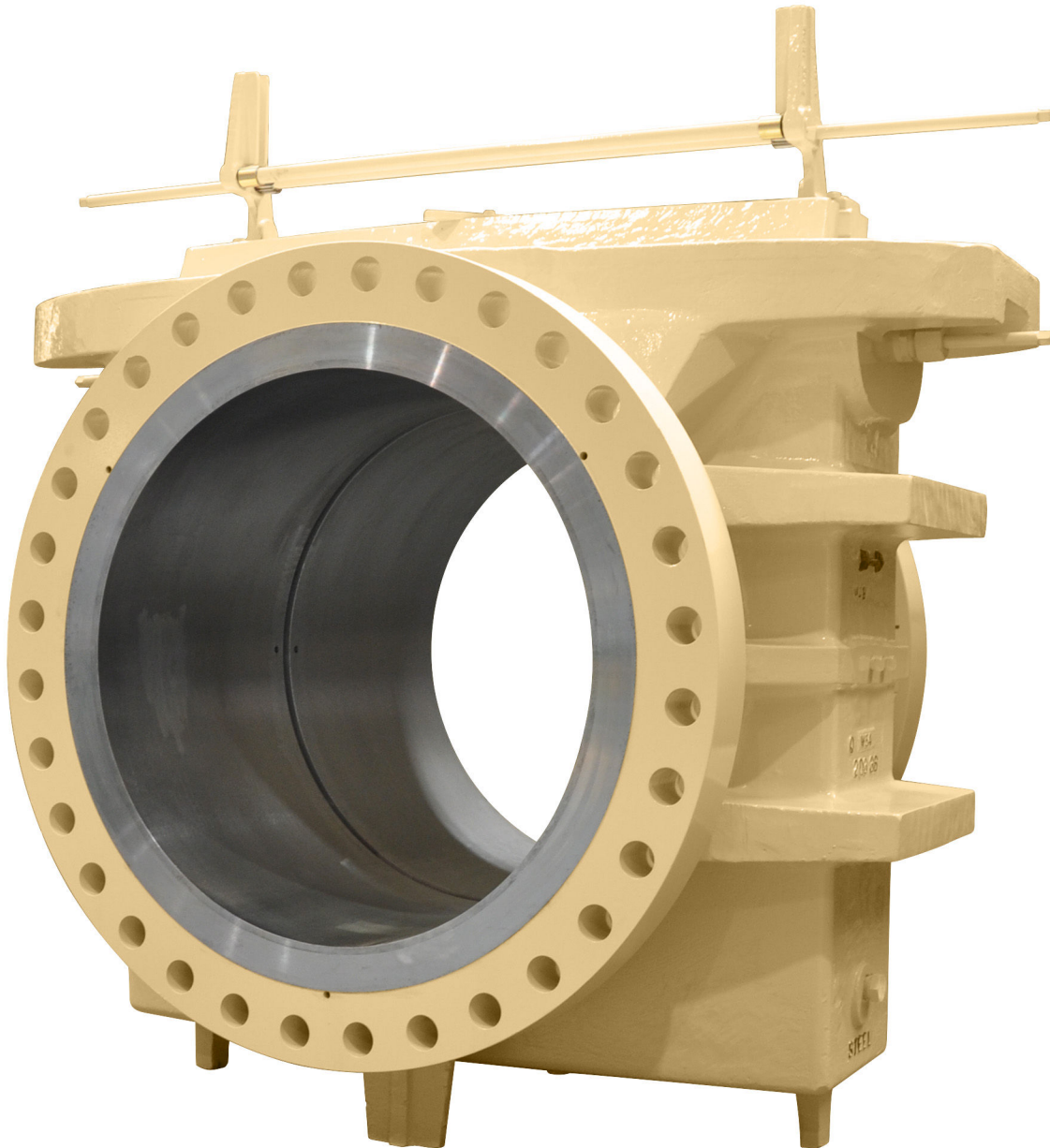


Daniel™ Junior Orifice Fittings

Sizes 10" - 42"



DANIEL™


EMERSON™

Flow Lifecycle Services for Daniel products

Location	Telephone number	Fax number
North America/Latin America	+1.713.467.6000	+1.713.827.4805
Flow Lifecycle Services for Daniel products	+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
Daniel Measurement and Control, Inc. (Headquarters) 11100 Brittmoore Park Drive Houston, TX 77041 USA http://www.emerson.com		

Email

- Customer Service: Daniel.SystemSales@Emerson.com
- Customer Support: Daniel.SystemSales@Emerson.com
- Asia-Pacific: danielap.support@emerson.com
- Europe: danielEMA.cst@emerson.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.

<http://www.daniel.com/rma>

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 “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 must 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!

Failure to follow the installation, operation or maintenance instructions for a Daniel product could lead to serious injury or death from explosion or exposure to dangerous substances.

To reduce the risk:

- **Comply with all information on the product, in this manual, and in any local and national codes that apply to this 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:
<https://www.emerson.com/en-us/catalog/supervisory-control-systems>.
- 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 MANUAL(S) 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.
- 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

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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.

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Part I

Plan

1 Introduction

Topics covered in this chapter:

- *Definition of Acronyms*
- *Purpose of this manual*
- *Description*
- *Parts and materials lists*

1.1 Definition of Acronyms

Table 1-1: Acronyms and their definition

Acronym	Description
AGA	American Gas Association
AISI	American Iron and Steel Institute
API	American Petroleum Institute
ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
ASTM	American Society of Testing and Materials
GPA	Gas Processors Association
ISO	International Organization of Standardization
MSS	Manufacturers Standardization Society of the Valve and Fittings Industry, Inc
NACE	NACE International (formerly National Association of Corrosion Engineers)
MPMS	API Manual of Petroleum Measurement Standards
API-14.3	API-AGA joint flow measurement code (API MPMS Chapter 14, Section 3, Part 2:2000(R2011) - also AGA Report No. 3, Part 2 and GPA 8185-00, Part 2)
ISO 5167	ISO flow measurement code (ISO 5167-2:2003(E))
U/S	upstream
D/S	downstream
DP	differential pressure (ΔP) - differences of static pressures found on the U/S and D/S faces of an orifice plate during the flow measurement process
CRS	cold rolled steel
CS	carbon steel
SS	stainless steel

Table 1-1: Acronyms and their definition (continued)

Acronym	Description
YP	gold (yellow chromate) zinc plated
ZP	silver (clear chromate) zinc plated
MAOP	maximum allowable operating pressure
NPSM	national pipe straight mechanical thread
NPT	national pipe tapered thread
HBR	butadiene rubber
HNBR	hydrogenated nitrile-butadiene rubber
NBR	nitrile-butadiene rubber
FFKM	perfluoroelastomer rubber
FKM	fluoroelastomer rubber
PTFE	polytetrafluoroethylene
SBR	styrene-butadiene rubber
TFE	tetrafluoroethylene

1.2 Purpose of this manual

This manual provides guidance to owners and personnel in the installation, operation and maintenance of the *Daniel™ Junior™ Orifice Fitting*.

To ensure safe and proper installation, operation and maintenance, it is imperative that product owners and operation personnel read and follow the information contained in this manual.

1.3 Description

The Daniel Junior Orifice Fitting (Junior) is an orifice plate holding device that houses, and accurately positions, an orifice plate within a pipe or tube to measure fluid flow. It is just one component in a flow measurement system. Daniel designed Junior Orifice Fitting (Junior) allowing users to:

- Position an orifice plate, concentric to flow moving through a line, within API-14.3, Part 2 or ISO 5167 installation requirements.
- Isolate the Junior with upstream and downstream block valves, avoiding removal of the Junior from the piping system for orifice plate changes or inspections. To prevent interrupting service during an orifice plate operation, measurement system designers may add bypass piping around the Junior.

The orifice plate within a Junior restricts the fluid moving through a pipe. This restriction creates a change in static pipe pressure of the fluid. Instrumentation measures the difference in change of the fluid entering orifice plate bore, and once again after it exits the

plate bore. That instrumentation then combines that information, along with other data gathered from the flowing fluid, and calculates the amount of fluid that passes through the system.

The Junior's single-chamber design allows for the inspection and the replacement of orifice plates without removing the fitting from the flow line. Use of the Junior eliminates the effort required to remove and inspect an orifice plate housed in conventional orifice flange installations.

Emerson manufactures all Junior units to applicable API-14.3 recommendations and in accordance with selected ANSI, ASME and ASTM specifications. As an option, Emerson also designs and manufactures fittings in compliance with ISO 5167.

Junior's bearing the "CE" mark are designed and manufactured in compliance with the European Union Pressure Equipment Directive (PED) 2014/68/EU (available on the Internet).

1.3.1 Technical data

NOTICE

Follow all the safety and equipment limits recommended in [Section 1.3.1](#) of this manual. It is the owner's and/or purchaser's responsibility to comply with these parameters.

⚠ WARNING!

PERSONAL PROTECTION HAZARD

Follow all parameters for the Junior Orifice Fitting indicated below.

Failure to comply may result in injury or equipment damage.

Table 1-2: Technical data

Product parameters and limitations	
• Fluid static pressures:	Refer to ASME/ANSI B16 standards, and your fitting's material of construction, to determine the maximum operating temperature and pressure of your Junior. Both the fitting's materials of construction and ASME/ANSI ratings information can be found on the product name-plate.
• Fluid phases:	Gas, liquid, vapor
• Fluids measured:	Most fluids
• Fluid temperature parameters:	-20° / +160° F (-29° C / +71° C) is the fluid temperature range for this product based upon the materials of construction (Refer to ASME codes (1)). Consult factory before operating this product outside of the specified temperature range.

Table 1-2: Technical data (continued)

Temperature and operating pressure limitations of Orifice Plate Seal materials:	<p>-20° / +160° F (-29° C / +71° C) is the fluid temperature range for this product based upon the materials of construction (Refer to ASME codes (1)) .</p> <p>The following list describes the most common Orifice Plate Seal material and their available forms offered for use in Daniel Junior fittings.</p> <p>Consult factory before operating this product outside of the specified temperature range.</p>	
	HNBR:	<p>Loose or Bonded:</p> <p>Material available for "loose" seal rings (2"-10") or "bonded" seal to orifice plates (12" and larger). Operating pressure is limited to lesser of ANSI Class MAOP or 1500 psig.</p> <p>O-ring:</p> <p>Used with Snap Seal Ring assemblies (2" and larger). Operating pressure is limited to ANSI Class MAOP.</p>
	HBR:	<p>Loose or Bonded:</p> <p>Material available for "loose" seal rings (2"-10") or "bonded" seal to orifice plates (12" and larger). Operating pressure is limited to lesser of ANSI Class MAOP or 1500 psig.</p>
	FKM:	<p>Loose or Bonded:</p> <p>Material available for "loose" seal rings (2"-10") or "bonded" seal to orifice plates (12" and larger). Operating pressure is limited to lesser of ANSI Class MAOP or 1500 psig.</p> <p>"O" Ring:</p> <p>Used with Snap Seal Ring assemblies (2" and larger). Operating pressure is limited to ANSI Class MAOP.</p>
	PTFE:	<p>Loose:</p> <p>Material used for orifice plate seal rings (2" and above).</p> <p>Operating pressure is limited to ANSI Class MAOP.</p>
	FFKM:	<p>"O" Ring:</p> <p>Used with Snap Seal Ring assemblies (2" and larger). Operating pressure is limited to ANSI Class MAOP.</p>
	• Differential pressure:	Refer to API 14.3 or ISO 5167, as appropriate to your system
Space Limits		
See Product Datasheet "Junior Orifice Plate Holders: DAN-Junior-DS"		

Table 1-2: Technical data (continued)

Time parameters	
See Section 4.1 instructions	
Components	
<ul style="list-style-type: none"> Maintenance intervals: 	<p>The owners and users of these products should perform regular scheduled intervals of maintenance activities. The recommended intervals are every month or as directed by the owner's maintenance procedures. Examine components during each scheduled maintenance period, site visits and during each orifice plate change.</p> <p>Replace any component that shows signs of wear or when damaged with parts specified for Daniel products.</p>
<ul style="list-style-type: none"> Seal replacement: 	<p>Examine seals during each scheduled maintenance period, site visits and during each orifice plate change.</p> <p>Replace any worn or damaged or non-functioning seals with parts specified for Daniel products.</p>
<ul style="list-style-type: none"> Fastener torque verification: 	<p>Check all fasteners for tightness during each scheduled maintenance period, site visits and during each orifice plate change.</p> <p>Use information provided in Section 5.2 as a starting point in establishing the proper fastener torque values for your particular service environment.</p>
<ul style="list-style-type: none"> Corrosion allowance: 	<p>The factory machines the meter bore of each fitting to close tolerances. This is to conform to industry measurement standards.</p> <p>The fitting's meter bore dimensions DO NOT include an allowance for corrosion.</p> <p>It is the end user's responsibility to specify a fitting's material of construction based upon their knowledge of the process fluid and environmental conditions of an intended service.</p> <p>Therefore, it is important that the end user to monitor any change in the gas or liquid composition during monthly exercises, site visits and plate changes that may create a corrosion concern (Reference: U.S. DOT, CFR Title 49: Part 192.477).</p>
Environmental parameters	
<ul style="list-style-type: none"> Application: 	Surface and Off-shore (not for use in subsea applications)
<ul style="list-style-type: none"> Confined/open: 	Designed for outdoor use. May be used in well ventilated spaces (buildings / enclosed meter houses). Installation at product owner's discretion.
<ul style="list-style-type: none"> Site temperature: 	<p>Recommended atmospheric temperature ranges</p> <p>Maximum: +120° F (+49° C),</p> <p>Minimum: -20° F (-29° C).</p>
<ul style="list-style-type: none"> Site humidity: 	No limit
<ul style="list-style-type: none"> Site elevation: 	No limit
<ul style="list-style-type: none"> Proximity to population: 	Reference: Class 1 location: U.S. DOT, CFR Title 49: Part 192.5

Table 1-2: Technical data (continued)

<ul style="list-style-type: none"> Proximity to traffic: 	The owner must protect the fitting from accidental damage by vehicular traffic or other causes, by either placing the unit at a safe distance from the traffic, or installing barricades around the unit.
<ul style="list-style-type: none"> Proximity to equipment: 	Install the Junior in a well ventilated place, not less than 3 feet (914 millimeters) from any source of ignition or any source of heat which might damage the unit.
Interface parameters	
<ul style="list-style-type: none"> Replacement parts: 	Use only replacement parts specified for Daniel products. Unauthorized parts and procedures can affect this product's performance and place the safe operation of your process at risk.
<ul style="list-style-type: none"> Aftermarket attachments: 	Use of pressure sensing equipment, drain valves, and other accessories (e.g., needle valves, multi-port valves, transmitters, 3-pin recorders, etc.) are permissible. The use of aftermarket equipment must be installed and operated as directed by the aftermarket equipment manufacturer, and their warranties and replacements are not contained within the scope of this document.
<ul style="list-style-type: none"> Pipe supports: 	<p>The owner must employ sound engineering principles to design the support systems for the flow measurement system (or meter tube). It is important that the design engineer develop a method to support the entire weight (equipment, piping and fluid) of the system.</p> <p>The method developed must prevent bending to reduce the potential of creating unwanted stress at welded joints and flanges. Unwanted stresses may lead to leaks and may ultimately lead to failure or rupture of the flow measurement system.</p>
<ul style="list-style-type: none"> Vandalism / Tampering: 	It is the responsibility of each product owner to protect the Junior from vandalism, tampering or other unauthorized activity.

1.4 Parts and materials lists

1.4.1 Daniel Junior Orifice Fitting 10"-16"

Figure 1-1: Daniel Junior Orifice Fitting 10"-16"

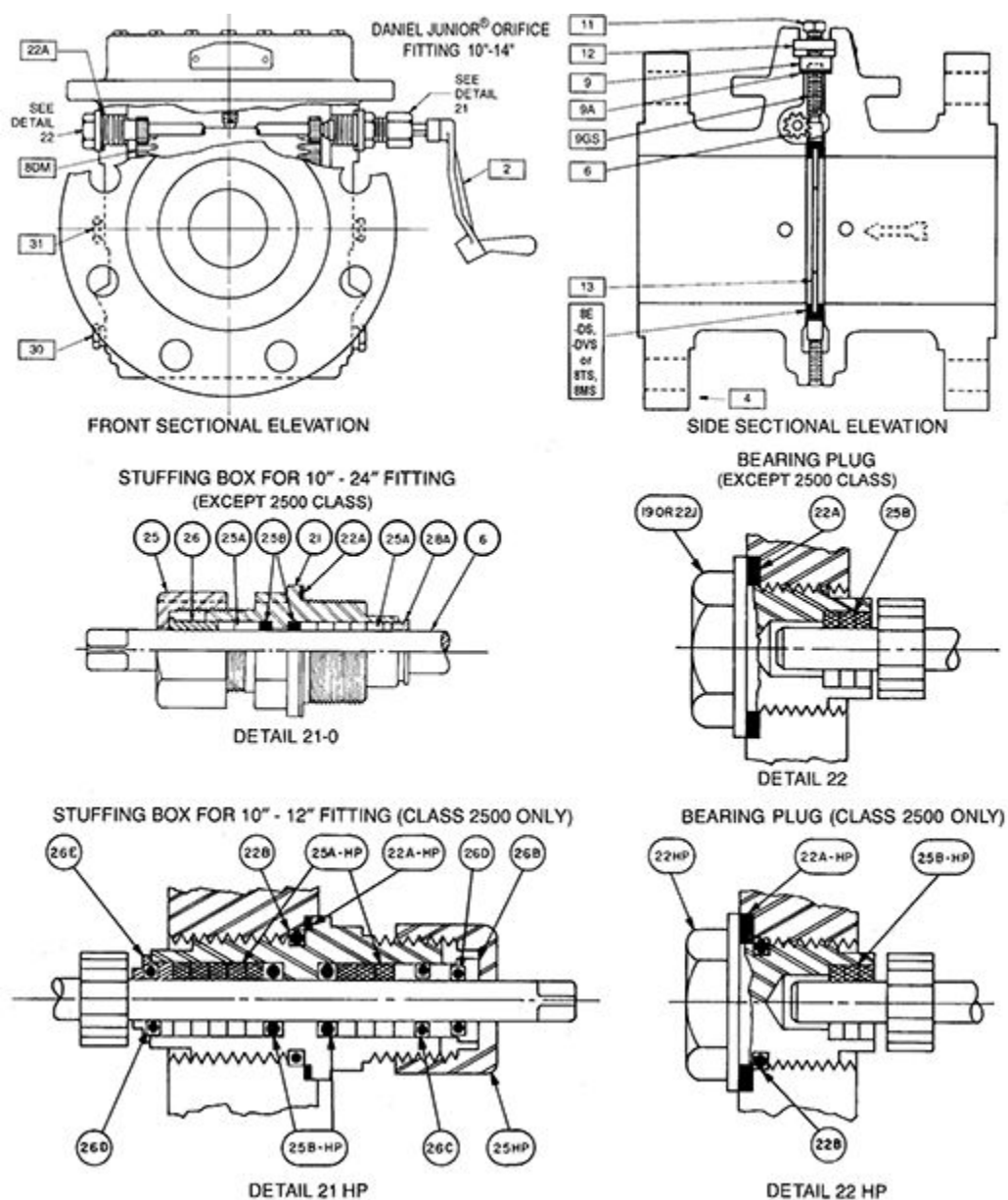


Table 1-3: Daniel Junior Orifice Fitting sizes 10" thru 16"

Parts and materials			Number required			
			Size			
Item no.	Description	Material and ratings	10"	12"	14"	16"
*2	Operating wrench	Malleable iron	1	1	1	1
4	Body	Cast iron steel	1	1	1	1
6	Plate Carrier shaft and pinions	C.R.S. (Chemically Treated)	1	1	1	1
8 DM	Plate carrier	C.R.S. (Chemically treated)	1	1	1	1
8 E-DS	Sealing unit	Synthetic rubber (removable)	1	-	-	1
8 E-DVS	Sealing unit	Synthetic rubber bonded to both sides orifice plate	-	1	1	1
8 TS	Optional sealing units for special services	PTFE (plate not included)*	1	1	1	1
8 MS	Optional sealing units for special services	Zinc plated or stainless steel (plate not included)	1	1	1	1
8 SN	Optional Snap Seal Ring units for special services	Zinc plated or stainless steel w/ O-rings (plate not included)	1	1	1	1
9	Sealing bar	C.R.S. (Chemically treated)	1	1	1	1
9 HP*	Sealing bar	C.R.S. (Chemically treated) (1500 only)*	1	1	1	1
		C.R.S. (Chemically treated) (2500 only)*	1	1	-	1
9 GS	Sealing bar alignment pin	C.R.S. (Chemically treated)	1	1	1	1
9 A	Sealing bar gasket	Composite	1	1	1	1
11	Clamping bar screws	Steel (150-600)	8	10	11	12
		Steel (900)	8	10	22	24
		Steel (1500 only)	16	20	22	22
		Steel (2500 only)	28	28	-	-
12	Clamping bar	C.R.S. (Chemically treated) (150-900)	1	1	1	1
12 HP*	Clamping bar	C.R.S. (Chemically treated) (1500 only)	1	1	-	-
		C.R.S. (Chemically treated) (2500 only)	1	1	-	-
13	Orifice plate	Stainless steel	1	1	1	1
21-0 & 21-1	Stuffing body assembly		1	1	1	2
21 & 21 A	Stuffing body box	C.R.S.	1	1	1	2

Table 1-3: Daniel Junior Orifice Fitting sizes 10" thru 16" (continued)

Parts and materials			Number required			
			Size			
Item no.	Description	Material and ratings	10"	12"	14"	16"
22 & 22HP	Bearing plug	C.R.S.	1	1	1	-
22 A & 22 A-HP & 21 H	Bearing plug and stuffing box gaskets	Stainless steel	2	2	-	2
22 B	Bearing plug and stuffing box "O" ring seals	Synthetic rubber (Daniel 2500 only)	2	2	-	-
25 A & 21 J	Packing sleeves	PTFE Daniel 150	9	11	12	14
		PTFE Daniel 300	9	11	12	14
		PTFE Daniel 600	10	11	13	14
		PTFE Daniel 900	10	11	-	-
		PTFE Daniel 1500	12	14	-	-
25 A-HP	Packing sleeves	PTFE Daniel 2500	10	10	-	-
25 B & 25 B-HP	Shaft centering rings	PTFE	2 per stuffing box, 3 per bearing plug			
26 & 21 C	Stuffing box glands	Stainless steel (150-1500)	1	1	1	2
26 B	External stuffing box glands with "O" ring grove	316 stainless steel (2500 only)	1	1	-	-
26 E	Internal stuffing box glands with "O" ring grove	316 stainless steel (2500 only)	1	1	-	-
26 C	"O" rings	Synthetic rubber (2500 only)	1	1	-	-
26 D	"O" rings	Synthetic rubber (2500 only)	2	2	-	-
28 A & 21 F	Packing bushing & retainer	Stainless steel (10"-24") (150-1500)	2	2	2	2
30	Drain valve plug	C.R.S.	2	2	2	2
31	1 / 2" N.P.T. tap hole plug	C.R.S.	4	4	4	4

Note

- All Daniel Junior Orifice Fittings are supplied with pipe plugs on one side only. If additional quantities are required, please contact the factory directly.
- (*) Indicates Interchangeable parts for all line sizes of specified pressure rating(s).

General notes:

- Most parts available in other materials upon customer request.
- C S (Carbon Steel), CRS (ColdRolledSteel), NPT (National Pipe Thread), ZP (Zinc Plated).
- The materials listed above indicate standard "A" trim.
- NA CE MR0175 compliant trims are available upon customer request. Various part materials are changed for "NACE" and "AASG" trim fittings.
- Other trim options available upon request. Consult factory.

When ordering parts, please specify:⁽¹⁾

- Catalog number
- Size
- Serial number
- Item number
- Material
- Quantity of each item required

(1) *Catalog number, size and serial number can be found on the fitting nameplate. Part item numbers and part materials are found in [Section 1.4.1](#).*

1.4.2 Daniel Junior Orifice Fitting 18" - 42"

Figure 1-2: Daniel Junior Orifice Fitting 18" - 42"

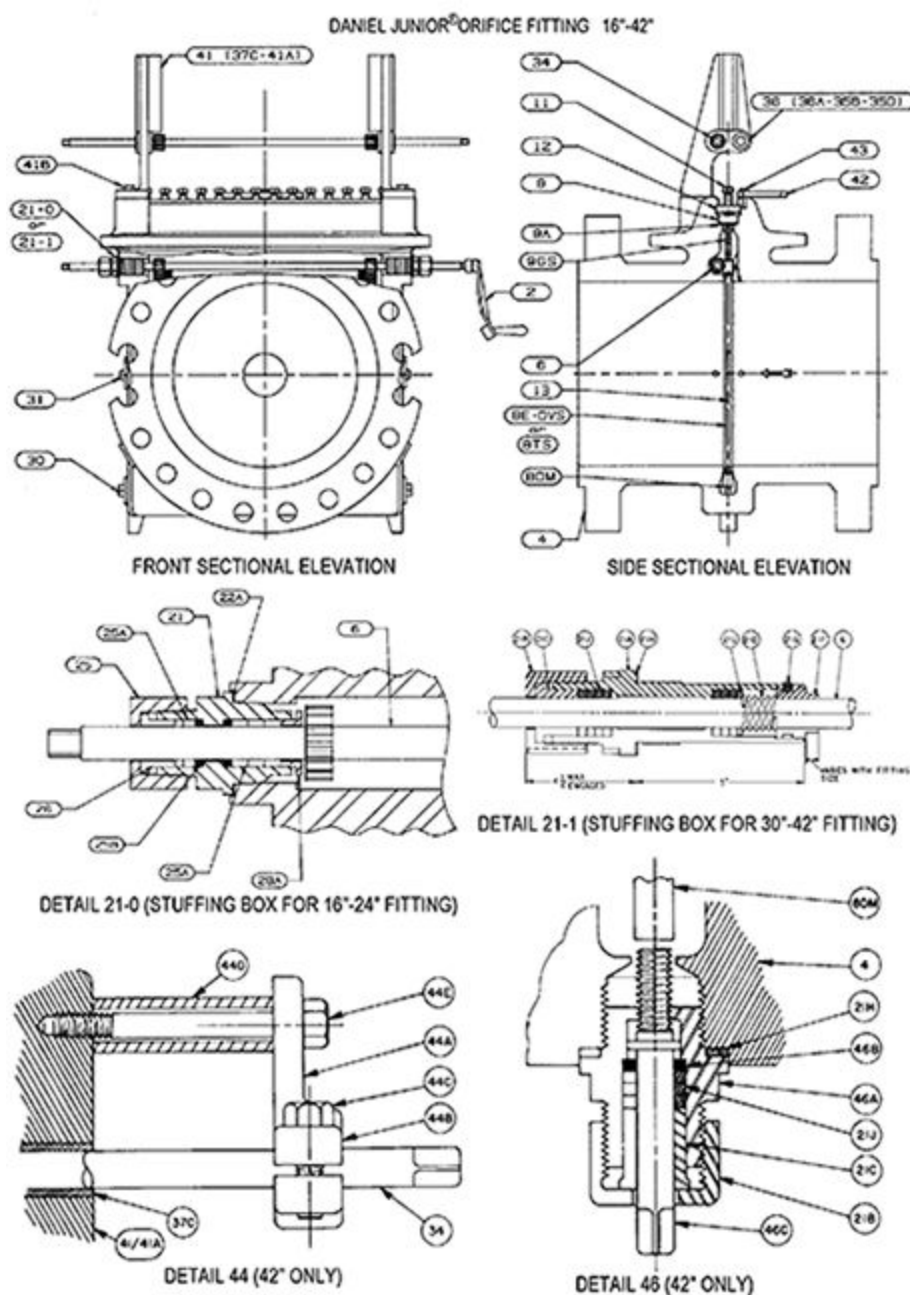


Table 1-4: Daniel Junior Orifice Fitting sizes 18" thru 24"

Parts and materials			Number required		
			Size		
Item no.	Description	Material and ratings	18"	20"	24"
*2	Operating wrench	Malleable iron	1	1	1
4	Body	Cast iron steel	1	1	1
6	Plate Carrier shaft and pinions	C.R.S. (Chemically Treated)	1	1	1
8 DM	Plate carrier	C.R.S. (Chemically treated)	1	1	1
8 E-DVS	Sealing unit	Synthetic rubber bonded to both sides orifice plate	1	1	1
8 TS	Optional sealing units for special services	PTFE (plate not included)*	-	-	-
8 SN	Optional Snap Seal Ring units for special services	Zinc plated or stainless steel w/ O-rings (plate not included)	1	1	1
9	Sealing bar	C.R.S. (Chemically treated)	1	1	-
9 HP*	Sealing bar	C.R.S. (Chemically treated) (1500 only)*	1	1	-
9 GS	Sealing bar alignment pin	C.R.S. (Chemically treated)	1	1	1
9 A	Sealing bar gasket	Composite	1	1	1
11	Clamping bar screws	Steel (150-600)	14	15	18
		Steel (900)	28	28	36
		Steel (1500 only)	28	28	-
12	Clamping bar	C.R.S. (Chemically treated) (150-900)	1	1	1
12HP	Clamping bar	C.R.S. (Chemically treated) (1500)	1	1	1
13	Orifice plate	Stainless steel	1	1	1
21-0 & 21-1	Stuffing body assembly		2	2	2
21 & 21 A	Stuffing body box	C.R.S.	2	2	2
22 A & 22 A-HP & 21 H	Bearing plug and stuffing box gaskets	Stainless steel	2	2	2
25 & 25HP & 21B	Packing nuts	C.R.S. (Chemically treated)	2	2	2
25 A & 21 J	Packing sleeves	PTFE Daniel 150	14	14	14
		PTFE Daniel 300	16	14	14
		PTFE Daniel 600	16	20	22
26 & 21 C	Stuffing box glands	Stainless steel (150-1500)	2	2	2

Table 1-4: Daniel Junior Orifice Fitting sizes 18" thru 24" (continued)

Parts and materials			Number required		
			Size		
Item no.	Description	Material and ratings	18"	20"	24"
28 A & 21 F	Packing bushing & retainer	Stainless steel (10"-24") (150-1500)	2	2	2
30	Drain valve plug	C.R.S.	2	2	2
31	1/2" N.P.T. tap holeplug	C.R.S.	4	4	4
34	External plate carrier shaft and pinions	C.R.S. (Chemically treated)	1	1	1
36 & 36 A	External shaft and roller assembly shaft	C.R.S. (Chemically treated)	1	1	1
35 B	Rollers	Bronze	2	2	2
35 D	Roller snap rings	Steel (Chemically treated)	2	2	2
41 & 41 A	Plate carrier guide bracket assembly: Brackets	Cast carbon steel	2	2	2
41 B	Hex head cap screws	Steel	4	4	4
37C	Shaft bushing	Bronze	4	4	4
42	Plate carrier stop	Steel	1	1	1
43	Socket head cap screw w/ bushing	Steel	1	1	1

Note

- All Daniel Junior Orifice Fittings are supplied with pipe plugs on one side only. If additional quantities are required, please contact the factory directly.
- (*) Indicates Interchangeable parts for all line sizes of specified pressure rating(s).

General notes:

- Most parts available in other materials upon customer request.
- C S (Carbon Steel), CRS (ColdRolledSteel), NPT (National Pipe Thread), ZP (Zinc Plated).
- The materials listed above indicate standard "A" trim.
- NA CE MR0175 compliant trims are available upon customer request. Various part materials are changed for "NACE" and "AASG" trim fittings.
- Other trim options available upon request. Consult factory.

When ordering parts, please specify:⁽²⁾

- Catalog number

(2) Catalog number, size and serial number can be found on the fitting nameplate. Part item numbers and part materials are found in [Section 1.4.2](#)

- Size
- Serial number
- Item number
- Material
- Quantity of each item required

Table 1-5: Daniel Junior Orifice Fitting sizes 30" thru 42"

Parts and materials			Number required			
			Size			
Item no.	Description	Material and ratings	30"	34"	36"	42"
*2	Operating wrench	Malleable iron	1	1	1	1
4	Body	Cast iron steel	1	1	1	1
6	Plate Carrier shaft and pinions	316 SS	1	1	1	1
8 DM	Plate carrier	C.R.S. (Chemically treated)	1	1	1	1
8 E-DVS	Sealing unit	Synthetic rubber bonded to both sides orifice plate	1	1	1	1
9	Sealing bar	C.R.S. (Chemically treated)	1	1	1	1
9 GS	Sealing bar alignment pin	C.R.S. (Chemically treated)	1	1	1	1
9 A	Sealing bar gasket	Composite	1	1	1	1
11	Clamping bar screws	Steel (150-600)	24	34	24	32
12	Clamping bar	C.R.S. (Chemically treated) (150-900)	1	1	1	1
13	Orifice plate	Stainless steel	1	1	1	1
21-0 & 21-1	Stuffing body assembly		2	2	2	-
21 & 21 A	Stuffing body box	C.R.S.	2	2	2	2
21 E	Packing retainer washer	316 stainless steel	2	2	2	2
22 A & 22 A-HP & 21 H	Bearing plug and stuffing box gaskets	Stainless steel	2	2	2	2
22 J	Special stuffing box body plug	Carbon steel	2	2	-	2
25 & 25HP & 21B	Packing nuts	C.R.S. (Chemically treated)	2	2	2	2
25 A & 21 J	Packing sleeves	PTFE Daniel 150	16	16	16	16
		PTFE Daniel 300	16	16	16	16
		PTFE Daniel 600	16	16	16	-
26 & 21 C	Stuffing box glands	Stainless steel (150-1500)	2	2	2	2
28 A & 21 F	Packing bushing & retainer	Stainless steel (10"-24") (150-1500)	-	-	-	2

Table 1-5: Daniel Junior Orifice Fitting sizes 30" thru 42" (continued)

Parts and materials			Number required			
			Size			
Item no.	Description	Material and ratings	30"	34"	36"	42"
		Bronze (30"-42")	2	2	2	-
21 D	Stuffing box spring	316 stainless steel	2	2	2	2
21 G	Busing set screws	316 stainless steel	2	2	2	2
30	Drain valve plug	C.R.S.	2	2	2	2
31	1/2" N.P.T. tap hole plug	C.R.S.	4	4	4	4
34	External plate carrier shaft and pinions	316SS	1	1	1	1
36 & 36 A	External shaft and roller assembly shaft	316SS	1	1	1	1
35 B	Rollers	Bronze	2	2	2	2
35 D	Roller snap rings	Steel (Chemically treated)	2	2	2	4
41 & 41 A	Plate carrier guide bracket assembly : Brackets	Cast carbon steel	2	2	2	2
41 B	Hex head cap screws	Steel	4	4	4	4
37C	Shaft bushing	Bronze	4	4	4	4
42	Plate carrier stop	Steel	1	1	1	1
43	Socket head cap screw w/bushing	Steel	1	1	1	1
44 & 44 A	Plate carrier travel brake: body	Cast steel	-	-	-	4
44 B	Brake band	Bronze	-	-	-	4
44 C	Adjustment bolt	Steel	-	-	-	4
44 D	Sleeve	Steel	-	-	-	4
44 E	Hex bolt	Steel	-	-	-	4
45 A	Shaft support	Steel	-	-	-	2
45 B	Shaft support bushing	Bronze	-	-	-	4
45 C	Supporting Mtg. bolts	Steel	-	-	-	4
46 & 46 A	Jackscrow assembly : Jackscrow body	316 stainless steel	-	-	-	1
46 C	Jackscrow stem	4140	-	-	-	1
46 B	Jackscrow Ctrg. ring	316 stainless steel	-	-	-	1

Note

- All Daniel Junior Orifice Fittings are supplied with pipe plugs on one side only. If additional quantities are required, please contact the factory directly.
 - (*) Indicates Interchangeable parts for all line sizes of specified pressure rating(s).
-

General notes:

- Most parts available in other materials upon customer request.
- C S (Carbon Steel), CRS (ColdRolledSteel), NPT (National Pipe Thread), ZP (Zinc Plated).
- The materials listed above indicate standard "A" trim.
- NA CE MR0175 compliant trims are available upon customer request. Various part materials are changed for "NACE" and "AASG" trim fittings.
- Other trim options available upon request. Consult factory.

When ordering parts, please specify:⁽³⁾

- Catalog number
- Size
- Serial number
- Item number
- Material
- Quantity of each item required

(3) Catalog number, size and serial number can be found on the fitting nameplate. Part item numbers and part materials are found in [Section 1.4.2](#)

Part II

Install

2 Installation and commission

Topics covered in this chapter:

- *General information*
- *Storage*
- *Preliminary information*
- *Severe service conditions*
- *Corrosive service*
- *Low temperature service*
- *Design consideration*
- *Commission the Daniel Junior Orifice Fitting Installation*
- *Commission - Line pressure test*
- *Commission - Orifice Plate installation*

2.1 General information

WARNING!

HIGH PRESSURE HAZARD

Follow all instructions provided in this section when installing the Sealing Bar Gasket (9A), Sealing Bar (9), and Clamping Bar (12).

Failure to comply may cause pressurized fluids to escape, resulting in death or serious injury.

The Daniel Junior Fitting is an essential element in any orifice measurement system. Other elements in an orifice measurement system may include a meter tube, a flow conditioner, and various data recording devices.

Here are some options available to purchasers of a Junior fitting from Daniel:

- Purchase the fitting alone
- Purchase the fitting with a meter tube
- Purchase a complete flow measurement system that contains a Junior Orifice Fitting

Regardless of purchase option, Daniel personnel perform a unique test on each Junior fitting for fluid retention. This test is an internal hydrostatic SHELL test on BODY (4) to a minimum pressure of 1.5 times its rated maximum allowable operating pressure.

Important

When purchasing only a Daniel™ Junior™ Fitting, it is the responsibility of both the product owners and product operating personnel to perform an internal hydrostatic shell test of the final meter tube assembly prior to service.

Important

The installation technician must confirm the maximum allowable operating pressure (MAOP) of each item in the system, including the Junior, prior to performing any leak test.

⚠ WARNING!**FLUID EXPLOSION HAZARD**

Never pressurize a unit above the limits recommended in this manual. Before pressurizing the Daniel Junior Fitting, confirm the maximum allowable operating pressure (MAOP) of each item in the system.

Over-pressurizing the Daniel Junior Fitting could lead to an explosive release of fluid resulting in death or serious injury.

When assembling a flow measurement system that will contain a Daniel Junior Orifice Fitting, end users must pay particular attention to the requirements for permanent joining of components and the non-destructive testing of the completed assembly. See the appropriate code (AGA-3, ISO 5167, etc.) for meter tube requirements.

NOTICE

On installations built to comply with the European Union Pressure Equipment Directive (PED) 2014/68/EU, it is the responsibility of the end user to meet all essential safety requirements of the directive (available on the internet).

End users must pay particular attention to the requirements for permanent joining and non-destructive testing. Refer to the "Daniel Orifice Fittings - Installation and Operating Instructions specific to the Pressure Equipment Directive", Part Number 3-9008-002 (available on the Daniel Flow website).

2.2 Storage

Follow your company's storage procedures when placing any measurement equipment into inventory. Spraying a light coat of rust inhibitor onto the inside bore of a Daniel Junior, and to the bore of the meter tube, may protect its surface finish during storage.

2.3 Preliminary information

NOTICE

Follow all the safety and equipment limits recommended in [Section 1.3.1](#) of this manual. It is the owner's and/or purchaser's responsibility to comply with these parameters.

The Junior may arrive at your site in any number of ways, usually as a component in a meter tube/measurement system, or as a loose fitting. If received as a loose fitting, then see the appropriate code (AGA-3, etc.) for assembly requirements.

It is the responsibility of the product operators to clean the Junior and all piping components of foreign matter such as welding debris, scale, oil, grease, and dirt before commissioning.

Record the serial plate data on the Junior for future reference. Always provide the serial number and model number when ordering spare parts.

The factory packages the Orifice Plates (13) and Seal Ring units (8E-DSC or 8E-DS; 8TSC or 8TS; 8MSC or 8MS; 8SNC or 8SN) separately from the fitting.

The factory places the plate carriers (8DMC or 8DM) inside the fitting for shipment

2.4 Severe service conditions

If product owner expects to encounter gas or liquid composition where there is a likelihood of sediment accumulation within the fitting, then it is recommended that the owner instruct their operators to remove Drain Valve Plug (30) and install a blow-down valve in its place.

2.5 Corrosive service

Corrosive environments may affect both the external and internal surfaces of the Junior. External corrosive environments are defined as those conditions that affect the outer surfaces of the Junior, while an internal corrosive environment is a condition that affects the surface inside the Junior. Read, understand, and follow instructions in the sections below if an internal or external corrosive environment exists.

2.5.1 External corrosive environments

For Junior fittings located in external corrosive environments (offshore platforms, marine terminals, etc), Emerson recommends replacing the standard carbon steel Drain Valve Plug (30) with the stainless steel versions listed in the "Corrosive service" column (refer to [Section 2.6](#)).

2.5.2 Internal corrosive environments

It is the end user's responsibility to specify a fitting's material of construction based upon their knowledge of the process fluid and environmental conditions of an intended service. Daniel offers the Junior Fitting in a number of trims (refer to [Table 1-3](#) thru [Section 1.4.2](#) for part and material lists).

The inside diameter specifications of a Junior fitting are exact. No allowance is provided for corrosion of the inside diameter.

2.6 Low temperature service

The fitting's material of construction is just one factor to consider when placing an orifice fitting into a low temperature service. The other factor to consider is the material temperature limitations of the orifice plate seal. Refer to [Section 1.3.1](#) "Orifice plate seal material temperature limitations" to help you to select an orifice plate seal for your application.

For Junior fittings located in low temperature environments (atmospheric temperature ranges of +32 °F [0 °C] to -20 °F [-29 °C]), Emerson recommends replacing the standard carbon steel Drain Valve Plug (30) with the low temperature version listed in the "Low Temp Service" column (refer to [Table 2-1](#)).

Table 2-1: Alternate components

Part No.	Description	Plug size	Standard Service	Stainless Steel Corrosive Service	Low Temp Service
30	Drain Plug (10" - 14")	3/4"-14 NPT	1-507-01-104	1-507-01-144	1-507-01-171
30	Drain Plug (16" - 42")	1"-11.5 NPT	1-507-01-105	1-507-01-145	1-507-01-172

2.7 Design consideration

Owners and operators select and place Daniel fittings in a variety of flow measurement services around the world with successful results. Daniel personnel understand that each flow measurement service has its own set of unique process and environmental conditions. Although Daniel designs, builds and offers a product line that may be applicable to most flow measurement services, it is the end user's responsibility to match the fitting to the service to achieve successful results (refer to [Section 1.3.1](#)).

Important

Product owners and operating personnel must evaluate both process fluid and environmental conditions of an intended service and select the appropriate fitting to match those service requirements. Once selected, the product owners and operating personnel must place the Daniel fitting in a well-designed piping system.

Below is a list of some, but not all, pipe design conditions to consider:

- Service operating pressure
- Service testing pressures
- Service process fluid temperature and ambient site temperatures
- Mass of fluid in process and test conditions
- Chemical composition and toxicity of fluid in operating conditions
- Traffic, wind and earthquake at loading site

- Reaction forces and reaction moments (meter position, supports, attachments, piping, etc.)
- Corrosion, erosion, fatigue, etc.
- Decomposition of unstable fluids in operating and test conditions
- Possible damage from external fire

2.7.1 Installation configurations

Up to 12" nominal size (all ANSI Classes)

Product owners and operating personnel may design and install any Daniel Junior fitting, up to 12- inch line size, in one of two configurations. One configuration is to install the fitting in piping system with product flowing in a horizontal direction ([Figure 2-1](#): flow running parallel to the ground). The other is to install the fitting in piping system with product flowing in a vertical direction ([Figure 2-2](#): flow running perpendicular to the ground).

Figure 2-1: Horizontal flow direction

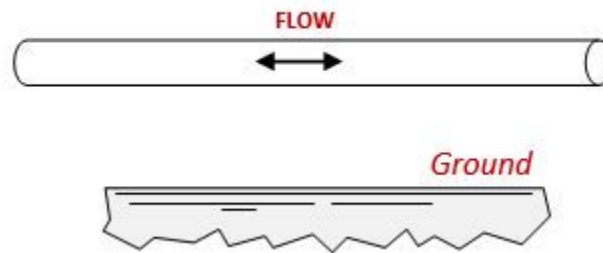
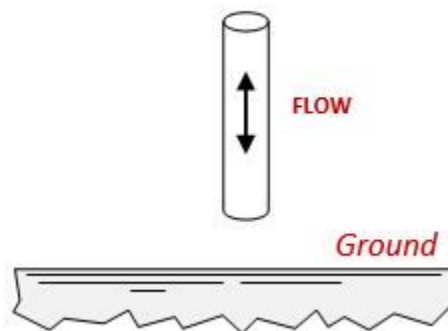


Figure 2-2: Vertical flow direction



Installing the fitting in a horizontal flow direction gives a product owner and operating personnel the option to fix the final position of the fitting parallel ([Figure 2-3](#) or [Figure 2-5](#)), or perpendicular ([Figure 2-4](#)), to the ground as shown.

Figure 2-3: Horizontal flow - "right side" position (parallel to the ground)

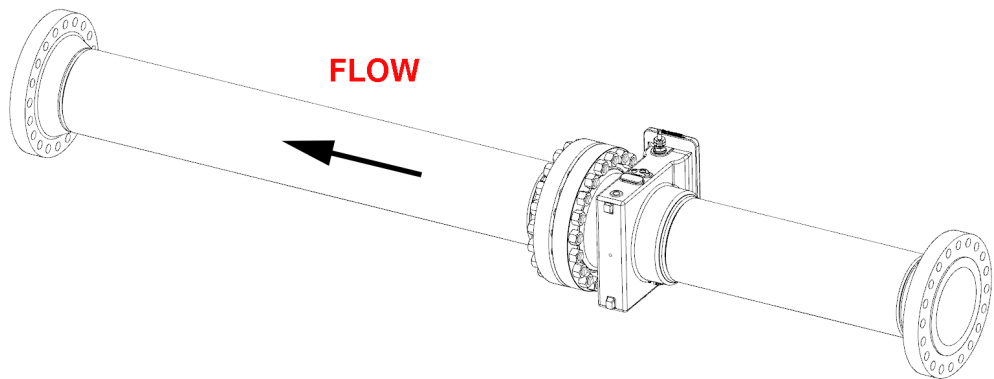


Figure 2-4: Horizontal flow - "normal" position (perpendicular to the ground)

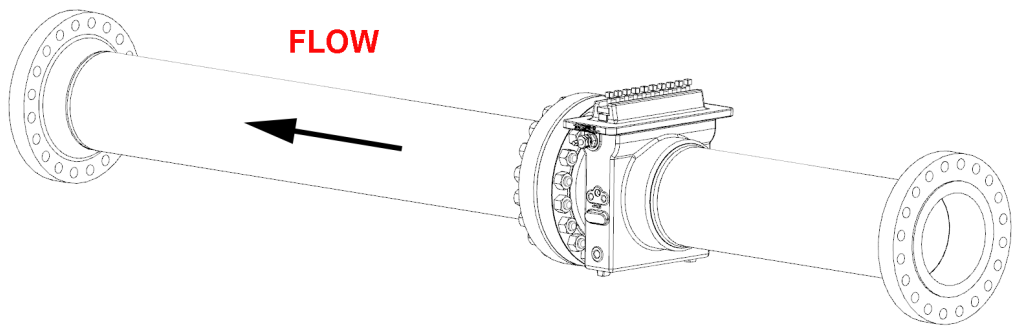
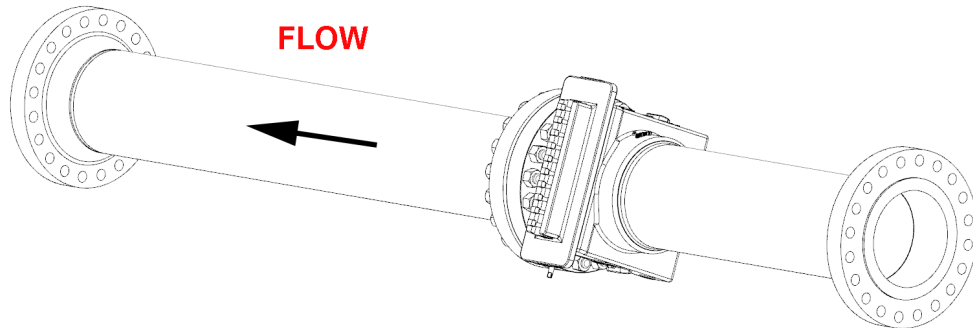


Figure 2-5: Horizontal flow - "left side" position (parallel to the ground)



Installing the fitting in a vertical flow configuration gives a product owner and operating personnel the option to fix the fitting in any position parallel to the ground. Although the insertion of the fitting in the vertical flow direction can be vertical UP or vertical DOWN, it is recommended the fitting be in the vertical down flow direction to reduce the potential of debris collecting on the orifice plate.

14" and larger nominal size (all ANSI Classes)

14" and larger Junior fittings are recommended to be installed only in Horizontal Flow - "Normal Position" direction per [Figure 2-4](#).

2.8 Commission the Daniel Junior Orifice Fitting Installation

⚠ DANGER!

FLUID EXPLOSION HAZARD

The Junior is a device that contains fluid at elevated pressure.

Failure to follow the instructions in this manual will result in death or serious injury.

Commissioning is the process of verifying that a system performs in accordance with the user's intended operational, maintenance, and measurement requirements.

The information contained in this section addresses commissioning topics for a Junior fully, or partially, assembled within an orifice plate flow measurement system.

Purchasers have the option of acquiring a Junior from Daniel for later installation in a flow measurement system, or purchasing a complete orifice plate flow measurement system containing a Junior.

Daniel packages orifice plates and seal rings separately from the Junior.

Product owners and product operators choosing to install a Junior into a flow measurement system NOT designed by Daniel must insure that the fabrication techniques and subsequent testing meet recognized industry standards.

Fitting installation personnel must confirm that the line flow direction corresponds to the flow directional indicator (an arrow or "INLET" / "OUTLET" tags) positioned on the Junior Body (4).

The Junior may be installed in any horizontal line with the plate access opening in a vertical(up) position or with the fitting rotated left or right to obtain a horizontal(side) opening position.

Procedure

1. Remove all foreign matter from the meter tube interior and the bore piping section of the Junior prior to installation.
2. Install the proper end flange gaskets, if required, and tighten all bolting to the appropriate torque, per product operator specifications.
3. Install the Sealing Bar Gasket (9A), Sealing Bar (9), and Clamping Bar (12) onto the Body (4).
4. Tighten and secure all Clamping Bar Screws (11) per the information and procedures contained in [Section 5.2](#).

CAUTION!

LOOSE CLAMPING BAR SCREW HAZARD

The factory assembled and shipped this product with loose clamping bar screws. Tighten and secure all Clamping Bar Screws (11) per the information and procedures contained in [Section 5.2](#) before applying pressure to this product.

Failure to comply may result in injury or equipment damage.

2.9 Commission - Line pressure test

Conditions:

1. The internal pressure within the Junior Body (4) and the adjacent metering system is equivalent to atmospheric pressure (0 psig / 0 barg).
2. The Orifice Plate (13) and Orifice Plate Sealing Unit (8E-DS or 8TS or 8MS or 8SN) is not installed on the Orifice Plate Carrier (8DM)
3. Orifice Plate Carrier (8DM) is installed in the Junior Body (4).
4. The Sealing Bar Gasket (9A) and Sealing Bar (9) are installed.
5. The Clamping Bar (12) is installed.
6. All Clamping Bar Screws (11) are tighten and secure per the information and procedures contained in [Section 5.2](#).

⚠ DANGER!**FLUID EXPLOSION HAZARD**

The Junior is a device that contains fluid at elevated pressure.

Failure to follow the instructions in this manual will result in death or serious injury.

After installing the Junior into the service line, personnel may perform a line pressure test of the service line.

Perform a leak test after installing the Junior and securing the Clamping Bar (12).

Procedure

1. Install a pressure gauge (calibrated to a recognized standard) on the orifice metering system in a location where the gauge will detect the pressure inside the Junior. Test personnel must choose a pressure gauge rated for the maximum operating pressure of the system (the Junior, service line seals (flange gaskets) and the adjacent piping) determined by the product owner and product operator.

Important

The installation technician must confirm the maximum allowable operating pressure (MAOP) of each item in the system, including the Junior, prior to performing any leak test.

⚠ WARNING!**EXPLOSION HAZARD**

Never exceed the maximum allowable operating pressure of the lowest rated item in the system.

Failure to comply may result in death or serious injury.

2. Slowly pressurize the orifice metering system at a rate of 1 psig per second (0.15 barg per second) and then stop the pressurization when the pressure inside the fitting body reaches 20 psig (1.4 barg). Hold the system at this pressure for five minutes.

Important

The correct positioning and installation of the Sealing Bar Gasket (9A), Sealing Bar (9), and Clamping Bar (12) are essential to providing a pressure barrier between the line pressure and atmospheric pressure.

During this five-minute hold, test personnel should apply a leak detection solution over all connections and joint areas throughout the entire orifice metering system (including the Sealing Bar Gasket (9A) and all threaded connections on the Junior). No leak age should be visibly, or audibly, detected during this five-minute hold period.

If a leak is detected, mark the leak area with a marker and reduce the pressure inside the Daniel Junior Orifice Fitting to 0 psig (0 barg). Tighten any fastener or connector adjacent to the leak area and repeat the leak test again.

3. If after several attempts to contain the leakage and it still persists, call your Daniel Customer Service for assistance. Contact information is found in the back of this manual.

⚠ WARNING!

LEAKAGE HAZARD

Correct all leaks of any size prior to operating the system.

Failure to comply may lead to death or serious injury.

4. Once the 20 psig (1.4 barg) leak test is complete, and no leaks are detected, then slowly raise the pressure inside the orifice metering system at a rate of 10 psig per second (0.70 barg per second) and then stop the pressurization when the pressure inside the Junior reaches the maximum operating pressure of the system (the Junior and the adjacent piping) determined by the product operator. Hold the system at that pressure for ten minutes.

Important

The installation technician must confirm the maximum allowable operating pressure (MAOP) of each item in the system, including the Junior, prior to performing any leak test.

⚠ WARNING!

EXPLOSION HAZARD

Never exceed the maximum allowable operating pressure of the lowest rated item in the system.

Failure to comply may result in death or serious injury.

During this ten-minute hold, test personnel shall apply a leak detection solution over all connections and joint areas throughout the entire orifice metering system (including the Sealing Bar Gasket (9A) and all threaded connections on the Junior). No leakage should be visibly, or audibly, detected during this ten-minute hold period.

European Union Pressure Equipment Directive (PED) 97/23

NOTICE

On installations which are required to comply with the European Union Pressure Equipment Directive (PED) 97/23/EC, the installation must be tested to at least 1.43 times the maximum allowable operating pressure (MAOP) of the lowest rated component in the system as determined by the product operator.

5. If a leak is detected, mark the leak area and reduce the pressure inside the orifice metering system to 0 psig (0 bar). If a leak is detected at a fastener or connector, then tighten that fastener or connector and repeat the entire leak test again.
6. If several attempts to stop a leak fail, call Daniel Customer Service for assistance.
7. Slowly release the pressure from the orifice metering system until the pressure gauge reads zero (0) psig.

The Junior, with the orifice metering system, is now ready for orifice plate installation, final pressurization, and operation.

2.10 Commission - Orifice Plate installation

Conditions:

- The pressure within the Junior Body (4) and the adjacent metering system is equivalent to atmospheric pressure (0 psig / 0 barg).
- The Orifice Plate (13) and the Orifice Plate Sealing Unit (8E-DS or 8TS or 8MS or 8SN) is installed into the Orifice Plate Carrier (8DM)
- The Sealing Bar Gasket (9A) is installed on the Junior Body (4).
- The Sealing Bar (9) is installed on the Junior Body (4).
- The Orifice Plate Carrier (8DM) is installed in the Junior Body (4).
- The Clamping Bar (12) is installed.
- All Clamping Bar Screws (11) are tightened and secure per the information and procedures contained in [Section 5.2](#).

DANGER!

FLUID EXPLOSION HAZARD

The Junior is a device that contains fluid at elevated pressure.

Failure to follow the instructions in this manual will result in death or serious injury.

Procedure

1. Confirm that the pressure inside the Junior Body (4) and adjacent metering system components is at atmospheric pressure (0 psig / 0 barg) to begin orifice plate installation. When evacuating the metering system, direct fluid and/or gas to a safe area away from the operator and in accordance with local environmental regulations.
2. CONFIRM that the pressure inside the Daniel Junior Orifice Fitting Body (4) and adjacent metering system components is equivalent to atmospheric pressure.
3. Loosen each Clamping Bar Screw (11) two turns. Do not remove the Clamping Bar (12).
4. Lightly tap the Sealing Bar (9) to break the Sealing Bar Gasket (9A) seal.
5. Once the seal is broken, slide the Clamping Bar (12) out from the Body (4).
6. Lift out the sealing bar (9) and the sealing bar gasket (9A).
7. Rotate the plate carrier shaft (6) to raise the plate carrier (8DM).
8. For Daniel Junior Orifice Fittings sizes 10" through 16" remove the orifice plate carrier (8DM) from the fitting.

For Daniel Junior Orifice Fittings sizes larger than 16", rotate the external plate carrier shaft (34) to position the plate carrier(8DM) in the plate carrier guide-bracket assembly (41), and position the plate carrier stop (42) under the plate carrier to hold it in place to allow plate installation.

9. Install a new Orifice Plate Sealing Unit (8E - DS) or (8TS) or (8MS) or (8SN) onto the Orifice Plate (13).
10. Install the Orifice Plate (13) and new Orifice Plate Sealing Unit (8E - DS) or (8TS) or (8MS) or (8SN) into the Plate Carrier (8DM) taking into account the flow direction of the metering system. This can be done by assuring the Orifice Plate (13) beveled side faces toward the Plate Carrier (8DM) rack teeth.

Important

Failure to install the Orifice Plate (13) and Orifice Plate Sealing Unit (8E-DSC or 8TSC or 8MSC or 8SNC) in a position properly oriented with the direction of flow will result in measurement error and a possible loss of revenue.

11. Rotate the Plate Carrier Shaft (6) to lower the Plate Carrier (8DM) into the Body (4).
12. Install a new Sealing Bar Gasket (9A) into the Junior Body (4).
13. Install Sealing Bar (9) on Junior Body (4).
14. Install the Clamping Bar (12).

Important

The correct positioning and installation of the Sealing Bar Gasket (9A), Sealing Bar (9) , and Clamping Bar (12) are essential to providing a pressure barrier between the line pressure and atmospheric pressure.

15. Tighten each Clamping Bar Screw (11) located on the Clamping Bar (12) (Reference: [Section 5.2](#)).
16. Remove any commissioning equipment (test instruments, tubing, etc.,) from system.

The Daniel Junior Orifice Fitting is now ready for final pressurization and operation.

Part III

Maintain

3 Maintenance recommendations

3.1 Normal operating conditions

Under normal measurement conditions, a product operator should inspect the Junior, as well as the meter tube, at intervals established by the product operator.

It is the responsibility of the product owner and product operator to perform inspections at appropriate intervals during the life of their system.

1. An external inspection of the Junior and metering system shall include a visual assessment of the entire system for vandalism, or other inadvertent damage.
2. Tighten fastener and connector components, if necessary.
3. Natural corrosion and erosion of the orifice metering system internal features require that maintenance personnel perform an inspection of the orifice system's bore diameter to ensure compliance with a metering code (for example, API-14.3/AGA-3).

3.1.1 Lubrication

Apply a light coat of lubricant on the orifice seal ring to assist in installation and extraction of the plate carrier assembly.

Part IV

Operate

Chapters covered in this part:

- *Orifice plate removal and installation*
- *Supplemental information*

4 Orifice plate removal and installation

Topics covered in this chapter:

- *Plate change procedure*
- *Operating instructions*
- *Plate removal*
- *Plate insertion*

4.1 Plate change procedure

Follow these instructions during every plate change.

DANGER!

FLUID EXPLOSION HAZARD

Follow the instructions below to avoid inadvertent or accidental propulsion of fluid or internal components from the Body (4).

Failure to comply will result in death or serious injury.

Never place any part of your body over the slot opening of the Body when the Sealing Bar Gasket (9A), the Sealing Bar (9) and the Clamping Bar (12) are removed from the Daniel Junior Orifice Fitting and the line is under pressure.

Daniel Junior Orifice Fitting is shown in vertical position. The KEEP OUT ZONE includes the plate carrier slot opening of the Body (4) even when the Junior is positioned horizontally (laying on its side).

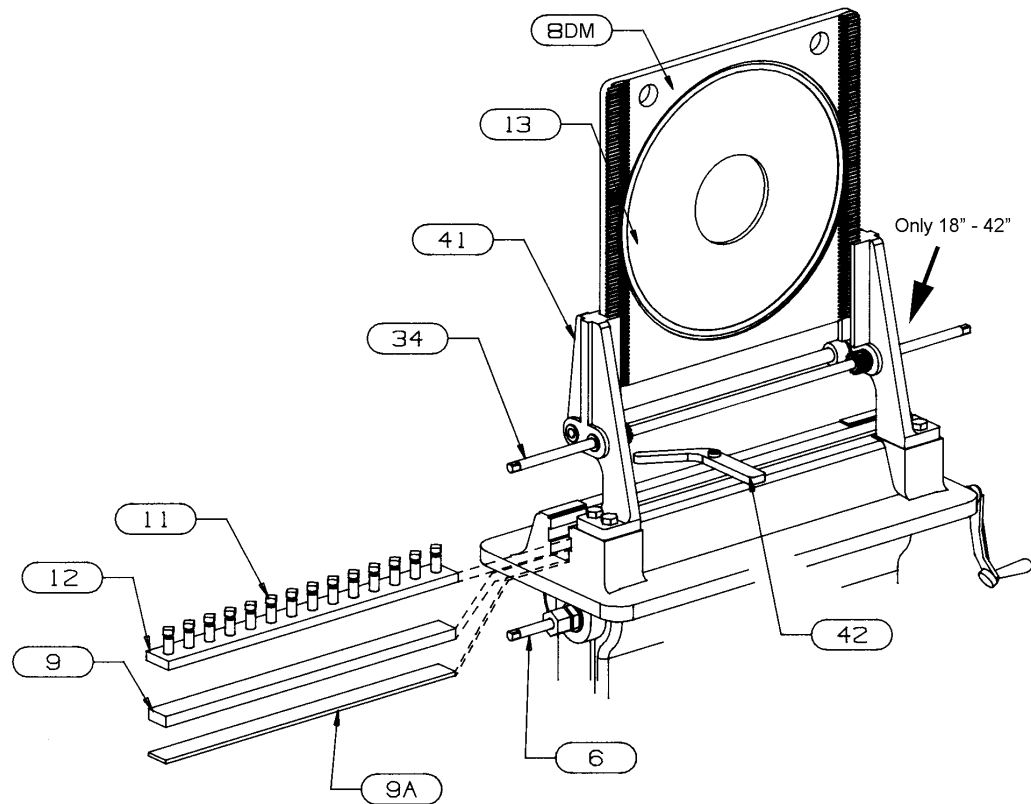
WARNING!

EXPLOSION HAZARD

The Daniel Junior Orifice Fitting contains fluid at elevated pressure. Make sure to follow the instructions below for proper installation and removal of the plate.

Failure to comply can cause an explosive release and may result in death or serious injury.

Figure 4-1: Components involved in plate removal and insertion process



Note: Item numbers 34, 41 and 42 used on 18"-42" only.

4.2 Operating instructions

The Junior design allows an operator to install or remove the Orifice Plate (13) with a minimum amount of metering system shut-downtime.

A product operator can easily remove the Plate Carrier (8DM), Orifice Plate (13) and Orifice Plate Sealing Unit (8E-DS) or (8TS) or (8MS) or (8SN) from the Body (4).

To change or inspect, an orifice plate or orifice plate seal, simply push on the Orifice Plate (13) and Orifice Plate Sealing Unit (8E-DS) or (8TS) or (8MS) or (8SN) until it pops out of the Orifice Plate Carrier (8DM).

By removing the Orifice Plate Sealing Unit (8E-DS) or (8TS) or (8MS) or (8SN) from the Orifice Plate (13), a product operator may then closely inspect both parts for signs of damage or wear.

4.3 Plate removal

Conditions:

- Isolate and gradually depressurize the line containing the Junior Orifice Fitting.
- The orifice plate (13) located in flow stream and in the Junior Orifice Fitting.

Procedure

1. Depressurize or shut in the line supporting the Daniel Junior Orifice Fitting.

DANGER!

FLUID AT ELEVATED PRESSURE HAZARD

The Daniel Junior Orifice Fitting is a device that contains fluid at elevated pressure.

Failure to follow the instructions in this manual will result in death or serious injury.

2. Extract the sealing bar (9) and orifice plate carrier (8DM), once the pressure in the fitting is reduced to ambient pressure .
3. Loosen the clamping bar screws(11) on the clamping bar (12) two turns.
4. Lightly tap the sealing bar (9) to break the gasket (9A) seal.
5. Slide out the clamping bar (12).
6. Lift out the sealing bar (9) and the sealing bar gasket (9A).
7. Rotate the plate carrier shaft (6) to raise the plate carrier (8DM).
8. For Daniel Junior Orifice Fittings sizes 10" through 16" remove the orifice plate carrier (8DM) from the fitting.

For Daniel Junior Orifice Fittings sizes larger than 16", rotate the external plate carrier shaft (34) to position the plate carrier (8DM) in the plate carrier guide-bracket assembly (41), and position the plate carrier stop (42) under the plate carrier to hold it in place to allow inspection, cleaning or plate changing.
9. Remove the orifice plate sealing unit (8E-DS, 8TS, 8M S, 8SN) from the orifice plate (13). (For orifice plates with sealing unit part number 8E-DVS, the synthetic rubber is permanently bonded to the plate and cannot be separated.)

4.4 Plate insertion

DANGER!

FLUID AT ELEVATED PRESSURE HAZARD

The Daniel Junior Orifice Fitting is a device that contains fluid at elevated pressure.

Failure to follow the instructions in this manual will result in death or serious injury.

Conditions:

- Daniel Junior Orifice Fitting in line, and the Sealing Bar (9) Sealing Bar Gasket (9A) and Clamping Bar (12) removed from the Body (4).

Procedure

1. Ensure a new sealing bar gasket (9A) is on hand for installation onto the Daniel Junior Orifice Fitting body (4), in Step 5.
2. Install a new orifice seal (8E-DS, 8TS, 8MS, 8SN) on the orifice plate (13), except where sealing unit part number 8-DVS (permanently bonded synthetic rubber) is in use.
3. Install the orifice plate (13) and seal assembly (8E-DS, 8TS, 8MS, 8SN) as required into the plate carrier (8DM) taking into account the flow direction of the line (inlet side upstream).

Important

Failure to install the Orifice Plate (13) and Orifice Plate Sealing Unit (8E-DS) or (8TS) or (8MS) or (8SN) in a position properly oriented with the direction of flow will result in measurement error and a possible loss of revenue.

4. For Daniel Junior Orifice Fittings sizes 10" through 16", rotate the plate carrier shaft (6) to seat the plate carrier (8DM) in the fitting.

For Daniel Junior Orifice Fittings larger than 16", rotate the external plate carrier shaft (34) to raise the plate carrier (8DM), and position the plate carrier stop (42) clear of the opening. Rotate the external plate carrier shaft (34) to lower the plate carrier (8DM) into the top of the fitting body (4), and engage the gears associated with the plate carrier shaft (6). Rotate the plate carrier shaft (6) to seat the plate carrier (8DM) in the fitting.

5. Install the clamping bar (12).
6. Tighten each of the clamping bar screws (11), located on the Clamping Bar (12) (Reference: [Section 5.2](#)).

The Junior Orifice Fitting is now ready for final pressurization and operation.

5 Supplemental information

Topics covered in this chapter:

- *Recommended spare parts for one-year operation*
- *Torque information*

5.1 Recommended spare parts for one-year operation

Table 5-1: Recommended spare parts for one-year operation

Item no.	Description	Material	Quantity
8E-DS	Orifice Plate Sealing Unit	Elastomer	5
8TS	Orifice Plate Sealing Unit	PTFE	1
8MS	Orifice Plate Sealing Unit	Metallic	1
9A	Sealing Bar Gasket (ANSI 150-600)	Flat Fiber Sheet	5
	Sealing Bar Gasket (ANSI 900)	Flat Fiber Sheet	5
	Sealing Bar Gasket (ANSI 1500-2500)	Elastomer	5

5.2 Torque information

For a fitting to pass all factory tests, factory assembly personnel tighten each fastener used in the Junior to ensure proper operation and to seal the unit.

Product owners and product operators must realize that both time and service conditions impact the tightness and strength of joints originally assembled in the factory. Some, but not all, of these service conditions are:

- Time in service or storage
- Temperature cycles
- Vibration
- Mechanical loads
- Pressure loads
- Fastener thread condition (dirt/corrosion)

- Condition of joint assembly components (fasteners, gaskets, sealing surface conditions)
- Fastener lubrication and coatings

Emerson publishes these suggested torque values to help owners and users establish a starting point for applying torque to fasteners in service to achieve a seal. The torque value applied to the clamping bar screws, necessary to achieve that seal, maybe greater than, less than or within the suggested torque range in [Section 5.2](#).

Again, these values are only a reference. They are reference values because it is impossible for Emerson to know all of the variable conditions (some listed above) that your fitting (under your care) will see in actual service. Only the owner or operator, after careful consideration of a fitting's service conditions, can specify a torque value to achieve an adequate seal. Therefore, owners and operators are ultimately responsible for clamping bar assembly torque specifications. Again, owners and users are to use the torque values given in the following table as reference only.

Apply the torque values that you select using the sequencing patterns provided in this section and in accordance with industry or company bolting procedures.

These values are FOR REFERENCE only.

Table 5-2: Clamping bar screw (11) size and suggested torque values

Screw size	Suggested torque range (lbf·ft [N·m])		Maximum torque (lbf·ft [N·m])
	Lower	Upper	
1/2"-13	75 [101]	120 [163]	130 [176]
5/8"-11	120 [163]	195 [264]	265 [359]

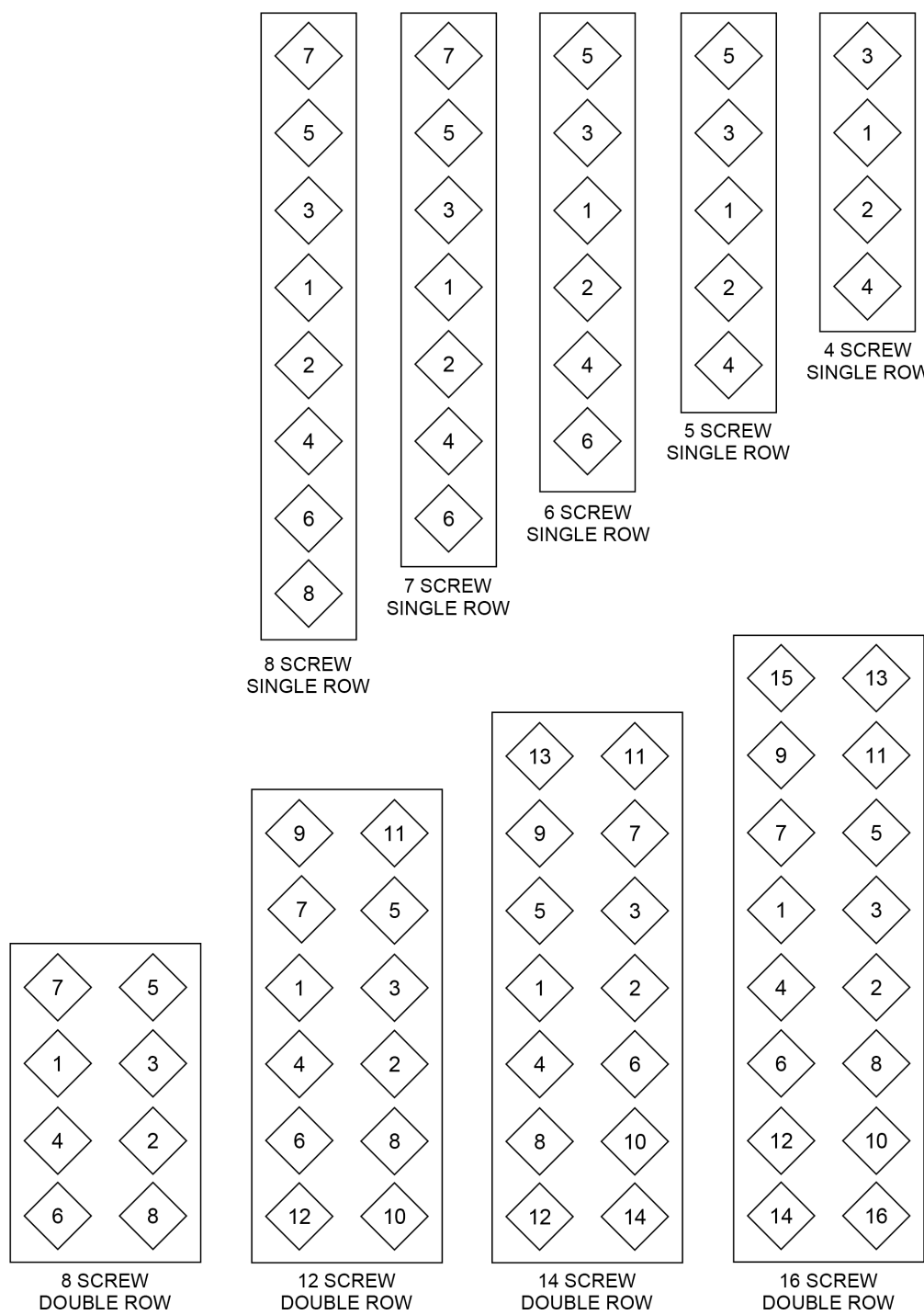
These torques values are to help users establish a starting point to provide adequate assembly and in-service clamping force in most applications. These values are FOR REFERENCE only.

DO NOT apply torque greater than the Maximum Torque value.

These torque values reflect new, heat treated, alloy steel (AISI 4140) screws.

Owners and operators are ultimately responsible for all joint assemblies within their system, including the clamping bar screws of the Junior fitting.

Figure 5-1: Torque pattern sequences



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