

Bolted Closure

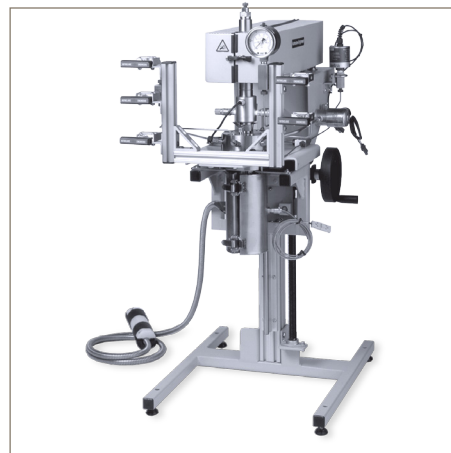
Stirred Reactors: 100 and 300 ml

Volume: 100 & 300 ml

Vessel MAWP*: 5,500 psi @ 650°F (379 bar @ 343°C)

Material of Construction: 316 Stainless Steel, Hastelloy® C276

* Maximum Allowable Working Pressure



Principle of Operation:

The Parker Autoclave Engineers' Bolted Closure Reactor has been designed for reliable high pressure operation. The seal can be a metal gasket machined from the same material as the vessel or an elastomeric seal. 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. The bolted closure stirred laboratory reactor is a versatile high pressure and high temperature, stirred laboratory reactor. It is used for chemical synthesis of corrosive, hazardous and very reactive chemicals/petrochemicals as well as materials research.

General Specifications:

Maximum Allowable Working Pressure (MAWP) - Design Pressure

5,500 psi @ 650° F (379 Bar @ 343° C) [See Note](#)

Minimum Design Metal Temperature (MDMT)

-20° F @ 5,500 psi (-29° C @ 379 Bar)

Maximum Recommended Operating Pressure (MROP)

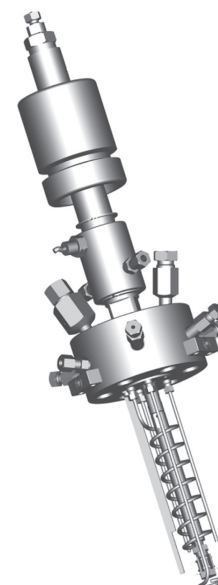
Varies based on gauge, transducer, and rupture disk selection.
Refer to Ordering Guide for Details.

Critical Dimensions	100 ml	300 ml
Inside Diameter	1.81" (46 mm)	1.81" (46 mm)
Straight Wall	2.75" (70 mm)	6.69" (170 mm)
Approximate Dimensions	Short Bench Top	Tall Bench Top
Overall Height**	34.8" (883 mm)	39.4" (1001 mm)
Width	20.5" (521 mm)	20.5" (521 mm)
Depth	26.2" (665 mm)	26.2" (665 mm)

Note

The user should be aware that the 650°F (343°C) vessel temperature rating is the maximum mean wall temperature of the vessel, as defined by the ASME B&PV Code. Many variables can affect the thermal capabilities of the vessel. These factors can include, but are not limited to, the use of insulation, whether the process is batch or continuous flow, or even a chemical process itself. These factors may have bearing on heat up rate, maximum process temperature, and the cool down rate of the reactor. These factors should be considered by the user when purchasing a system in order to verify that the equipment will reach desired operating temperature in a reasonable time period. Please consult Parker Autoclave Engineers if assistance is required.

** Overall height based on belt driven units. Consult factory for overall height of other configurations.



300 ml Bolted Closure
Reactor Internals



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Features:

- Versatile product configuration
- Operating pressures as high as 4,700 psi @ 650°F (324 bar @ 343°C)
- Open vessel and remove body without disassembling pressure connections
- Available worldwide to meet codes such as ASME, CE and CRN

Connection Schedule:

All of the connections shown will be provided. For any accessories not ordered, the corresponding connection will be plugged. All connections at cover are AE high temperature F437 Flat Bottom adapted to the "External" connection listed below.

Opening	Purpose	Internal	External	Location	Smallest Diameter Orifice (nominal) in flow path
A	Charging Port	0.19" Port	3/8" O.D. Tube	Cover Top	0.19"
B	Gas Inlet	Branched into A	1/8" O.D. Tube	Cover Side	0.062"
C	Blow Pipe or Sparge Tube †	1/8" O.D. Tube	1/8" O.D. Tube	Cover Side	0.062" / 0.031" †
D & H	Cooling Coil	1/8" O.D. Tube	1/4" O.D. Tube	Cover Side	0.062"
E	Vent & Pressure Indication	Branched into F	1/8" O.D. Tube	Cover Side	0.062"
F	Safety Head	0.19" Port	3/8" FNPT	Cover Top	0.19"
G	Thermowell ††	1/8" O.D. Tube	3/32" Port ††	Cover Top	N/A
J	Liquid Sample or Sparge Tube †	1/8" O.D. Tube	1/8" O.D. Tube	Cover Side	0.062" / 0.031" †
K	MagneDrive® Agitator	1/2" O.D. Mixing Shaft	AE Special	Cover Top	N/A

† The tube that forms the sparge tube is 1/8" O.D. and 1/16" I.D. with a plug in the end. Nine .031" diameter holes are drilled in the sparge ring to bubble gas into the reactor.

†† The tube that forms the thermowell is 1/8" O.D. and 1/16" I.D. with a plug in the end. A 3/32" port is drilled in the cover to guide the thermocouple to the opening in the thermowell. Thermowell only provided if heating/cooling option is selected.

Technical Specifications:

Parker Autoclave Engineers provides a variety of optional accessories to custom configure your reactor. See the **Ordering Guide** on the back cover to configure a reactor for your specific application.

Seal Materials: Metal gasket (vessel material), Nitrile, EPR, PTFE Encapsulated FKM, FKM, Silicone or FFKMO-rings

Approvals: Optional ASME code stamp, Canadian Registration or CE Mark

Stand: Short Bench Top or Tall Bench Top

Body Lift: None or Manual Jack

Agitator: MagneDrive® MAG075-01 Series with 7 in-lb (0.79 N-m) static torque, Purebon®⁶ (carbon graphite) or FPGF bearings
MagneDrive® MAG075-02 Series with 16 in-lb (1.8 N-m) static torque, Purebon®⁶ (carbon graphite) or FPGF bearings
iMag075® Series with 7 in-lb (0.79 N-m) static torque, Purebon®⁶ (carbon graphite) or FPGF bearings

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 electronic speed adjustment.

1/8 HP (0.09 KW) or 1/3 HP (0.25 KW) General Purpose DC with 130 V Armature

Impeller Styles: AE Dispersimax®, Straight Turbine, Axial Flow-Up, or Axial Flow-Down; All 7/8 inch (22.2 mm) diameter.

Baffle: One (1) single blade baffle attached to the top cover is included

Speed Sensor: Magnetic Sensor General Purpose

Heating Furnaces: 120 VAC or 240 VAC, Single Phase - 100ml - 650 Watt, 300ml - 1,200 Watt

Jacket: Removable, spiral baffled with O-ring seals.

Internal Accessories Available	External Accessories Available
<ul style="list-style-type: none"> • Liquid Sample Tube, optional 1/8" Valve • Blow Pipe, optional 1/8" Valve • Sparge Tube, optional 1/8" Valve • Cooling Coil, optional manual or solenoid 1/4" Valve • Process Thermocouple, Type K 	<ul style="list-style-type: none"> • Vent Valve, 1/8" Valve • 2.5" (63.5 mm) Dial Pressure Gauge - multiple ranges available • Pressure Transducer - Range dependent on gauge • One or two gas Inlet, 1/8" Valves, Shared Connection • Catalyst Charging Valve, 3/8" O.D. Tube with 1/4" Port • External Thermocouple Type K • 3/16" Bottom Port (centered AE F437FB connection) • Forward Pressure Regulation (FPR) or Back Pressure Regulation (BPR)

Supporting Information:

Engineering drawings are available upon request from Parker Autoclave Engineers for more detailed technical information. Reference our catalog for additional literature on Bolted Closure Ordering Guide, Instrumentation, Agitation, Pressure Vessels, and Stirred Reactors. The following drawings are available upon request from PAE for more detailed technical information

Drawing Number 40A-8362 - Bench Top/Light Floor Motor Options (Air and DC motors)
 Drawing Number 30B-0792 - Belt Drive Assembly (AC Motor)
 Drawing Number 30A-9638 - Manual Screw Jack Assembly

Drawings				Drawing Title
316 Stainless Steel		Hastelloy® C-276		
100 ml	300 ml	100 ml	300 ml	
40C-0531	40A-8545	40C-0439	40A-8684	Bench Top Bolted Closure General Arrangement
	40A-8521		40A-8636	Bolted Closure Reactor
30A-9605		30B-0382		MAG 075 MagneDrive® Assembly
40C-0513		40C-0998		iMAG 075 MagneDrive® Inline Drive
30A-9640		30B-0479		1/8" Valve Rack

Ordering Guide:

Model Code				Pressure Vessel						MagneDrive® Agitator					Internal Accessories				External Accessories					
B	0	3	0	S	S	B	0	0	1	1	A	1	1	1	A	1	1	0	1	1	D	1	1	0
Volume				A	A	B	C	D	E	F	G	H	J	K	L	M	N	O	P	R	S	T	U	V

Part Number Example: **B030SSB0011A111A11011D110** (example selections indicated in yellow below)

Model Code

Volume	
010	100 ml Bolted Closure Reactor
030	300 ml Bolted Closure Reactor

Pressure Vessel

AA - Vessel Material	
SS	316 Stainless Steel
HC	Hastelloy®1 C-276

B - O-ring Seal Material	
A	Metal Gasket, 650°F/343°C (Vessel Material) ²
B	Nitrile (Max. Temp. 250°F/121°C) ²
C	Ethylene-Propylene (Max. Temp. 300°F/149°C) ²
D	PTFE (PTFE Encapsulated FKM) (Max. Temp. 400°F/204°C) ²
E	FKM (Max. Temp. 450°F/232°C) ²
F	Silicone (Max. Temp. 450°F/232°C) ²
G	FFKM (Kalrez®) ³ (Max. Temp. 500°F/260°C) ²

C - Body Bottom Connection	
0	None (No Connection)
2	Flat Bottom Connection

D - Approvals Available ¹¹	
0	None Required
1	ASME Code Stamp
2	CE Mark Compliance
3	Canadian Registration

E - Stand	
0	None
1	Short Bench Top
2	Tall Bench Top

F - Body Lift Mechanism	
0	None
1	Manual Jack
2	Manual Jack CE

MagneDrive® Agitator

G - MagneDrive® Agitator	
A	MAG075-01 Belt Driven
B	iMAG075 Inline
C	MAG075-02 Belt Driven
D	iMAG075 Inline with Dispersimax (for 100 ml only)
F	MAG075-01 Belt Driven with Dispersimax (for 100 ml only)
G	MAG075-02 Belt Driven with Dispersimax (for 100 ml only)
X	No MagneDrive® with opening plugged

H - Bearings	
0	None ⁵
1	Purebon® ⁶ (Carbon Graphite)
2	Fluoropolymer with graphite fiber ⁷
1	Purebon® ⁶ 3310

J - Speed Sensors	
0	None
1	General Purpose Hall Effect

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
7	AC Motor, XP CE Mark
C	Belt & Guard WITHOUT MOTOR
D	1/8 HP 0-130 VDC Variable Speed GP Inline
E	1/3 HP 0-130 VDC Variable Speed GP Inline
F	Air Motor - Manual Speed Adjust Inline
G	Air Motor - Electronic Speed Adjust Inline

L - Impellers / Shaft / Baffles	
A	AE Dispersimax™ (6 blades) with Baffle Bar
B	Turbine (6 blades) with Baffle Bar
C	Axial-Up (4 blades) with Baffle Bar
D	Axial-Down (4 blades) with Baffle Bar
X	None ⁵

Internal Accessories

M - Liquid Sample	
0	None, Plugged Connection
1	Sample Tube Only
2	Sample Tube with Manual Valve
5	Sample Tube with Manual Valve and Filter

N - Blow Pipe ¹⁰	
0	None, Plugged Connection
1	Blow Pipe Only
2	Blow Pipe with Manual Valve

O - Sparge Tube ¹⁰	
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" (120 Volt) Solenoid Valve
4	Cooling Coil with 1/4" (240 Volt) Solenoid Valve

NOTES:

1. HASTELLOY® is a registered trademark of Haynes International Inc.
2. Temperature limits are suggested. Actual performance will vary with chemical compatibility.
3. Kalrez® is a registered trademark of DuPont.
4. The drain valve is a "Flush" design (no dead volume) that extends approximately 8.25" (210 mm) below the vessel.
5. Use this option only if X (No MagneDrive®) is selected as the model of MagneDrive® agitator
6. Purebon® is a registered trademark of Morgan AM&T.
7. Fluoropolymer bearings have a maximum recommended service temperature of 500°F (260°C).
8. MROP may be further reduced by temperature and number of cycles.
9. When heating/cooling is selected, the reactor is supplied with a process Type K Thermocouple and Thermowell, and an external Type K Thermocouple. When no heating/cooling is selected, the reactor will be supplied with a plugged connection for the process thermocouple.
10. In 100 & 300 ml size, either a Blow Pipe or a Sparge Tube is available, but not both.
11. Consult factory for pricing and rating of code vessels.

External Accessories

R - Vent Valve	
0	None, Plugged Connection
1	Vent with Manual Valve
2	High Volume Vent with Solenoid Valve (120 Volt)
3	High Volume Vent with Solenoid Valve (240 Volt)
4	BPR Digital (120 Volt)
5	BPR Digital (240 Volt)
7	BPR Digital with High Volume Vent 120 VAC Solenoid
8	BPR Digital with High Volume Vent 240 VAC Solenoid

S - Pressure Gauge/Transducer (MROP = Max. Recommended Operating Pressure)	
A	600 psi Gauge Only (450 psi MROP) ⁸
B	1,000 psi Gauge Only (750 psi MROP) ⁸
C	2,000 psi Gauge Only (1,500 psi MROP) ⁸
D	3,000 psi Gauge Only (2,250 psi MROP) ⁸
E	5,000 psi Gauge Only (3,750 psi MROP) ⁸
F	7,500 psi Gauge Only (4,700 psi MROP) ⁸
G	600 psi Gauge/1 ksi Transducer (450 psi MROP) ⁸
H	1,000 psi Gauge/1 ksi Transducer (750 psi MROP) ⁸
J	2,000 psi Gauge/3 ksi Transducer (1,500 psi MROP) ⁸
K	3,000 psi Gauge/3 ksi Transducer (2,250 psi MROP) ⁸
L	5,000 psi Gauge/5 ksi Transducer (3,750 psi MROP) ⁸
M	7,500 psi Gauge/10 ksi Transducer (4,700 psi MROP) ⁸
N	600 psi Gauge/1 ksi IS Transducer (450 psi MROP) ⁸
P	1,000 psi Gauge/1 ksi IS Transducer (750 psi MROP) ⁸
Q	2,000 psi Gauge/3 ksi IS Transducer (1,500 psi MROP) ⁸
R	3,000 psi Gauge/3 ksi IS Transducer (2,250 psi MROP) ⁸
S	5,000 psi Gauge/5 ksi IS Transducer (3,750 psi MROP) ⁸
T	7,500 psi Gauge/10 ksi IS Transducer (4,700 psi MROP) ⁸

T - Heating and Cooling ⁹	
0	None
1	Electric 120 VAC, Single Phase
2	Electric 240 VAC, Single Phase
3	120 VAC, Purgeable Furnace
4	240 VAC, Purgeable Furnace
5	Baffled Removable Jacket, 1/4" FNPT Connections 450°F (232°C) Maximum

U - Gas Inlet	
0	None, Plugged Connection
1	Gas Inlet Line with One (1) Manual Valve
2	Gas Inlet Line with Two (2) Manual Valve (Shared Connection)
3	Forward Pressure Regulation (FPR) - Digital 120VAC
4	Forward Pressure Regulation (FPR) - Digital 240 VAC

V - Charging Valve	
0	None, Plugged Connection
1	3/8" Manual Charging Valve
2	Manual Valve with 8cc Charging Cartridge
3	Manual Valve with 20cc Charging Cartridge
4	Reflux Condenser

WARNING

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Bulletin SR-BC-100/300

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