

Series Number:

# 5100

Type:  
**Glass or Metal**

Stand:  
**Bench Top**

Mounting Style:  
**Fixed Head**

Vessel Sizes:  
**160 mL - 1.5 L**

Maximum Operating Pressure, MAWP Rating, psi (bar):  
**Glass: 150 (10)**  
**Metal: 1000 (69)**

Maximum Operating Temperature, °C:  
**225**

## Series 5100 Glass Reactors, 160-1500 mL



**5111 Bench Top Reactor, Glass Jacketed Vessel, 1000 mL, Fixed Head.**

### The Parr Series 5100 Low Pressure Glass Reactors offer:

1. A system for running reactions similar to those that have been conducted for many years in the Parr shaker, but which offer stirring for better scalability, higher operating temperatures and pressures, and more extensive reactor controls and instrumentation.
2. Glass Reactors for use at elevated pressures that permit direct observation of mixing action, color changes, or changes of state.
3. Reactors designed for convenient operation at moderate pressure and/or for corrosion resistance.

### Convenient and Easy Sealing with O-rings and Split-Ring Closures

Parr has developed an O-ring and closure system to accommodate the requirements of this unique glass-to-metal seal and support, which is convenient to use. A face seal-type O-ring design is used with the proven and popular

Parr split-ring closure. For this application a special gasket groove was designed to retain the O-ring on the head of the reactor when it is opened. A full range of O-ring materials is available for chemical compatibility with reactants, products and solvents.

The split-ring for the glass vessel is padded with high temperature cushions so the glass vessel does not come in direct contact with the metal split-ring. Six sealing screws are tightened finger tight to develop the seal on the O-ring. The split-ring snaps together with latches to provide a secure and positive closure.

The alternate metal cylinders use a different split-ring designed to handle the higher working pressure of the metal vessels.

### Standard Reactor Fittings

The head of each glass reactor is equipped with:

- Pressure gage, 3-1/2 inch diameter, calibrated 0-200 psi and 0-14 bar
- Gas release valve

## 5100



Split-Ring for Glass Reactors.



Split-Ring for Metal Reactors.

- Gas inlet valve
- Liquid sampling valve
- Internal thermocouple
- Internal cooling loop – standard 300 mL to 1.5 L
- Internal stirrer with magnetic drive
- Heads intended for use with glass cylinders are equipped with spring-loaded relief valves adjustable between 50-150 psi.
- All heads are equipped with a rupture disc rated for 1000 psi.
- Internal fittings are T316 Stainless Steel with optional PTFE coating.

### Materials of Construction

These reactors are a combination of a glass reaction vessel with a metal head, internal stirrer, dip tube, thermowell, cooling loop, and external valves and fittings, or alternately an all metal system.

The standard material of construction for the head is Type 316 Stainless Steel with PTFE coated T316SS internals. As an alternative the head and internal wetted parts can be provided in any of the standard Parr materials of construction. See the 5100 Ordering Guide, [page 63](#).

### Size

Series 5100 Reactors can be easily converted between the 160, 300, 450, and 600 mL sizes by simply changing the cylinders and internal parts. In a similar manner, 1 L and 1.5 L are interchangeable. While the 160-600 mL stand cannot be converted to hold 1 and 1.5 L vessels, the larger stand can be converted to accommodate the 160-600 mL vessels. If you plan to convert at a later time, be sure to order the stand for the largest size you plan to use so the shield and supports will not have to be replaced.

### Heating and Temperature Control

These reactors are available with either jacketed or non-jacketed glass or metal cylinders allowing for heating by either a user supplied circulator or with a removable heating mantle respectively. While we would normally expect glass vessels to be equipped with circulating jackets to maintain their transparent feature, some users may not need to heat their reactions or may prefer to use removable heating mantles when they need to work at elevated temperatures. Although transparency is not an issue with metal vessels, users will generally want to select the same heating method for metal

vessels as they use for glass vessels so they can utilize the same heating and control system for both.

Users who are using a circulating bath that has its own temperature control for use with these reactors will want to order the reactor without a heating mantle and may only need a motor controller for stirring speed to complete the system. Most laboratory circulators should be adequate for these small vessels. Moveable electric heating mantles are available for vessels that do not have attached circulating jackets. These mantles are for use with 115 or 230 VAC.

### 5110 Conversion Sets: Glass to Metal or Metal to Glass

Series 5100 Reactors can be easily converted between glass and metal cylinders. The conversion sets include the cylinder, closure, gage and safety relief devices for the “converted to” system. Sets do not include heater.

#### 5110 & 5120 Conversion Sets

##### Glass to Metal

Catalog Number	Size, mL	Converts From	Converts To
5110A	300	Glass Jacketed	Metal Jacketed
5110B	300	Glass	Metal
5110C	450	Glass Jacketed	Metal Jacketed
5110D	450	Glass	Metal
5110E	600	Glass Jacketed	Metal Jacketed
5110F	600	Glass	Metal
5110M	215	Glass Jacketed	Metal Jacketed
5110N	160	Glass	Metal
5120A	1000	Glass Jacketed	Metal Jacketed
5120B	1000	Glass	Metal
5120C	1500	Glass Jacketed	Metal Jacketed
5120D	1500	Glass	Metal

##### Metal to Glass

Catalog Number	Size, mL	Converts From	Converts To
5110G	300	Metal Jacketed	Glass Jacketed
5110H	300	Metal	Glass
5110I	450	Metal Jacketed	Glass Jacketed
5110J	450	Metal	Glass
5110K	600	Metal Jacketed	Glass Jacketed
5110L	600	Metal	Glass
5110P	215	Metal Jacketed	Glass Jacketed
5110Q	160	Metal	Glass
5120E	1000	Metal Jacketed	Glass Jacketed
5120F	1000	Metal	Glass
5120G	1500	Metal Jacketed	Glass Jacketed
5120H	1500	Metal	Glass

# Series 5100 Glass Reactors, 160-1500 mL

Series 5100 Pressure Reactor System Specifications						
Shaded bar indicates specifications that change within series.						
Model Number	5101	5102	5103	5104	5111	5112
Approximate Volume, mL	300	450	600	160	1000	1500
Maximum Pressure, Glass	150 psi (10 bar)					
Maximum Pressure, Metal	1000 psi (69 bar)					
<b>Maximum Temperature</b>						
with FKM O-ring	225 °C					
with FFKM O-ring, Glass Vessel	225 °C					
with FFKM O-ring, Metal Vessel	300 °C					
<b>Reactor Details</b>						
Mounting Style	Fixed Head					
Stand Type	Bench Top					
Closure	Glass Vessels: 6 Thumb Screws; Metal Vessels: Split-Rings (6 Compression Bolts)					
Valve Connections	1/8" Male NPT					
Magnetic Stirrer, Model No.	A1120HC9					
Maximum Torque	16 Inch-Pounds					
Impeller(s)	1	2	2	1	2	2
Stirrer Motor	1/8 hp variable speed					
Pressure Gage, Size	3.5 inches					
Range, Glass Cylinder	0-200 psi (14 bar)					
Range, Metal Cylinder	0-1000 psi (69 bar)					
Temperature Measurement	Fixed, Type J, Thermocouple					
Cooling Coil	Single Loop Included			None	Single Loop Included	
<b>Heater Style</b>	Mantle					
Heater Power Glass, Watts	510	590	780	400	400	550
Heater Power Metal, Watts	510	590	780	400	450	650
<b>Electrical Supply</b>						
Volts, AC	115 / 230					
Maximum Load, amps, 115 / 230	9 / 5					
<b>Cylinder Dimensions</b>						
I.D. x Depth, inches	2.5 x 4.0	2.5 x 6.0	2.5 x 8.0	2.5 x 2.0	4.0 x 6.0	4.0 x 8.0
Vessel Assembly Weight, Glass, pounds	15	15	16	14	29	28
Vessel Assembly Weight, Metal, pounds	18	19	21	16	33	36
Cylinder Weight, Glass, pounds	0.8	1.1	1.4	0.5	3.0	4.1
Cylinder Weight, Metal, pounds	3.4	4.6	5.9	2.2	8.3	10.8
<b>Reactor/Stand Dimensions</b>						
Width x Depth w/o Controller, inches	17 x 24				21 x 26	
Height, inches	30				33	
Weight, pounds	60	63	66	60	109	113
<b>Spare Parts Kit</b>	5109M				5119M	
Other options available. See Ordering Guide, visit <a href="http://www.parrinst.com">www.parrinst.com</a> , or call for more information. Weights and dimensions are estimated from the base model. Final weights and dimensions will vary based on options selected.						

# Series 5100 Ordering Guide

The Order No. for the Base System is: **51\_\_\_-G-SS-4B-115-VS.12-200**

A composite identification number to be used when ordering a 5100 Series Reactor can be developed by combining individual symbols from the separate sections below. For more information on how to use this ordering guide, [please see page 27](#).

A Base Model	
Model	Size
5101	300 mL
5102	450 mL
5103	600 mL
5104	160 mL (215 mL Glass Jacketed)
5111	1000 mL
5112	1500 mL

B Cylinder Type	
Model	Material
-GJ	Glass Jacketed
-G	Glass
-MJ	Metal Jacketed
-M	Metal

C Gasket	
Model	Material
-OV	FKM O-ring
-OK	FFKM O-ring

D Materials of Construction	
Model	Material
-SS	T316 Stainless Steel
-MO	Alloy 400
-IN	Alloy 600
-HB	Alloy B-2 / B-3
-HC	Alloy C-276
-CS	Alloy 20
-Ti2	Titanium Grade 2
-Ti4	Titanium Grade 4
-ZR702	Zirconium Grade 702
-ZR705	Zirconium Grade 705

See [page 10](#) or [24](#) for complete list of available alloys.

E Magnetic Stirrer Drive	
Model	Material
-M	General Purpose, 16 in-lb
-FMD1	Footless, General Purpose, 16 in-lb

F Mag. Drive Material of Construction	
Model	Material
-MOC Symbol	Indicate Material of Construction

G Electrical Supply	
Model	Material
-115	115 VAC
-230	230 VAC

H Motor Option	
Model	Material
-VS .12	Variable Speed, 1/8 hp
-VS .25	Variable Speed, 1/4 hp
-XP .25	Explosion Proof Variable Speed, 1/4 hp
-AM .25	Air Motor, 1/4 hp

I Pressure Gage	
Model	Material
-200	200 psi / 14 bar
-100	100 psi / 7 bar
-1000	1000 psi / 69 bar (Metal Vessels Only)

J Heater	
Model	Material
-MH	Mantle (Non-Jacketed Vessels Only)
-NH	No Heater

K Controller	
Model	Material
-4848	PID Control, Ramp & Soak Programming, Motor Speed Control, and Data logging with Software. (RS-485 to USB cable not included) For use with up to three additional display modules.
-4848B	Same as 4848 but with up to six additional modules
-A2110E	Motor Controller
-4871	Process Controller (for enhanced control options)

See [Chapter 6](#) for a complete list of controllers and options.

L 4848 Controller Options	
Model	Material
-TDM	Tachometer Display Module
-MCM	Motor Control Module w/Tachometer
-PDM	Pressure Display Module
-HTM	High Temperature Cut Off Module
-ETLM	External Temperature Limit Module
-MTM*	Motor Torque Module
-SVM	Solenoid Valve Module (for cooling control)
-A1925E4	RS-485 to USB Cable for 4848 Controller (required for data logging)
-A1925E6	RS-485 to USB Converter, isolated, 30-ft
-A2208E	RS-485 Daisy Chain for Multiple Controller (must be used with A1925E6)
-A3504HC	SpecView Software Package for 4838/4848

\* The MTM must be installed in conjunction with the MCM.

M Custom Options (List All Desired)	
Model	Material
-PS	Paddle Stirrer, 300 mL and Larger
-GE	Gas Entrainment Stirrer
-XCAD	External Catalyst Addition Device
-SCP	Solids Charging Port (Ball Valve)
-RC	Reflux Condenser
-RTC	Reflux/Take-Off Condenser

See [Chapter 7](#) for a complete list of optional accessories.

N Certifications	
Model	Material
-ASME	ASME Documentation
-CE	CE Documentation
-P	Parr Certification

O Spare Parts Kit	
Model	Material
-5109M	Spare Parts Kit for Models 5101, 5102, 5103, 5104
-5119M	Spare Parts Kit for Models 5111 and 5112

Please note that all options and combinations are not compatible with all models.