



**Autoclave
Engineers** 

Parker Autoclave Engineers
Providing Tools for Research and Industry

Stirred Reactors



High Temperature 2,000 and 4,000 ml Bolted Closure Stirred Reactor

At a Glance

Volume:	2000 or 4000 ml
Vessel MAWP: (Design Pressure)	5,000 psi @ 950° F (345 Bar @ 510° C)
Material of Construction:	316 Stainless Steel or Hastelloy C-276

Principle of Operation

The Parker Autoclave Engineers' Bolted Closure Reactor has been designed for reliable high pressure operation. The seal is a metal gasket machined from the same material as the vessel. Many combinations of standard components are available. The cover of the unit remains fixed in the stand to permit opening of the vessel without disassembling any process connections. The body is easily removed and drops away from the cover.

General Specifications

Maximum Allowable Working Pressure (MAWP)

5,000 psi @ 950° F*
(345 Bar @ 510° C)*

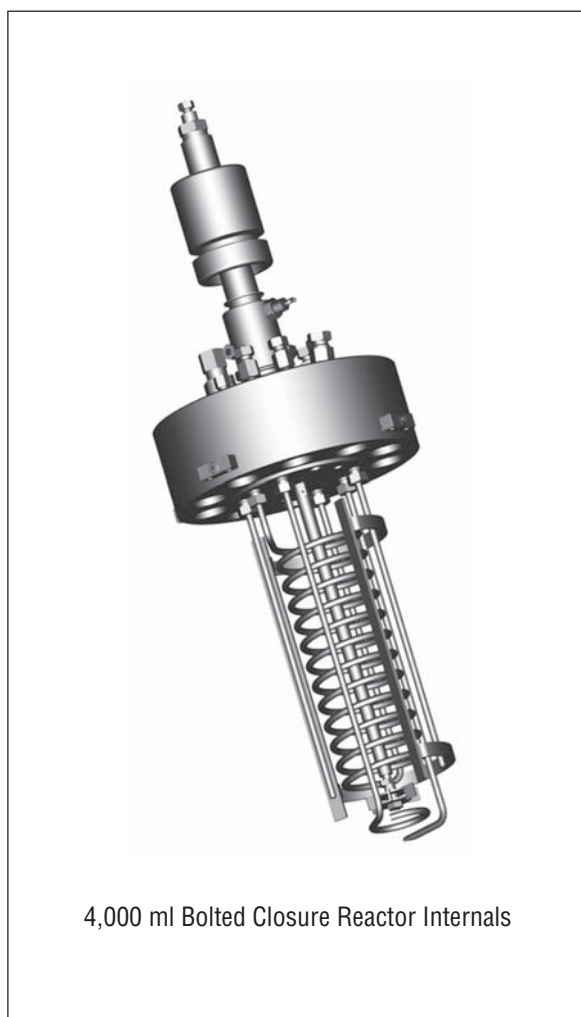
Minimum Design Metal Temperature (MDMT)

-20° F @ 5,000 psi
(-29° C @ 345 Bar)

Maximum Recommended Operating Pressure (MROP)

Varies based on gage, transducer, and rupture disk selection. Refer to Ordering Guide for Details.

Critical Dimensions:	2,000 ml	4,000 ml
Inside Diameter:	5.0" (127 mm)	5.0" (127 mm)
Straight Wall:	6.06" (153 mm)	12.31" (312 mm)
Approximate Dimensions:	Floor Stand	
Overall Height**:	59.4" (1508 mm)	
Width:	30.0" (762 mm)	
Depth:	38.0" (965 mm)	



4,000 ml Bolted Closure Reactor Internals

* 650° F (343° C) rating is vessel mean wall temperature. Actual Process temperature will be lower.

** Overall height based on belt driven units. For actuals see standard drawings.

2,000 and 4,000 ml Bolted Closure Stirred Reactors Connection Schedule

All of the connections shown are provided. For any accessories not ordered, the corresponding connection will be plugged. All connections (except safety head) are adapted from an AE high temperature F437 Flat Bottom connection to the "External" connection listed below.

Opening	Purpose	Internal	External	Location
"A"	Charging Port	3/8" Port	3/8" Tube	Cover Top
"B"	Gas Inlet	1/4" Tube	1/4" Tube	Cover Top
"C"	Sparge Tube	1/4" Tube	1/4" Tube	Cover Top
"D" & "H"	Cooling Coil (1/8 FNPT at cover)	1/4" Tube	1/4" Tube	Cover Top
"E"	Thermowell	1/4" Tube	None	Cover Top
"F"	Safety Head (F750FB at Cover)	None	3/8" FNPT	Cover Top
"G"	Vent and Pressure Indication	None	1/4" Tube	Cover Top
"J"	Blow Pipe	1/4" Tube	1/4" Tube	Cover Top
"K"	Liquid Sample	1/4" Tube	1/4" Tube	Cover Top
"L"	MagneDrive® Agitator	None	AE Special	Cover Top

Technical Specifications

Parker Autoclave Engineers provides a variety of optional accessories to custom configure each reactor. See the Bolted Closure Stirred Reactor Ordering Guide to configure a reactor for a specific application.

Seal Materials: Metal Gasket (vessel material).
Approvals: Optional ASME Code Stamp or CE Mark.
Stand: Floor Stand Only.
Body Lift: None or Manual Jack.
Agitator: MagneDrive® MAG075-01 Series with 7 in-lb (0.79 N-m) static torque, Purebon® (carbon graphite) bearings or FPGF. MagneDrive® MAG075-02 Series with 16 in-lb (1.8 N-m) static torque, Purebon® (carbon graphite) bearings or FPGF.
Motors: 1/2 HP (0.37 KW) General Purpose DC with either: 90 V Armature (120 V unit), or 180 V Armature (240 V unit). 1/2 HP (0.37 KW) Explosion-Proof DC with either: 90 V Armature (120 V unit), or 180 V Armature (240 V unit). Air Motor with manual or electric speed adjustment.
Impeller Styles: AE Dispersimax, Straight Turbine, Axial Flow-Up, or Axial Flow-Down; All 2.0 inch (50.8 mm) diameter.
Baffle: Two (2) blade spring loaded baffle bar (removable).
Speed Sensor: Magnetic Sensor General Purpose, or Intrinsically-Safe Magnetic Sensor (Barrier Required)
Heating: Furnaces: 120 VAC (2000ml Only), Single Phase or 240 VAC, Single Phase; 2,000ml-2,000Watt, 4,000ml-3,500 Watt.

Internal Accessories Available: Liquid Sample Tube, 1/4" Valve
 Blow Pipe, 1/4" Valve
 Sparge Tube, 1/4" Valve
 Cooling Coil, 1/4" Tube
 Process Thermocouple, Type J or K

External Accessories Available: Vent Valve, 1/4" Valve
 2.5" (63.5 mm) Dial Pressure Gage - Multiple ranges available
 Pressure Transducers - Range Dependent on Gage
 One or Two Gas Inlet, 1/4" Valves, Shared Connection
 External Thermocouple, Type J or K
 1/2" Port Manual Flush Valve

Supporting Information

Please refer to the following sections of the catalog for complimentary products and additional technical details.

- "Bolted Closure Stirred Reactor Ordering Guide" - Provides a step-by-step guide on how to configure the Bolted Closure Reactor to a specific application.
- "Instrumentation" - Details Parker Autoclave Engineers' full line of control options for temperature, pressure, and speed.
- "Agitation" - Provides additional specifications on the MagneDrive® magnetic agitator and available impeller systems.
- "Pressure Vessels" - Provides details on the Bolted Closure vessel assembly.
- "Stirred Reactor Selection Guide" - Provides general information on all of Parker Autoclave Engineers' stirred reactors.

WARNING

FAILURE, IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS AND/OR SYSTEMS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

This document and other information from Parker Hannifin Corporation, its subsidiaries and authorized distributors provide product and/or system options for further investigation by users having technical expertise. It is important that you analyze all aspects of your application and review the information concerning the product or system in the current product catalog. Due to the variety of operating conditions and applications for these products or systems, the user, through its own analysis and testing, is solely responsible for making the final selection of the products and systems and assuring that all performance, safety and warning requirements of the application are met. The products described herein, including without limitation, product features, specifications, designs, availability and pricing, are subject to change by Parker Hannifin Corporation and its subsidiaries at any time without notice.

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EZE-Seal Stirred Reactor Ordering Guide

Volume	Pressure Vessel	MagneDrive	Internal Accessories	External Accessories
E _ _ _	--- A B C D E F ---	G H J K L	--- M N O P Q ---	R S T U V W
	(Select from options below)	(See reverse)	(See reverse)	
	100 ml - "010" 300 ml - "030"	500 ml - "050" 1,000 ml - "100"	2,000 ml - "200" 4,000 ml - "400"	

Pressure Vessel

A Vessel Material:

- SS - 316 Stainless Steel
- HC - Hastelloy C-276

B Seal Materials:

- A - Metal Gasket, 850° F (454° C)*
(Vessel Material, Silver Plated)
- B - Buna-N O-ring, 250° F (121° C)*
- C - EPDM O-ring, 300° F (149° C)*
- D - PTFE O-ring, 400° F (204° C)*
- E - Viton®¹ O-ring, 450° F (232° C)*
- F - Silicone O-ring, 400° F (204° C)*
- G - Kalrez®¹ O-ring, 500° F (260° C)*

C Flush Valve:

- 0 - None
- 1 - 1/2" Port Manual Valve
(500 ml to 4,000 ml only, requires floor stand)

D Approvals Available:

- 0 - None Required
- 1 - ASME Code Stamp
- 2 - CE Mark Compliance

E Stand:

- 0 - None
- 1 - Short Bench Top (100 ml & 300 ml only)
- 2 - Tall Bench Top (100 ml to 1,000 ml only)
- 3 - Floor (500 ml to 4,000 ml only)

F Body Lift Mechanism:

- 0 - None
- 1 - Manual Jack

MagneDrive® Agitator

G Models:

- A - MAG075-01 Belt Driven
- C - MAG075-02 Belt Driven

H Bearings:

- 1 - Purebon®² (Carbon Graphite)

J Speed Sensors:

- 0 - None
- 1 - General Purpose
- 2 - Intrinsically Safe (IS Barrier not provided)

K Motors:

- 0 - None
- 1 - DC Variable Speed, 90 VDC, General Purpose
- 2 - DC Variable Speed, 180 VDC, General Purpose
- 3 - DC Variable Speed, 90 VDC, XP (Non-CE Mark)
- 4 - DC Variable Speed, 180 VDC, XP (Non-CE Mark)
- 5 - Air with Manual Speed Adjust
- 6 - Air with Electronic Speed Adjust

L Impellers:

- A - AE Dispersimax (6 blade) with Baffle Bar**
- B - Turbine (6 blade) with Baffle Bar
- C - Axial Up (4 blade) with Baffle Bar
- D - Axial Down (4 blade) with Baffle Bar

*Temperature limits are suggested. Actual performance will vary with chemical compatibility.

**Dispersimax impeller system not available for 100 ml EZE-Seal.

¹ Viton® and Kalrez® are registered trademarks of DuPont Dow Elastomers.

² Purebon® is a registered trademark of Pure Carbon.

EZE-Seal Stirred Reactor Ordering Guide

Volume Pressure Vessel MagneDrive Internal Accessories External Accessories

E _ _ _ --- A B C D E F --- G H J K L --- M N O P Q --- R S T U V W

(See Reverse)

(See reverse)

(Select from Options Below)

Internal Accessories

M Liquid Sample:

- 0 - None, (Plugged Connection)
- 1 - Sample Tube Only
- 2 - Tube with Manual Valve

N Blow Pipe**:

- 0 - None, (Plugged Connection)
- 1 - Blow Pipe Only
- 2 - Blow Pipe with Manual Valve

O Sparge Tube**:

- 0 - None, (Plugged Connection)
- 1 - Sparge Tube Only
- 2 - Sparge Tube with Manual Valve

P Cooling Coil:

- 0 - None, (Plugged Connection)
- 1 - Cooling Coil Only
- 2 - Cooling Coil with Manual Valve
- 3 - Cooling Coil with 1/4" Solenoid Valve(120V)
- 4 - Cooling Coil with 1/4" Solenoid Valve(240V)

Q Process Thermocouple:

- 0 - None, (Plugged Connection)
- 1 - Thermowell Only
- 2 - Thermowell with Type "K"
- 3 - Thermowell with Type "J"

IMPORTANT NOTES:

*Temperature limits are suggested. Actual performance will vary.

**In 100 ml and 300 ml sizes, a Blow Pipe or a Sparge Tube is available, but not both.

+MROP may be further reduced by temperature and number of cycles

External Accessories

R Vent Valve:

- 0 - None, (Plugged Connection)
- 1 - Vent with Manual Valve

S Pressure Gauge/Transducer:

(Dictates Max. Recommended Operating Pressure "MROP")

- A - 600 psi Gage Only, (450 psi MROP)+
- B - 1,000 psi Gage Only, (750 psi MROP)+
- C - 2,000 psi Gage Only, (1,500 psi MROP)+
- D - 3,000 psi Gage Only, (2,250 psi MROP)+
- E - 5,000 psi Gage Only, (2,850 psi MROP)+
- G - 600 psi Gage/Transducer, (450 psi MROP)+
- H - 1,000 psi Gage/Transducer, (750 psi MROP)+
- J - 2,000 psi Gage/Transducer, (1,500 psi MROP)+
- K - 3,000 psi Gage/Transducer, (2,250 psi MROP)+
- L - 5,000 psi Gage/Transducer, (2,850 psi MROP)+

T Heating & Cooling:

- 0 - None
- 1 - Electric 120 VAC, Single Phase (2,000 ml Only)
- 2 - Electric 240 VAC, Single Phase
- 5 - Baffled Removable Jacket, 1/4" FNPT Connections, 450° F (232° C) Max.*

U Gas Inlet:

- 0 - None, (Plugged Connection)
- 1 - Gas Inlet Line with One (1) Manual Valve
- 2 - Gas Inlet Line with Two (2) Manual Valves (Shared Connection)

V Charging Valve:

- 0 - None, (Plugged Connection)
- 1 - 3/8" Manual Charging Valve

W External Thermocouple:

- 0 - None
- 1 - Type "K"
- 2 - Type "J"

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