

# Daniel™ Ultrasonic Flow Meters

Installation and Operating Instructions Specific to the Pressure Equipment Directive



3400 Mark III Gas Ultrasonic Meter



3800 Mark III Liquid Ultrasonic Meter



3410 Series Gas Ultrasonic Meter



3810 Series Liquid Ultrasonic Meter



# Daniel customer service

Location	Telephone number	Fax number
North America/Latin America	+1.713.467.6000	+1.713.827.4805
Daniel Customer Service	+1.713.827.6314	+1.713.827.6312
USA (toll free)	+1.888.356.9001	+1.713.827.3380
Asia Pacific (Republic of Singapore)	+65.6777.8211	+65.6777.0947.0743
Europe (Stirling Scotland, UK)	+44 (0)1786.433400	+44 (0)1786.433401
Middle East Africa (Dubai, UAE)	+971 4 8118100	+971 4 8865465

## E-mail

- Customer Service: tech.service@emersonprocess.com
- Customer Support: daniel.cst.support@emerson.com
- Asia-Pacific: danielap.support@emerson.com
- Europe: DanielEMA.CST@EmersonProcess.com

## Return Material Authorization (RMA)

A Return Material Authorization (RMA) number must be obtained prior to returning any equipment for any reason. Download the RMA form from the Support Services web page by selecting the link below.

[www2.emersonprocess.com/EN-US/BRANDS/DANIEL/SUPPORT-SERVICES/Pages/Support-Services.aspx?](http://www2.emersonprocess.com/EN-US/BRANDS/DANIEL/SUPPORT-SERVICES/Pages/Support-Services.aspx?)

# Signal words and symbols

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



Safety alert symbol

This is a safety alert symbol. It is used to alert you to potential physical injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

---

## **DANGER**

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

---

## **WARNING**

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

---

## **CAUTION**

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

---

## **NOTICE**

Notice is used to address safety messages or practices not related to personal injury.

---

---

### **Important**

Important is a statement the user needs to know and consider.

---

### **Tip**

Tip provides information or suggestions for improved efficiency or best results.

---

### **Note**

Note is a “general by-the-way” content not essential to the main flow of information.

---

# Important safety 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 strictly adhere both to the information printed on the product and to all instructions provided in this manual prior to installation, operation, and maintenance.

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 NOTICES AND PRODUCT WARNINGS.**

## **WARNING**

Installing, operating or maintaining a Daniel product improperly could lead to serious injury or death from explosion or exposure to dangerous substances. To reduce this risk:

- 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.

---

### **Product owners (Purchasers):**

- Use the correct product for the environment and pressures present. See technical data or product specifications for limitations. If you are unsure, discuss your needs with your Daniel representative.
- Inform and train all personnel in the proper installation, operation, and maintenance of this product.
- To ensure safe and proper performance, only informed and trained personnel should install, operate, repair and maintain this product.
- Verify that this is the correct instruction manual for your Daniel product. If this is not the correct documentation, contact Daniel at 1-713-827-6314. You may also download the correct manual from:

<http://www.daniel.com>

- Save this instruction manual for future reference.
- 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.
- ALWAYS READ AND FOLLOW THE INSTALLATION, OPERATIONS, MAINTENANCE AND TROUBLESHOOTING MANUALS AND ALL PRODUCT WARNINGS AND INSTRUCTIONS.
- Do not use this equipment for any purpose other than its intended service. This may result in property damage and/or serious personal injury or death.

## Product Operation Personnel:

- To prevent personal injury, personnel must follow all instructions of this manual prior to and during operation of the product.
- Follow all warnings, cautions, and notices marked on, and supplied with, this product.
- Verify that this is the correct instruction manual for your Daniel product. If this is not the correct documentation, contact Daniel at 1-713-827-6314. You may also download the correct manual from:

<http://www.daniel.com>

- Read and understand all instructions and operating procedures for this product.
- If you do not understand an instruction, or do not feel comfortable following the instructions, contact your Daniel representative for clarification or assistance.
- Install this product as specified in the INSTALLATION section of this manual per applicable local and national codes.
- Follow all instructions during the installation, operation, and maintenance of this product.
- Connect the product to the appropriate pressure and electrical sources when and where applicable.
- Ensure that all connections to pressure and electrical sources are secure prior to and during equipment operation.
- 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.
- Save this instruction manual for future reference.

# Notice

THE CONTENTS OF THIS PUBLICATION ARE PRESENTED FOR INFORMATIONAL PURPOSES ONLY, AND WHILE EVERY EFFORT HAS BEEN MADE TO ENSURE THEIR ACCURACY, THEY ARE NOT TO BE CONSTRUED AS WARRANTIES OR GUARANTEES, EXPRESSED OR IMPLIED, REGARDING THE PRODUCTS OR SERVICES DESCRIBED HEREIN OR THEIR USE OR APPLICABILITY. ALL SALES ARE GOVERNED BY DANIEL'S TERMS AND CONDITIONS, WHICH ARE AVAILABLE UPON REQUEST. WE RESERVE THE RIGHT TO MODIFY OR IMPROVE THE DESIGNS OR SPECIFICATIONS OF SUCH PRODUCTS AT ANY TIME.

DANIEL DOES NOT ASSUME RESPONSIBILITY FOR THE SELECTION, USE OR MAINTENANCE OF ANY PRODUCT. RESPONSIBILITY FOR PROPER SELECTION, USE AND MAINTENANCE OF ANY DANIEL PRODUCT REMAINS SOLELY WITH THE PURCHASER AND END-USER.

TO THE BEST OF DANIEL'S KNOWLEDGE THE INFORMATION HEREIN IS COMPLETE AND ACCURATE. DANIEL MAKES NO WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THIS MANUAL AND, IN NO EVENT, SHALL DANIEL BE LIABLE FOR ANY INCIDENTAL, PUNITIVE, SPECIAL OR CONSEQUENTIAL DAMAGES INCLUDING, BUT NOT LIMITED TO, LOSS OF PRODUCTION, LOSS OF PROFITS, LOSS OF REVENUE OR USE AND COSTS INCURRED INCLUDING WITHOUT LIMITATION FOR CAPITAL, FUEL AND POWER, AND CLAIMS OF THIRD PARTIES.

PRODUCT NAMES USED HEREIN ARE FOR MANUFACTURER OR SUPPLIER IDENTIFICATION ONLY AND MAY BE TRADEMARKS/REGISTERED TRADEMARKS OF THESE COMPANIES

# Warranty and Limitations

**1. LIMITED WARRANTY:** Subject to the limitations contained in Section 2 herein, Daniel Measurement & Control, Inc. ("Daniel") warrants that the licensed firmware embodied in the Goods will execute the programming instructions provided by Daniel, and that the Goods manufactured by Daniel will be free from defects in materials or workmanship under normal use and care and Services will be performed by trained personnel using proper equipment and instrumentation for the particular Service provided. The foregoing warranties will apply until the expiration of the applicable warranty period. Goods are warranted for twelve (12) months from the date of initial installation or eighteen (18) months from the date of shipment by Daniel, whichever period expires first. Consumables and Services are warranted for a period of 90 days from the date of shipment or completion of the Services. Products purchased by Daniel from a third party for resale to Buyer ("Resale Products") shall carry only the warranty extended by the original manufacturer. Buyer agrees that Daniel has no liability for Resale Products beyond making a reasonable commercial effort to arrange for procurement and shipping of the Resale Products. If Buyer discovers any warranty defects and notifies Daniel thereof in writing during the applicable warranty period, Daniel shall, at its option, correct any errors that are found by Daniel in the firmware or Services or repair or replace F.O.B. point of manufacture that portion of the Goods or firmware found by Daniel to be defective, or refund the purchase price of the defective portion of the Goods/Services. All replacements or repairs necessitated by inadequate maintenance, normal wear and usage, unsuitable power sources or environmental conditions, accident, misuse, improper installation, modification, repair, use of unauthorized replacement parts, storage or handling, or any other cause not the fault of Daniel are not covered by this limited warranty, and shall be at Buyer's expense. Daniel shall not be obligated to pay any costs or charges incurred by Buyer or any other party except as may be agreed upon in writing in advance by Daniel. All costs of dismantling, reinstallation and freight and the time and expenses of Daniel's personnel and representatives for site travel and diagnosis under this warranty clause shall be borne by Buyer unless accepted in writing by Daniel. Goods repaired and parts replaced by Daniel during the warranty period shall be in warranty for the remainder of the original warranty period or ninety (90) days, whichever is longer. This limited warranty is the only warranty made by Daniel and can be amended only in a writing signed by Daniel. THE WARRANTIES AND REMEDIES SET FORTH ABOVE ARE EXCLUSIVE. THERE ARE NO REPRESENTATIONS OR WARRANTIES OF ANY KIND, EXPRESS OR IMPLIED, AS TO MERCHANTABILITY, FITNESS FOR PARTICULAR PURPOSE OR ANY OTHER MATTER WITH RESPECT TO ANY OF THE GOODS OR SERVICES. Buyer acknowledges and agrees that corrosion or erosion of materials is not covered by this warranty.

**2. LIMITATION OF REMEDY AND LIABILITY:** DANIEL SHALL NOT BE LIABLE FOR DAMAGES CAUSED BY DELAY IN PERFORMANCE. THE REMEDIES OF BUYER SET FORTH IN THIS AGREEMENT ARE EXCLUSIVE. IN NO EVENT, REGARDLESS OF THE FORM OF THE CLAIM OR CAUSE OF ACTION (WHETHER BASED IN CONTRACT, INFRINGEMENT, NEGLIGENCE, STRICT LIABILITY, OTHER TORT OR OTHERWISE), SHALL DANIEL'S LIABILITY TO BUYER AND/OR ITS CUSTOMERS EXCEED THE PRICE TO BUYER OF THE SPECIFIC GOODS MANUFACTURED OR SERVICES PROVIDED BY DANIEL GIVING RISE TO THE CLAIM OR CAUSE OF ACTION. BUYER AGREES THAT IN NO EVENT SHALL DANIEL'S LIABILITY TO BUYER AND/OR ITS CUSTOMERS EXTEND TO INCLUDE INCIDENTAL, CONSEQUENTIAL OR PUNITIVE DAMAGES. THE TERM "CONSEQUENTIAL DAMAGES" SHALL INCLUDE, BUT NOT BE LIMITED TO, LOSS OF ANTICIPATED PROFITS, REVENUE OR USE AND COSTS INCURRED INCLUDING WITHOUT LIMITATION FOR CAPITAL, FUEL AND POWER, AND CLAIMS OF BUYER'S CUSTOMERS.



# Contents

## Preface

Daniel customer service  
Signal words and symbols  
Important safety instructions  
Notice  
Warranty and Limitations

<b>Section 1:</b>	<b>Introduction .....</b>	<b>1</b>
	1.1 Purpose .....	1
<b>Section 2:</b>	<b>Scope .....</b>	<b>3</b>
	2.1 Document scope .....	3
<b>Section 3:</b>	<b>Installation .....</b>	<b>5</b>
	3.1 Meter installation .....	5



# List of Tables

Table 3-1 Relevant parts of the Essential Safety Requirements (ESR)..... 6



# Section 1: Introduction

## 1.1 Purpose

This document shall identify specific installation and operation instructions necessary to ensure compliance with the Essential Safety Requirements (ESR) of the European Economic Area Pressure Equipment Directive (PED) 97/23/EC and the UK Pressure Equipment Regulations 1999 (SI 1999/2001).



## Section 2: Scope

### 2.1 Document scope

This document applies to all Daniel Ultrasonic Flow Meters designed by Daniel Measurement and Control, Inc. (Daniel) of Houston, Texas, USA, and manufactured by Daniel or an authorized agent.





## Section 3: Installation

### 3.1 Meter installation

Daniel Ultrasonic Flow Meters are supplied as components to be installed in the end user's piping system. It is the responsibility of the end user of the equipment to ensure compliance with the Essential Safety Requirements of the Directive and Regulations quoted in [Section 1.1](#) of this document. Relevant parts of the directive ESR are listed below.

Table 3-1 Relevant parts of the Essential Safety Requirements (ESR)

PED ESR reference	ESR requirement	Compliance requirement
2.3	Provisions to ensure safe handling and operation: <ul style="list-style-type: none"> <li>• The method of operation specified for pressure equipment must be such as to preclude any reasonably foreseen risk in the operation of the equipment. Particular attention must be paid, where appropriate, to the following.</li> </ul>	
	Closures and openings:	Gas Ultrasonic Flow Meters: <ul style="list-style-type: none"> <li>• During removal and replacement of transducers the end user shall ensure that the meter has been properly isolated and the internal pressure has been safely vented.</li> <li>• If changing the transducers under line pressure by means of the Daniel supplied extractor tool; the instructions for use given in the manual supplied with each extractor tool must be strictly complied with.</li> </ul> Liquid Ultrasonic Flow Meters: <ul style="list-style-type: none"> <li>• Refer to the Daniel Ultrasonic Flow Meter Installation, Maintenance and Troubleshooting manuals for detailed procedures.</li> <li>• Daniel Liquid Ultrasonic Flow Meters are supplied with transducers which are extractable while the line is pressurized.</li> </ul>
	<ul style="list-style-type: none"> <li>• Devices to prevent physical access while pressure or a vacuum exists.</li> <li>• Surface temperature</li> <li>• Decomposition of unstable fluids</li> </ul>	<ul style="list-style-type: none"> <li>• The end user shall ensure that the meters are installed in a properly designed system with access limitation in place if required.</li> <li>• It is the responsibility of the end user to assess the expected surface temperature in service, and if necessary, take the necessary precautions to avoid personnel coming into contact with the equipment.</li> <li>• It is not envisaged that, for the designed service, the equipment shall come into contact with unstable fluids. However, the end user should assess the risk and take any steps considered necessary.</li> </ul>

PED ESR reference	ESR requirement	Compliance requirement
2.4	Means of examination: <ul style="list-style-type: none"> <li>Pressure equipment must be designed and constructed so that all necessary examinations to ensure safety can be carried out.</li> </ul>	<ul style="list-style-type: none"> <li>Daniel Ultrasonic Flow Meters are designed so that all critical parts can be examined without the need to remove the unit from service. The end user should refer to the operations and maintenance instructions supplied with each meter. It is not considered that the process medium for which the equipment is designed will give rise to severe corrosion/erosion problems. It is the end user's responsibility to monitor any change in the process medium that may cause concern.</li> </ul>
2.5	Means of draining and venting: <ul style="list-style-type: none"> <li>To avoid harmful effects such as water hammer, vacuum collapse, corrosion and uncontrolled chemical reactions.</li> </ul>	<ul style="list-style-type: none"> <li>It is the responsibility of the end user to ensure that the equipment is installed in a well-designed piping system to avoid such hazards.</li> </ul>
2.6	Corrosion or other chemical attack:	<ul style="list-style-type: none"> <li>It is not expected that the process medium for which the meters are designed will give rise to severe corrosion problems. It is the end user's responsibility to monitor any change in the process medium that may cause concern.</li> </ul>
2.7	Wear:	<ul style="list-style-type: none"> <li>It is not expected that the use of the meter for fluid measurement will give rise to any abnormal wear problems. It is the responsibility of the end user to install any necessary filtration upstream of the meter to maintain the condition of the process medium.</li> </ul>
2.10	Protection against exceeding the allowable limits of the pressure equipment:	<ul style="list-style-type: none"> <li>The Daniel Ultrasonic Flow Meters must be installed in a well-designed piping system with adequate protection against excessive pressure.</li> </ul>
2.12	External fire:	<ul style="list-style-type: none"> <li>The Daniel Ultrasonic Flow Meters have no special accessories for fire damage limitation. It is the responsibility of the end user to provide adequate fire-fighting facilities on-site.</li> </ul>
7.3	Pressure limiting devices, particularly for pressure vessels:	<ul style="list-style-type: none"> <li>The Daniel Ultrasonic Flow Meters are not pressure vessels and have no integral pressure limiting devices. It is the responsibility of the end user to ensure that the meters are installed in a well-designed system so that momentary pressure surges are limited to under 10% of the meters maximum allowable pressure.</li> </ul>





**Daniel Measurement and Control, Inc.**

11100 Brittmoore Park Drive

Houston, TX 77041 USA

T+1 713-467-6000

F+1 713-827-4805

USA Toll Free 1 888-356-9001

**Daniel Measurement Services, Inc.**

T +1 713-827-6314

[www.Daniel.com](http://www.Daniel.com)

**Europe: Stirling, Scotland, UK**

T + 44-1786-433400

**Middle East: Africa: Dubai, UAE**

T +971-4-811-8100

**Asia Pacific: Singapore**

T +65-677-8211



This product is a core component of the PlantWeb digital plant architecture.

© 2015 Daniel Measurement and Control, Inc. All rights reserved

The Emerson logo is a trademark and service mark of Emerson Electric Co. Daniel Measurement and Control, Inc. (Daniel) are Emerson Process Management business units. The Daniel name and logo are trademarks of Daniel Industries, Inc. The Senior, Junior, Simplex, MeterLink SeniorSonic, JuniorSonic, and DanPac are trademarks of Daniel Industries, Inc. All other trademarks are property of their respective owners.