

DANIEL™  
SERIES 1200  
TURBINE METER

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**3" and 4" SIZES**

**OPERATING AND MAINTENANCE INSTRUCTIONS**

**DANIEL MEASUREMENT AND CONTROL, INC.  
AN EMERSON PROCESS MANAGEMENT COMPANY  
HOUSTON, TEXAS**

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Revision F**

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## WARNING AND CAUTION STATEMENTS

### General Safety Information and Symbols

Pay special attention to the following signal words, safety alert symbols and statements:



indicates a hazardous situation which, if not avoided, will result in death or serious injury.



indicates a hazardous situation which, if not avoided, could result in death or serious injury.



indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.



is used to address practices associated with possible equipment damage and not related to personal injury.



is used to address miscellaneous practices not related to personal injury.

## IMPORTANT INSTRUCTIONS

Daniel Measurement and Control, Inc. (Daniel) designs, manufactures and tests products to function within specific conditions. Because these products are sophisticated technical instruments, it is important that the owner and operation personnel must strictly adhere both to the information printed on the product nameplate and to all instructions provided in this manual prior to installation, operation, and maintenance.



**Installing, operating or maintaining a Daniel Product improperly could lead to serious injury or death from explosion or exposure to dangerous substances. Comply with all information on the product, in this manual, and in any local and national codes that apply to the product. Do not allow untrained personnel to work with this product. Use Daniel parts and work procedures specified in this manual.**

Daniel also urges you to integrate this manual into your training and safety program.

**BE SURE ALL PERSONNEL READ AND FOLLOW THE INSTRUCTIONS  
IN THIS MANUAL AND ALL PRODUCT WARNINGS.**

Product Owners (Purchasers):

1. Select the correct product for the environment and pressures present. If you are unsure, discuss your needs with your Daniel representative.
2. Inform and educate all personnel in the proper installation, operation, and maintenance of this product.
3. To ensure proper performance, only informed and trained personnel should install, operate, repair and maintain this product.
4. Save this instruction manual for future reference.
5. If you resell or transfer this product, it is your responsibility to forward this instruction manual along with the product to the new owner or transferee.
6. A Return Material Authorization (RMA) number must be obtained prior to returning any equipment for any reason.
7. Download the RMA form on the Daniel Measurement and Control, Inc. Support Services web page by selecting the link below.

<http://www2.emersonprocess.com/EN-US/BRANDS/DANIEL/SUPPORT-SERVICES/Pages/Support-Services.aspx>

Product Operation Personnel (Personnel):

1. Read and understand all instructions and operating procedures for this product.
2. Install this product as specified in the Installation section of this manual per applicable local and national codes.
3. Follow all warnings, cautions, and notices marked on, and supplied with, this product.
4. Follow all instructions during the installation, operation, and maintenance of this product.
5. To prevent personal injury, ensure that all components are in place prior to and during operation of the product.
6. Connect all products to the proper electrical and pressure sources when and where applicable.
7. If you do not understand an instruction, or do not feel comfortable following the instructions, contact your Daniel representative for clarification or assistance.
8. If this instruction manual is not the correct manual for your Daniel product, telephone Daniel at 1-713-827-6314 and Daniel will provide you with the requested manual. You may also download the correct manual from <http://www.daniel.com>.
9. Use only replacement parts specified by Daniel. Unauthorized parts and procedures can affect this product's performance, safety, and invalidate the warranty. "Look-a-like" substitutions may result in deadly fire, explosion, release of toxic substances or improper operation.
10. Save this instruction manual for future reference.

## CAUTION

### DAMAGE TO ELECTRONIC COMPONENTS

**Proper handling procedures must be observed during the removal, installation or other handling of internal circuit boards or devices.**

Failure to properly handle the instrument can damage electronic components that are susceptible to static electricity.

#### Handling Procedure:

1. Power to the unit must be removed.
2. Personnel must be grounded, via a wrist strap or other safe, suitable means before any printed circuit card or other internal device is installed, removed or adjusted.
3. Printed circuit cards must be transported in a conductive bag or other conductive container. Boards must not be removed from protective enclosure until immediately before installation. Removed boards must immediately be placed in a protective container for transport, storage or return to the factory.

## CAUTION

### DAMAGE TO ELECTRONIC COMPONENTS

**This instrument is not unique in its content of ESD (electrostatic discharge) sensitive components. Most modern electronic designs contain components that utilize metal oxide technology (NMOS, CMOS, etc.).**

Failure to properly handle the instrument can damage or destroy electronic components that are susceptible to even small amounts of static electricity. The components will exhibit early failure even though they appear to function properly.

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**DANIEL MEASUREMENT AND CONTROL, INC.  
DANIEL™ SERIES 1200 TURBINE METER  
OPERATING AND MAINTENANCE INSTRUCTIONS**

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## **1.0 INTRODUCTION**

### **1.1 General**

This manual is designed to assist in the installation and operation of the Daniel™ 1200 Turbine Meter. To assure proper installation and startup it is important to read this manual in its entirety.

### **1.2 Description**

The Series 1200 Turbine Flowmeter is a volumetric flow metering and transmitting device used extensively in the petroleum industry for the accurate measurement of liquid hydrocarbons. The meter's simple configuration assures higher flow rates, extended flow range and sustained performance capability. This meter is specifically designed for pipeline and loading rack service where a vital characteristic is repeatability.



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**2.0 SPECIFICATIONS**

This meter is designed for use within the guidelines of API Standards, Chapter 5.3, formerly Standard 2534 (The Measurement of Liquid Hydrocarbons by Turbine Meter Systems) and the test procedures of API Standards, Chapter 4 (Prover Systems).

**PERSONAL INJURY AND/OR EQUIPMENT DAMAGE**

**Do not exceed specifications listed below.**

Failure to heed this warning could result in serious injury and/or damage to the equipment.

**Meter Performance**

Linearity:  $\pm 0.15\%$

Repeatability:  $\pm 0.02\%$

**Pickoff Type**

Single or dual, non-wetted, reluctance pickoffs

**Preamplifier Type**

Dual Channel preamplifier

**Preamplifier Performance****Inputs**

Supply voltage: 10-30 Vdc

Sensor Type: Reluctance

Type: Sine Wave

Amplitude: 40 mV peak to peak minimum

**Outputs**

## Powered Pulse Output

Type: Square Wave

Frequency Range: 0 to 5 kHz

Amplitude: 0 to 5 V

1000 Ohm internal pull-ups, 20 mA, max.

## Variable Voltage Output

Type: Square Wave

Frequency Range: 0 to 5 kHz

Amplitude: 0 to Supply Voltage

1000 Ohm internal pull-ups, 70 mA, max.

## Open Collector Output (Per Channel)

Type: Square Wave

Frequency Range: 0 to 5 kHz

Max. Voltage: 30 Vdc

Max. Current: 125 mA

Max. Power: 0.5 Watts

**Transmission Distance**

Pickoff only (without Preamp): Belden 88442 or equivalent up to 20 ft. (6.1 meters)

With Preamp: 3,000 ft. (914 meters)

**Materials of Construction**

Meter Body: CS Standard, SS Optional

Internal Components: Aluminum/SS

Bearings: Turcite, Stainless Steel or Tungsten Carbide

UMB Housing: Aluminum

**Ratings**

The maximum working pressure for the Series 1200 Turbine Meter is based on the temperature/pressure rating of the ANSI B16.5 flanges. The following chart lists the maximum working pressure of both 304 stainless steel and carbon steel flanges at 100° and 180° Fahrenheit (the maximum operating temperature for the standard meter). For maximum working pressures at intermediate temperatures, and for other materials, refer to ANSI B16.5.

<b>Pressure/Temperature</b>	<b>Carbon Steel</b>	<b>Stainless Steel</b>
150# ANSI / -20 to 100°F	285 psig WP	275 psig WP
150# ANSI / 180°F	265 psig WP	239 psig WP
300# ANSI / -20 to 100°F	740 psig WP	720 psig WP
300# ANSI / 180°F	688 psig WP	624 psig WP

**Ratings**

Pressure	ANSI pressure/temperature rating corresponding to flanges used.
Pressure Drop	3 psi (20.7 kPa) at maximum flow rate (based on gasoline, meter only)
Ambient Temperature	-40 to 140°F (-40 to 60°C) (T <sub>amb</sub> is an electrical specification) CS flange minimum temperature is -20°F (-29°C)
Process Temperature	-20° to 180° F (-29°to 82° C)

**Mechanical Connections**

Standard: 150 or 300 # ANSI R.F. flanges

**Approvals:**

Electrical: UL and ULC: Class I, Division 1, Groups C & D  
DEMKO 03 ATEX 130946X  
IECEX UL 11.0031X

Environmental: NEMA 4

Metrology: NTEP 90-118  
NMi TC7573

Standard Temperature:

**CE 0539**  **II 2G**  
**DEMKO 03 ATEX 130946X**  
**Ex d IIB T6 Gb**

Brazil Certification Nameplate  
 (Standard Temperature Range):

<b>DANIEL</b>	
<i>MEDIDOR DE LIQUIDO TIPO TURBINA</i>	
<small>MONTADO NO MEXICO COM COMPONENTES NACIONAIS E ESTRANGEIROS</small>	
MODELO	<input type="text"/>
SERIE	<input type="text"/>
RANGE VAZAO	<input type="text"/>
FATOR K	<input type="text"/>
PULSOS POR	<input type="text"/>
TAG	<input type="text"/>
 <b>ATENCAO</b>	
NAO EXCEDER <input type="text"/>	PRESSAO DE OPERACAO AT 100°F (38°C)
<small>PRESSAO ACIMA DO ESPECIFICADO PODE CAUSAR RUPTURA TO MEDIDOR E SERIOS DANOS FISICOS. NAO INSTALAR OU LIGAR SEM ANTES CONSULTAR O MANUAL DE OPERACAO</small>	
<b>A REMOCAO DESTA PLAQUETA ANULA A GARANTIA</b>	
<b>Seguranca</b>	
Todas as entradas roscadas do UMB sao 3/4 NPT	 NCC 5611/09 Ex d IIB T6 Gb
PARAMETROS ELECTRICOS: 10 to 30 VDC TEMP. DE PROCESSO : -29°C to 200°C, TEMP. AMBIENTE : -40°C to 60° DANIEL MEASUREMENT AND CONTROL, INC., HOUSTON, TX 77041 USA	

### 3.0 INSTALLATION

#### 3.1 General

This section contains specific instructions for receipt and installation of the meter.

#### 3.2 Flow Considerations

A properly designed flow system will do two basic things towards maintaining the linearity of the turbine meter. It will properly condition the incoming flow such that it is homogeneous throughout its cross section and it will provide proper back pressure so that cavitation will not originate inside the meter.

Linearity can be defined as the total range of deviation of accuracy, expressed as a curve, between minimum and maximum flow rates. The ideal accuracy curve of a volumetric meter, such as the turbine, is a straight line denoting a constant meter factor.

Cavitation is the formation and collapse of vapor-filled cavities that result from a sudden decrease and increase in pressure.

## CAUTION

### MECHANICAL EQUIPMENT DAMAGE

**Provide unobstructed upstream piping.**

Turbine meter performance depends on the incoming fluid being devoid of swirls and excessive turbulence. These conditions can be avoided by providing unobstructed piping upstream of the meter. Pipe fittings such as elbows and tees, and piping components such as valves and strainers should be located far enough upstream to allow dissipation of any flow disturbance before it reaches the meter. Use of flow straighteners greatly influence meter performance.

### **Specific Gravity**

Turbine meter performance is affected by specific gravity and may influence performance. The effect of specific gravity on the turbine meter may be evidenced when specific gravity drops below 0.70. As specific gravity decreases, the lift forces on the turbine blade decreases. Likewise as velocity decreases, lift forces decrease. These reduced lift forces are overtaken by bearing friction as low rates are approached. Subsequently, linearity deteriorates at low flow rates while measuring low density fluids.

To compensate for separate meter factors at low flow rates electronic monitoring equipment is used. This has been proven to enhance the overall measuring accuracy at the load rack. As low flow startup and shutoff flow rate is encountered, an established meter factor for that rate is applied. During the time that the high flow rate is used to load the bulk of the measured volume, a meter factor established for high flow rate is applied.

### **Viscosity**

Turbine meters are viscosity sensitive in that as the metered fluid increases in viscosity, meter linearity begins to suffer. This effect on linearity is primarily due to a change in the fluid's velocity profile and skin friction between the fluid and the rotor blades.

### **Seasonal Changes**

For optimal performance in loading rack applications, where fuel oils are metered and where there is a large temperature swing from summer to winter, it is recommended that a new meter factor be established as seasons change. This is recommended since temperature affects the viscosity of fuel oil and viscosity affects turbine meter performance.

Generally speaking, viscosities of 3 centipoise or less give no cause for concern. Above this viscosity, all influential factors should be considered. By properly anticipating the flow system's viscosity, maximum flow rate, flow range and desired linearity, the user can properly apply the turbine meter to the required application.

### 3.3 Installation and Equipment

Figure 3-1, Typical Installation has been provided as a guide in establishing optimum performance of the meter. Prior to installation consider the general information listed below.

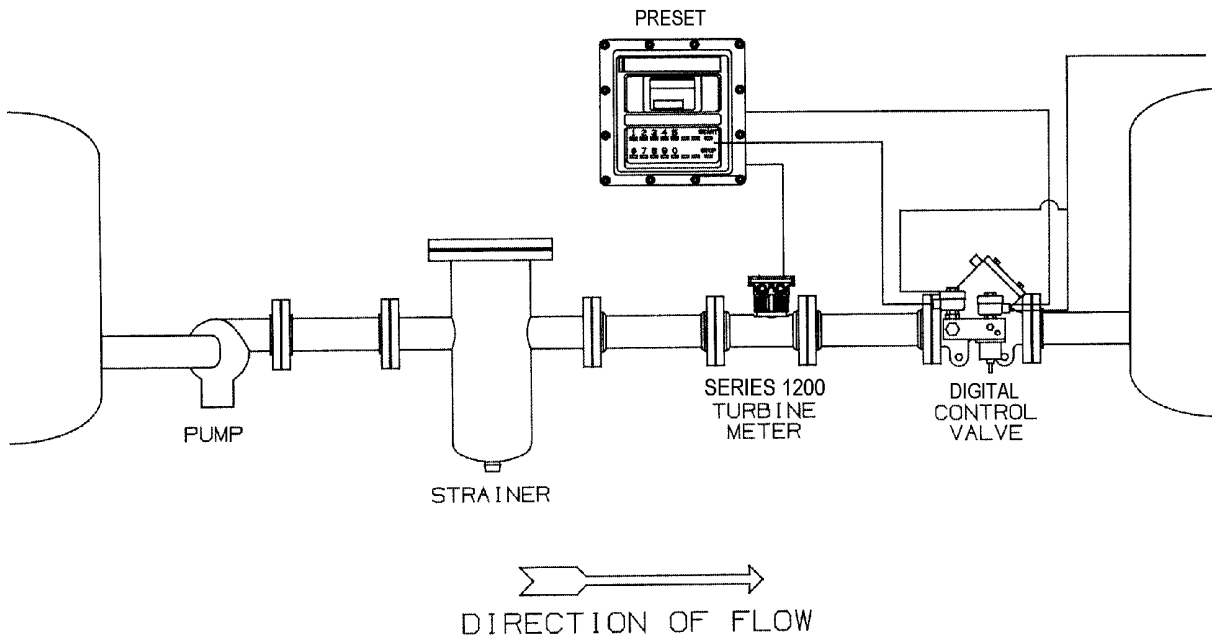


Figure 3-1. Typical Installation

1. Note the direction of flow indicated on the plate near the inlet flange and install accordingly.
2. New Installations - Lines should be flushed thoroughly to rid piping of potentially damaging foreign material such as welding bead, pipe scale, etc. before the meter is placed into service.

## NOTICE

A spool piece installed in place of the meter is recommended for this procedure.

When installing this equipment, bolting must conform to the requirements of ASME B16.5 paragraph 5.3 and to the material requirements of ASME B16.5 Table 1B. Gaskets must conform to the requirements of ASME B16.20.

It is the customer's responsibility to ensure that piping or other attachments connected to the Product do not place adverse stresses on the Product.

The design of the Product has not been assessed for the effects of traffic, wind or earthquake loading.

It is the customer's responsibility to provide fire prevention measures and equipment per local regulations.

**WARNING****PERSONAL INJURY AND/OR EQUIPMENT DAMAGE**

**Install and use the Daniel Series 1200 Turbine Meter only per noted instructions and specifications.**

Use of this equipment for any purpose other than its intended purpose may result in property damage and/or serious personal injury or death.

The Product has been designed with a minimum of 1.5mm (.059 inches) corrosion allowance. The customer should implement a periodic inspection and maintenance program to ensure that no part of the Product's pressure-retaining components has corrosion or erosion exceeding this amount. (The design engineer may choose to select a different corrosion allowance, but it should be identified and published.)

3. Products to be measured.

**CAUTION****MECHANICAL EQUIPMENT DAMAGE**

**Always use a flushing medium that is compatible with the metallurgy of the meter and its internal components and similar to the product for which the meter is intended.**

Using water as a flushing medium may result in damage to the internal components of the turbine meter.

4. Always install the meter downstream of pumps.

## **Valves**

The metering system should have a flow rate control valve located at a convenient distance downstream of all measurement equipment. The function of the control valve is to limit and maintain system pressure on the meter. This avoids cavitation.

When a loading rack meter is being calibrated with a displacer type prover (using a piston or sphere) a back pressure valve should also be used downstream of the proving device. This valve can be a simple manual valve that is partially closed. A minimum pressure of 12 to 15 PSI (83 to 103 kPa) should be maintained downstream of the prover.

1. Valves should be capable of rapid, smooth opening and closing with positive shut-off.
2. When used for intermittent flow, valves should be fast acting and shock-free.
3. Bypass lines should be equipped with blind or positive shut-off devices.
4. Shut-off or control valves should be located downstream of the meter.

## **Flow Straightening**

The Series 1200 three inch and four inch Turbine Meters are supplied with a flow conditioning plate standard. However, an upstream and downstream spool of at least five pipe diameters is recommended for best performance.

## **Strainers**

A strainer of proper size should be installed upstream of the meter to protect it from the introduction of foreign material which might damage the meter. Recommended mesh size: 40 mesh.

### **Strainer Monitoring:**

1. Recommended procedures dictate that regular, scheduled cleaning of the strainer basket should be conducted to prevent filling and rupturing of the screen.
2. Pressure gauges installed on both sides of the strainer will indicate differential pressure across the strainer. High-pressure differential caused by filling of the basket with foreign material can cause strainer basket rupture resulting in possible meter damage.

### **3.4 Pickoff Coils and Electrical Connections**

#### **A. Pickoff Coils**

The Series 1200 Turbine has the capacity for single or dual pickoff coils mounted 90° electrically out of phase. Each pickoff produces a low level sine wave signal, which varies in amplitude (V) and frequency (Hz) proportional to the velocity of the turbine blades. This signal information is coupled to the input terminals of the preamplifier.

#### **B. Electrical Connections**

Pickoff input signal connections are made at terminal strip connection TB2 for Channel A and TB3 for Channel B. Power supply and output signal connections are made at terminal strip TB1. Reference Figure 3-2.

#### **C. Induced Interference**

The Turbine meter should be located as far as possible from any electrical equipment such as motors, solenoids or relays which could induce an interference signal into the turbine meter pickoff coil. High amplitude interference introduced into the preamplifier can result in interference with the flow signal.

Interference Check - Upon installation of the turbine meter and preamplifier, the presence of an interference signal can be detected by performing the following check.

1. Connect a suitable readout device to the preamp output terminal strip TB1 (number 3 for channel A or number 5 for channel B).
2. Apply +12 Vdc power to the preamp at terminal strip TB1 (number 1).
3. If an output is indicated on the readout at a no-flow condition, induced interference is present.
4. Duplicate the checking process if dual pickoffs are being used. Use output terminal strip TB1 number 3 or 5 as selected for pickoff output.

Interference may be reduced or eliminated by changing the location of the meter or by rotating the meter in the pipeline in progressive steps while simultaneously checking the output for the lowest possible signal reading.

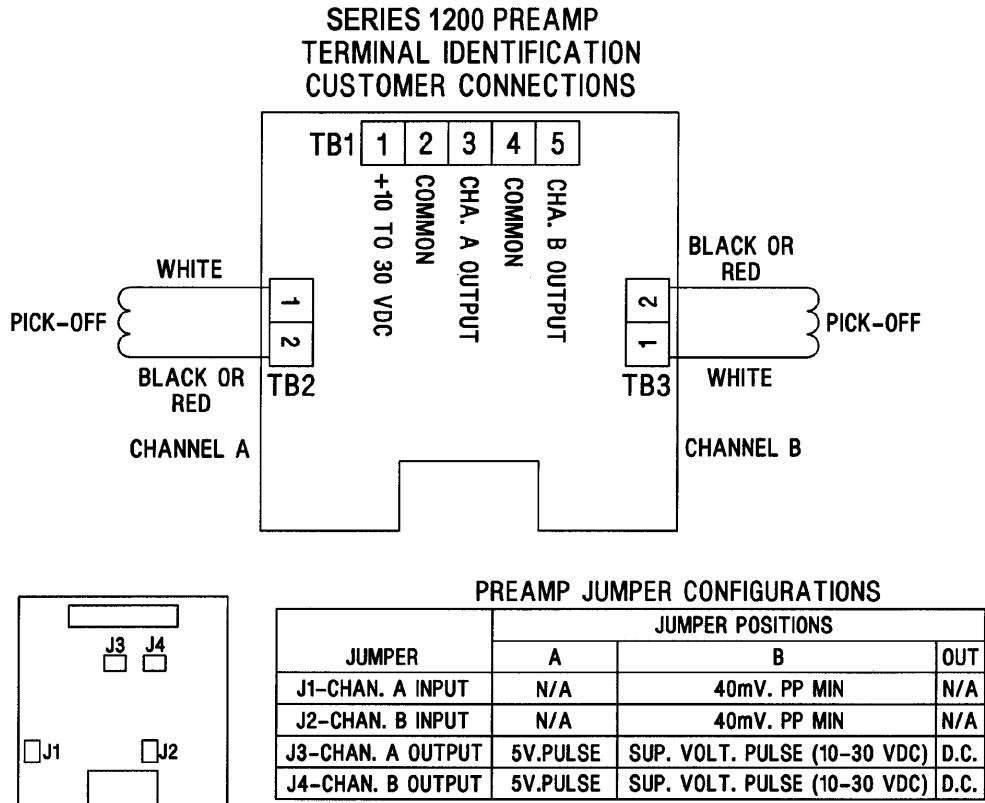


Figure 3-2. UMB Wiring

**D. Accessory Hookup**

General considerations: It is important that the appropriate service manual be referenced before attempting to use accessories or instrumentation with the Series 1200 Turbine. If service manuals for instrumentation were not received at the time of purchase or delivery, please contact the factory or nearest Daniel Measurement and Control Sales and Service Office.

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## **4.0 OPERATION**

### **4.1 General**

This section contains the operating procedures for the Series 1200 Turbine Meter. Reference Section 3.4 for general flow considerations that may effect meter performance. The Series 1200 Turbine Meter is a volumetric flow measuring and transmitting device that produces an output signal proportional to the rate-of-flow of the liquid being measured. The primary output is a single or dual high resolution signal that is amplified and shaped by an integral amplifier mounted within an explosion proof housing. This square-wave pulse can be fed directly to remote totalizing counters, digital readout devices or control instrumentation, or an integrally mounted electronic register.

### **4.2 Pre-start Checks**

Inspect all electrical connections to assure compliance to electrical codes and safety regulations.

All bolts used to secure the meter in line should be inspected to assure that proper mounting procedures have been followed and that flange connections are leak free.

Evaluate the system setup to assure that all components are in the proper sequence for accurate product measurement: isolation valve, strainer, flow straightener, meter, downstream section, control valve, etc.

### 4.3 Operation

Flow and pressure information is stamped on the nameplate located on the outside of the meter.



#### **PERSONAL INJURY AND/OR EQUIPMENT DAMAGE**

**Never subject the meter to flow or pressure ranges above those specified in Section 2 Specifications, or those stamped on the meter.**

Exceeding the meter specifications could result in serious injury and/or damage to the equipment.

1. Back pressure at the outlet of the meter must be sufficient for proper operation. Consider the following equation when determining back pressure for the meter.

2.  $P_b = 2 \Delta p + 1.25 p_e$

Where

$P_b$  = minimum back pressure, pounds per square inch gauge (psig)

$\Delta p$  = pressure drop through the meter at the maximum operating flow rate for the liquid being measured, pounds per square inch (psi)

$p_e$  = equilibrium vapor pressure of the liquid at the operating temperature, pounds per square inch absolute (psia), gauge pressure plus atmospheric pressure

3. Care should be taken to protect the Series 1200 housing and components from external impact of any kind. Note temperature limitations in Section 2 when selecting meter location.

## **5.0 MAINTENANCE**

Reference Figure 7-1 and 7-2 Exploded Parts Drawings.

### **NOTICE**

Item numbers reference actual engineering drawings and are not meant to be consecutively numbered.

### **5.1 General**

The Series 1200 Turbine is designed to operate for extended periods of time without evidence of wear or loss of precision. All meter adjustments were completed at the factory during liquid calibration and should not require field setup. However, should inspection of internal components be required or should field requirements change, information contained in this document must be read and understood before attempting any maintenance procedure.

If the Series 1200 Turbine is found to be in need of repair, it is recommended the user contact the nearest Daniel Measurement and Control Sales or Service Office. It is important that servicing be performed by trained and qualified service personnel.

### **5.2 Maintenance Considerations**

1. Label all parts or place parts in labeled containers during disassembly.
2. Use no metal clamping devices in direct contact with any meter part or surface.
3. Rotor blades determine proper flow measurement and should be handled with extreme care. Bending or altering the blades in any way can effect meter accuracy.

### 5.3 Disassembly Procedure - Internal Components

Before removing the meter from the system the following precautions must be taken:

Disconnect all power to the meter.

**⚠ WARNING**

**PERSONAL INJURY AND/OR EQUIPMENT DAMAGE**

**Disconnect power to the meter.**

Failure to disconnect power to the meter could result in serious personal injury and/or damage to the equipment.

Relieve all line pressure.

**⚠ WARNING**

**PERSONAL INJURY AND/OR EQUIPMENT DAMAGE**

**Relieve all pressure at this time.**

Failure to relieve line pressure at this time could result in serious personal injury and/or damage to the equipment.



The internals of the Series 1200 Turbine Meter are retained by means of patented self-centering support fins, which are engaged by the compression of the flow conditioning plate against the support fins.



Remove the nut, washer, and flow conditioning plate from the center bolt.



Lightly tap the center bolt on the end with a soft-faced hammer (mallet) to loosen the compression on the support fins. Push the shaft in to approximately flush with the support fins, lift the fins slightly to remove them from their engagement into the groove inside the flow tube.



Gently remove the internals from the flowtube.

**CAUTION**

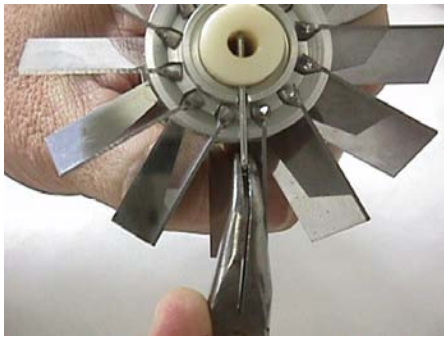
**METER PERFORMANCE CAN BE AFFECTED**

**Handle the rotor with care.**

Improper handling of the rotor assembly may cause distortion to the rotor blades.

**NOTICE**

Section 5.3.1 is specific to meters with Turcite bearings.  
Section 5.3.2 is specific to meters with Stainless Steel bearings.  
Section 5.3.3 is specific to meters with Tungsten Carbide bearings.

**5.3.1 Turcite Bearing Internals Disassembly**

Refer to Figure 7-2 and Table 7-2 for parts identification. After removing the internals from the flowtube, lay the support fins aside and remove the cotter pin from the end of the bearing supporting the rotor.



Gently slide the rotor from the bearing shaft. Note: There is an etched "U" on the upstream side of the rotor.

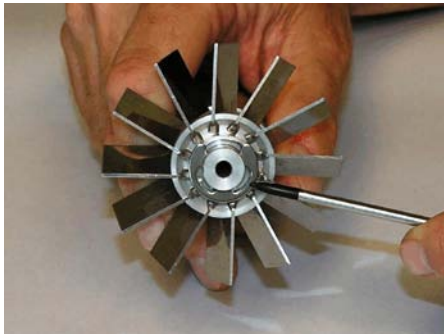


Remove the internal retaining ring holding the bearing in the diffuser.

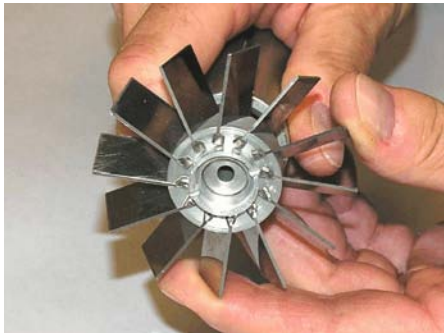


Remove the bearing assembly from the diffuser. Disassembly is complete.

### 5.3.2 Stainless Steel Bearing Internals Disassembly



Refer to Figure 7-3 and Table 7-3 for parts identification. After removing the internals from the flowtube, lay the support fins aside and remove the retaining ring from the end of the bearing supporting the rotor.



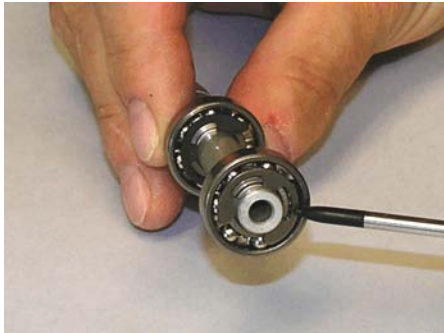
Gently slide the rotor from the bearing shaft. Note: There is an etched "U" on the upstream side of the rotor.



Remove the internal retaining ring holding the bearing assembly in the diffuser.

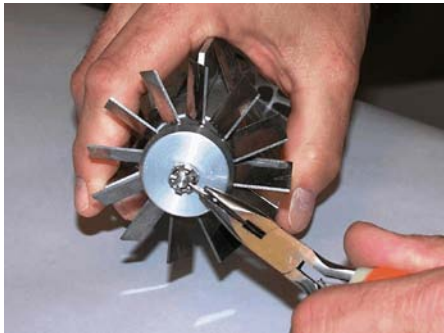


Remove the bearing assembly from the diffuser. Disassembly is complete.



If necessary, the bearing assembly retaining rings can be removed to inspect and/or replace the individual ball bearing units.

### 5.3.3 Tungsten Carbide Bearing Internals Disassembly



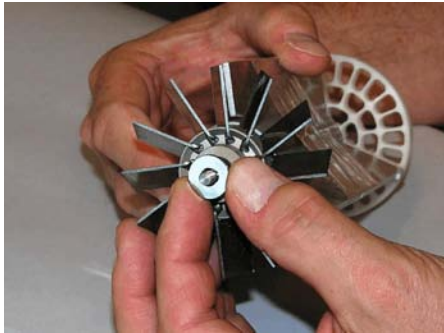
Refer to Figure 7-4 and Table 7-4. After removing the internals from the flowtube, lay the support fins aside and remove the cotter pin from the castle nut.



Remove castle nut from shaft.



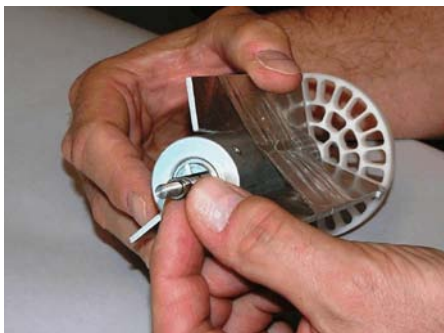
Remove outlet diffuser cap and Belleville washers.



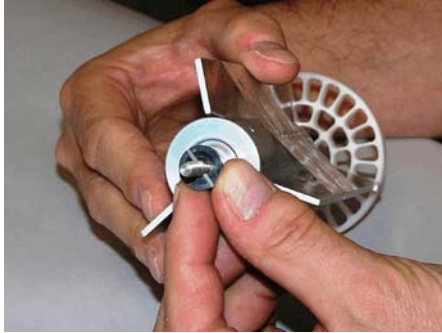
Remove downstream thrust washer from shaft. Note that the slot faces the rotor.



Gently slide the rotor from the bearing shaft. Note the orientation of rotor.



Remove shaft sleeve from the bearing shaft.



Remove upstream thrust washer. Note that the slot faces the rotor. Disassembly is complete.

#### **5.4 Reassembly of Internal Components**

In all cases reassembly is the reverse of disassembly. Caution must be taken at all times to protect the rotor blades from rough handling as blade position is critical to meter performance.

### **NOTICE**

Torque the retaining nuts to 25 in. lbs.

#### **5.5 Field Retrofittable Dual Pickoff**

(Reference Figure 7-1)

In the event that a second pickoff is required for equipment originally supplied with a single pickoff, or should field service or replacement of existing pickoffs be necessary, the following procedure is recommended.

**Sizes 3" and 4"**

1. Disconnect all power to the meter.

**PERSONAL INJURY AND/OR EQUIPMENT DAMAGE****Disconnect power to the meter.**

Failure to disconnect power to the meter could result in serious personal injury and/or damage to the equipment.

2. Remove retaining screws (item 16) and cover (item 22) of the UMB housing assembly.
3. Disconnect terminal connects at TB1, TB2, and TB3.
4. Loosen retaining screws of preamplifier board (item 19) and lift out.
5. Care should be taken not to jar or disrupt terminal board components.
6. Remove retaining plate (item 26) and screw, (item 16).
7. Insert second pickoff (item 24) into the pickoff cavity of the UMB and secure with retaining plate (item 26) and screw, (item 16).
8. Mount the preamplifier board in its original position and secure using spring loaded retaining screws.
9. Attach electrical output wiring from both pickoffs to terminal connection TB2 and TB3.
10. Attach electrical output wiring from electrical accessories (conduit wiring) to terminal connection TB1, number 3 for channel A, and number 5 for channel B.
11. Secure all electrical wiring.
12. Return UMB cover and secure using original retaining screws.

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**6.0 TROUBLESHOOTING**

**6.1 General**

This information has been provided as an aid in basic troubleshooting. Disassembly procedures have been outlined in Section 5.3 of this manual. If the Series 1200 Turbine is found to be in need of repair, it is recommended the user contact the nearest Daniel Measurement and Control Sales or Service Office. It is important that servicing be performed by trained and qualified service personnel.

Table 6-1. Troubleshooting

<b>Condition</b>	<b>Probable Cause</b>	<b>Correction</b>
No output pulses from amplifier module	Input voltage to amplifier below minimum required for operation	Apply correct voltage (10 - 30 VDC)
	Damaged or shorted pickoff (Resistance across leads should be 600-900 Ohm)	Replace pickoff
	Damaged amplifier module	Replace amplifier module
	Receiver unit not operating	Refer to instruction manual on defective unit
	Meter rotor not turning	Troubleshoot internal assembly
Turbine meter rotor not turning	Defective rotor bearing	Return rotor assembly to factory for replacement or repair
	Rotor damaged by foreign material passing through meter	Return rotor assembly to factory for replacement or repair
Inaccurate readout	Foreign material on rotor blades	Check and clean blades
	Rotor blades are bent	Return to factory for replacement or repair
	Defective accessory equipment	Troubleshoot equipment

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**7.0 PARTS LIST**

This section contains the necessary parts required to make up any standard unit covered in this manual. Recommended spare or replacement parts have been denoted by an asterisk.

**NOTICE**

Item numbers reference actual engineering drawings and are not meant to be consecutively numbered.

When ordering, the following information must be supplied.

- Serial number
- Part number
- Part description
- Quantity required.

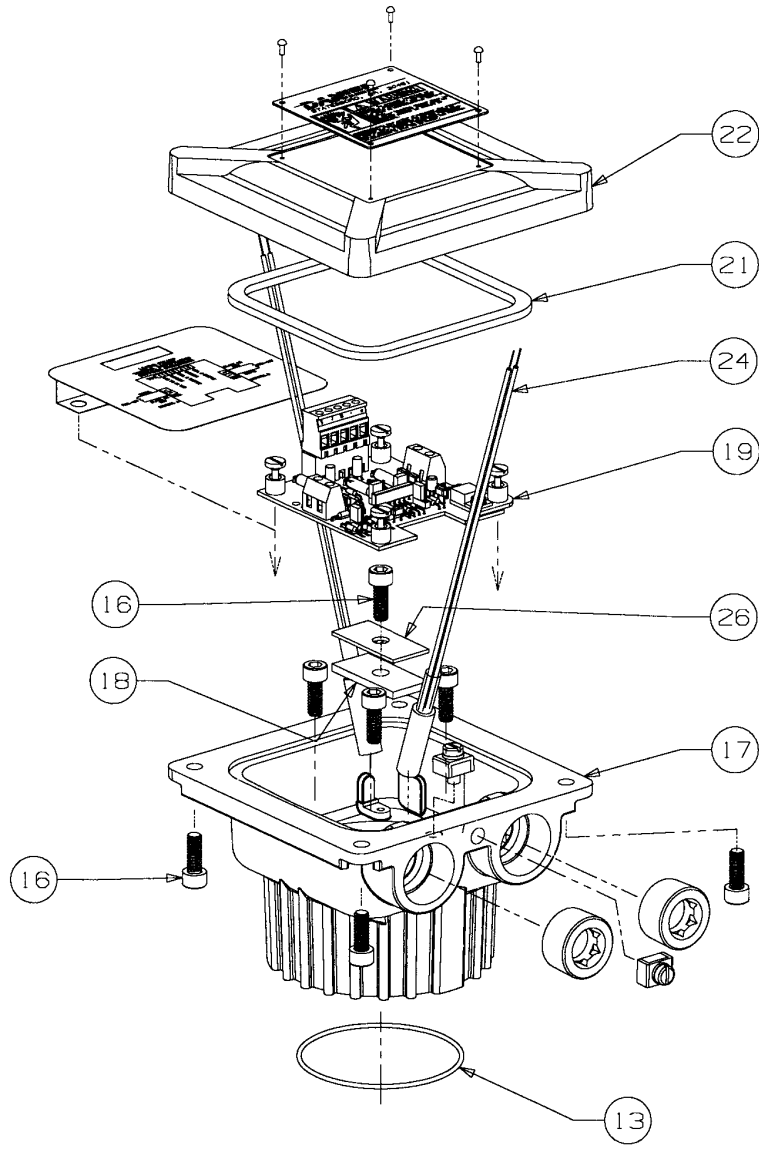


Figure 7-1. UMB Assembly (All Sizes) (Reference Table 7-1)

Table 7-1. UMB Assembly (All Sizes) (Reference Figure 7-1)

<b>Item Number</b>	<b>Description</b>	<b>Part Number</b>	<b>Quantity Required</b>
13*	O-ring (Viton®-A)	1500093-022	1
16**	Screw (Hex Socket Head)	151496	9
17	UMB Housing	899-00-100-00	1
18	Insulator	799-00-424-01	1
19*	Dual Channel Preamp	230-00-300-00	1
21*	Gasket	CA-375Z-259-XXA	1
22	UMB Cover	899-00-101-00	1
24*	Pickoff	899-00-201-00	1 or 2
26	Clamp	799-00-424-00	1

\* Recommended Spare Parts

\*\* All item 16 - Torque 55 in. lbs., min.

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**ATEX REPAIR NOTE:**

**Special Conditions for Safe Use:** The joint between the Universal Mounting Box cover and housing is a flat joint and has a flame path of 9.52mm in length and clearance of less than .0381mm. The joint between the Universal Mounting Box housing and Sensor housing is a spigot joint which has a radial length of 3.18mm, a axial length of 13.61mm and a clearance of .059mm.

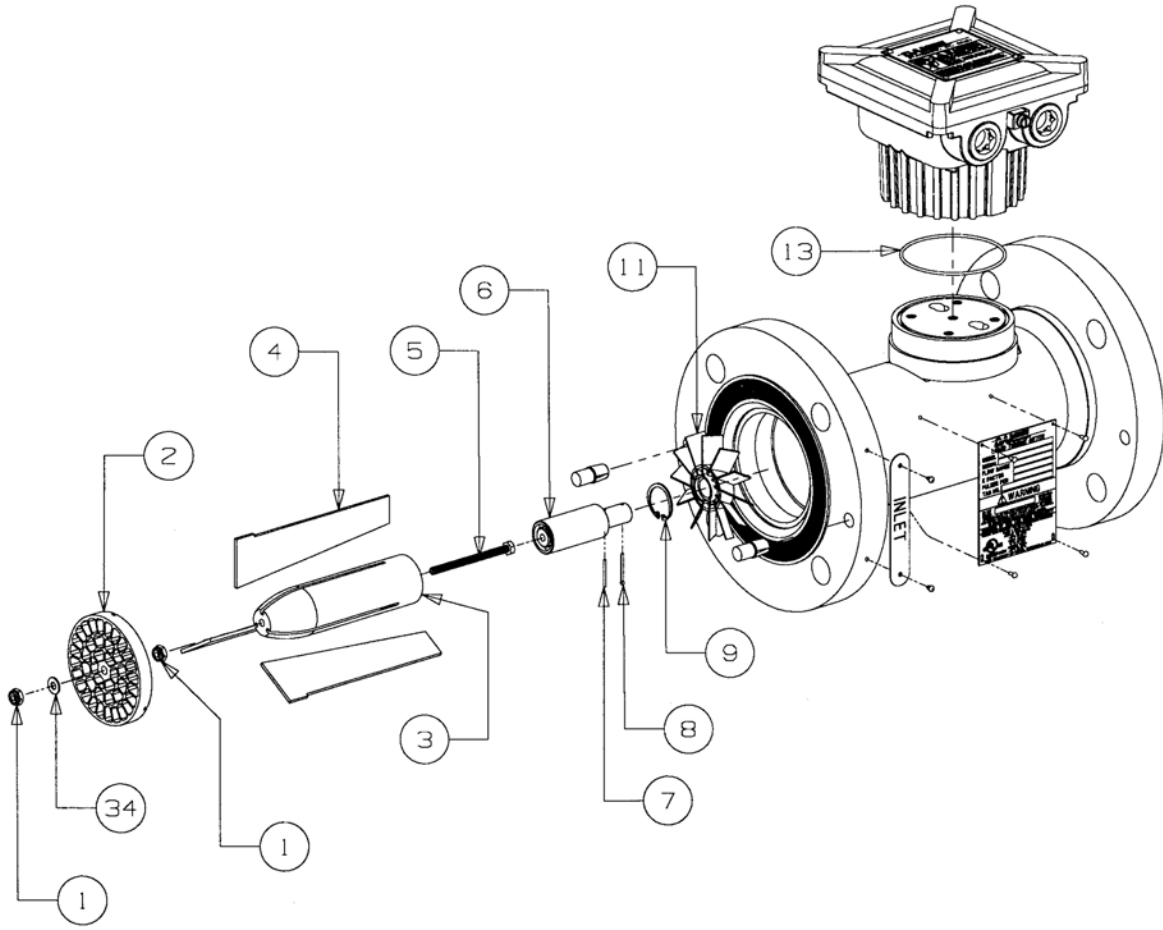


Figure 7-2. Meter Assembly (3" and 4") - Turcite Bearing Internals (Reference Table 7-2)

Table 7-2. Part Numbers (3" and 4") - Turcite Bearing Internals (Reference Figure 7-2)

<b>Item Number</b>	<b>Description</b>	<b>3" Part Number</b>	<b>4" Part Number</b>	<b>Quantity Required</b>
1	Nut	151687	151685	2
2	Flow Conditioning Plate - Thermoplastic	798-20-301-01	798-22-301-01	1
2	Flow Conditioning Plate - Aluminum	798-20-301-02	798-22-301-02	1
3	Diffuser	798-20-008-00	798-22-008-00	1
4	Support Fin	798-20-070-00	798-22-070-00	3
5	Screw (Hex Head)	1500615	150739-419	1
6*	Bearing	798-00-001-00	798-00-002-00	1
7	Roll Pin	153569	153505-419	1
8*	Cotter Pin	153907-419	153910-419	1
9*	Retaining Ring	1500616	1500617	1
11*	Rotor Assembly	798-20-319-00	798-22-319-00	1
13*	O-Ring (Viton®-A)	1500093-022	1500093-022	1
34	Washer	151891	151857-419	1

\* Recommended Spare Parts

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Table 7-3. Part Numbers (3" and 4") - Stainless Steel Bearing Internals  
(Reference Table 7-3)

Item Number	Description	3" Part Number	4" Part Number	Quantity Required
1	Nut	151687	151685	2
2	Flow Conditioning Plate - Thermoplastic	798-20-301-01	798-22-301-01	1
2	Flow Conditioning Plate - Aluminum	798-20-301-02	788-22-301-02	1
3	Diffuser	798-20-008-00	798-22-008-00	1
4	Support Fin	798-20-070-00	798-22-070-00	3
5	Screw (Hex Head)	1500615	150739-419	1
6	Shaft	798-20-010-00	798-22-010-00	1
7	Roll Pin	153569	153505-419	1
8	Retaining Ring (External)	156514	1500732	1
9	Retaining Ring	1500616	1500617	1
11	Rotor Assembly	798-20-319-00	798-22-319-00	1
13	O-Ring	1500093-022	1500093-022	1
34	Washer	151891	151857-419	1
61	Ball Bearing	155194	159641	2
62	Retaining Ring (External, Bowed)	1500733	1500735	2
63	Retaining Ring (External)	1500732	1500734	1



Table 7-4. Part Numbers (3" and 4") - Tungsten Carbide Bearing Internals  
(Reference Figure 7-4)

Item Number	Description	3" Part Number	4" Part Number	Quantity Required
1	Nut	151687	151685	1
2	Flow Conditioning Plate - Thermoplastic	798-20-301-01	798-22-301-01	1
2	Flow Conditioning Plate - Aluminum	798-20-301-02	788-22-301-02	1
3	Diffuser	798-20-390-00	798-22-390-00	1
4	Support Fin	798-20-070-00	798-22-070-00	3
13	O-Ring	1500093-022	1500093-022	1
34	Washer	151891	151857-419	1
70	Thrust Washer	894-22-062-00	894-22-062-00	2
71	Shaft Sleeve	894-22-073-00	894-22-073-00	1
72	Rotor Assembly	798-20-319-01	798-22-319-01	1
73	Outlet Diffuser Cap	798-20-013-00	798-22-013-00	1
74	Belleville Washer	1500422	1500422	2
75	Nut	151650	151650	1
76	Cotter Pin	153930	153930	1

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# Daniel Measurement and Control, Inc.

## Returned Material Authorization

### Repair Form for Used Equipment Including Decontamination/Cleaning Statement

A Return Material Authorization (RMA) number must be obtained prior to returning any equipment for any reason. Download the RMA form on the Daniel Measurement and Control, Inc. Support Services web page by selecting the link below.

<http://www2.emersonprocess.com/EN-US/BRANDS/DANIEL/SUPPORT-SERVICES/Pages/Support-Services.aspx>

1. Return Material Authorization (RMA) Number \_\_\_\_\_

2. Equipment to be returned:  
 Model Number \_\_\_\_\_ Serial Number \_\_\_\_\_

3. Reason for return: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

<b>Decontamination/Cleaning Fluids Process</b>			
A. List each substance in which the equipment was exposed. Attach additional documents if necessary.			
Common Name	CAS# if available	Used for Hazardous Waste (20 CFR 261)	EPA Waste Code if used for hazardous waste
		[ ] Yes [ ] No	
		[ ] Yes [ ] No	
		[ ] Yes [ ] No	
		[ ] Yes [ ] No	
		[ ] Yes [ ] No	
B. Circle any hazards and/or process fluid types that apply:			
<b>Infectious</b> Cyanides Carcinogen	<b>Radioactive</b> Sulfides Peroxide	<b>Explosive</b> Corrosive Reactive-Air	<b>Pyrophoric</b> Oxidizer Reactive-Water
			<b>Poison Gas</b> Flammable Reactive-Other (list)      Poison
<b>Other hazard category (list):</b>			
C. Describe decontamination/cleaning process. Include MSDS description for substances used in decontamination and cleaning processes. Attach additional documents if necessary.			

## Shipping Requirements

**Failure to comply with this procedure will result in the shipment being refused.**

1. Write the RMA number on the shipping package.
2. Inside the package include one copy of this document and all required Material Safety Data Sheets (MSDS)
3. Outside of the package attach one copy of this document and all required Material Safety Data Sheets (MSDS).

**THIS EQUIPMENT, BEING RETURNED "FOR REPAIR," HAS BEEN COMPLETELY DECONTAMINATED AND CLEANED. ALL FOREIGN SUBSTANCES HAVE BEEN DOCUMENTED ABOVE AND MSDS SHEETS ARE ATTACHED.**

By: \_\_\_\_\_  
(Signature)

\_\_\_\_\_  
(Print name)

Title: \_\_\_\_\_

Date: \_\_\_\_\_

Company: \_\_\_\_\_

Phone: \_\_\_\_\_

Fax: \_\_\_\_\_



The sales and service offices of Daniel Measurement and Control are located throughout the United States and in major countries overseas.  
Please contact Daniel Measurement Services at  
11100 Brittmoore Park Drive, Houston, Texas 77041, or phone (713) 827-6314  
for the location of the sales or service office nearest you.  
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