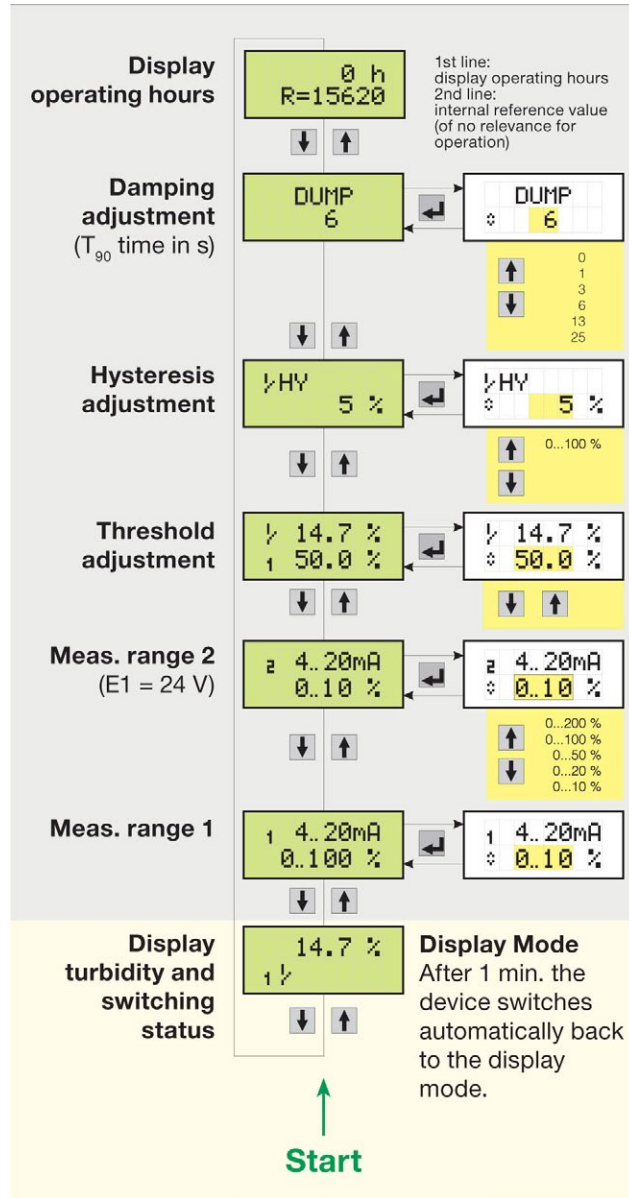
If the factory settings do not meet the requirements of a specific application it may be necessary to alter the monitors operation through parameter change. This is done using the display and the three keys on either side of the terminal strip pictured below. To access these it will be necessary to open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



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

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

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

Threshold- Set point for the switched output in %

X4-20mA-Range selection parameter for the 4-20mA output where X is between 1 and 2

## Section 7 - Troubleshooting

Symptom	Diagnosis	Action
Display does not light up	-Unit is miss wired -No power to monitor	-Correct wiring -Correct power issue
Display lights no analog output	Analog output has failed	Return to factory for service
Switched output does not operate	-Set point is incorrectly set -Output has been damaged by over current	-Adjust set point to correct value -Correct electrical problem and power cycle monitor
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 greater than 200%	Issue with measuring electronics	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/gas entrainment

**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.

## Section 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 clean ability 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.

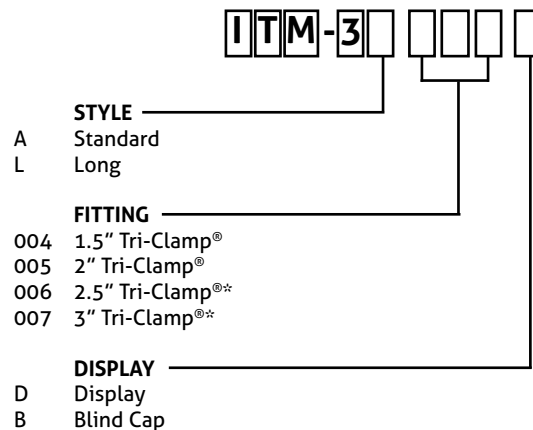
### 9.2 - Calibration

Although a full calibration of the ITM requires the device to be returned to the factory it is possible to check the ITMs performance against known liquids. When new, it is good practice to document the ITMs measurement of common products used with the device. This information can be used as a reference to check the ITM at future date. If a discrepancy is found, contact the factory for help to resolve.

## Section 10 - Spare Parts

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	
Window cap o-ring	36241N0017807900	Qty Required 1

## 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.

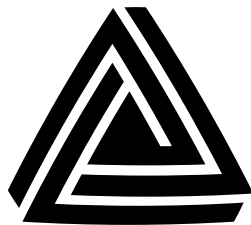
### Returns

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



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