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) | | | | | |
| **Maximum Temperature** | | | | | | |
| with FKM O-ring | 225 °C | | | | | |
| with FFKM O-ring, Glass Vessel | 225 °C | | | | | |
| with FFKM O-ring, Metal Vessel | 300 °C | | | | | |
| **Reactor Details** | | | | | | |
| 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 | |
| **Heater Style** | Mantle | | | | | |
| Heater Power Glass, Watts | 510 | 590 | 780 | 400 | 400 | 550 |
| Heater Power Metal, Watts | 510 | 590 | 780 | 400 | 450 | 650 |
| **Electrical Supply** | | | | | | |
| Volts, AC | 115 / 230 | | | | | |
| Maximum Load, amps, 115 / 230 | 9 / 5 | | | | | |
| **Cylinder Dimensions** | | | | | | |
| 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 |
| **Reactor/Stand Dimensions** | | | | | | |
| 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 |
| **Spare Parts Kit** | 5109M | | | | 5119M | |

Other options available. See Ordering Guide, visit www.parrinst.com, 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

| | |
|---|---|
| -GJ | Glass Jacketed |
| -G | Glass |
| -MJ | Metal Jacketed |
| -M | Metal |

## C Gasket

| | |
|---|---|
| -OV | FKM O-ring |
| -OK | FFKM O-ring |

## D Materials of Construction

| | |
|---|---|
| -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

| | |
|---|---|
| -M | General Purpose, 16 in-lb |
| -FMD1 | Footless, General Purpose, 16 in-lb |

## F Mag. Drive Material of Construction

| | |
|---|---|
| -MOC Symbol | Indicate Material of Construction |

## G Electrical Supply

| | |
|---|---|
| -115 | 115 VAC |
| -230 | 230 VAC |

## H Motor Option

| | |
|---|---|
| -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

| | |
|---|---|
| -200 | 200 psi / 14 bar |
| -100 | 100 psi / 7 bar |
| -1000 | 1000 psi / 69 bar (Metal Vessels Only) |

## J Heater

| | |
|---|---|
| -MH | Mantle (Non-Jacketed Vessels Only) |
| -NH | No Heater |

## K Controller

| | |
|---|---|
| -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

| | |
|---|---|
| -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)

| | |
|---|---|
| -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

| | |
|---|---|
| -ASME | ASME Documentation |
| -CE | CE Documentation |
| -P | Parr Certification |

## O Spare Parts Kit

| | |
|---|---|
| -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.*