



Asahi Glassplant Inc.
Arao, Japan

Japan

UK

USA

Switzerland

India



www.asahiglassplant.com

- **Introduction**
- **Reactors overview**
- **Why trust AG!?**
- **Why are AG! reactors the best for you?**
- **Which product(s) are you interested in?**
- **Summary**



What do we do?

Manufacturing of scientific glass equipment for various chemical processing applications

Glass (Borosilicate 3.3) and Quartz are typically at the heart of our products



Who do we serve?

Pharmaceuticals | Oil and Gas | Agro Chemicals
Fine Chemicals | Food and Beverage
Contract Manufacturing Organisations etc





What do we stand for?



Innovation

We always pursue innovation
in new technologies and
unprecedented knowledge



Sincerity

We serve our customers
with sincerity and respect



Progress

We will never stop but
continue to advance



Demonstrated Successful History

- Extremely experienced, 3rd generation family owned business, established in 1950
- Focussed on sustainable growth and customer satisfaction
- 1000s of satisfied customers worldwide
- Experience across a wide range of chemical processes and scales



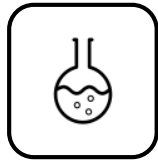
Technical Excellence

- Unrivalled combination of innovative design, strong engineering and unique manufacturing capabilities
- Our glassblowing capabilities create products that only AG! can manufacture



Customer Focus

- Willingness to provide customer specific solutions at all scales
- We keep working until you are satisfied



Reaction

Definition:

a chemical change produced by two or more substances acting on each other



Benchtop Reactor
300 mL to 5 L
-90 °C to +230 °C



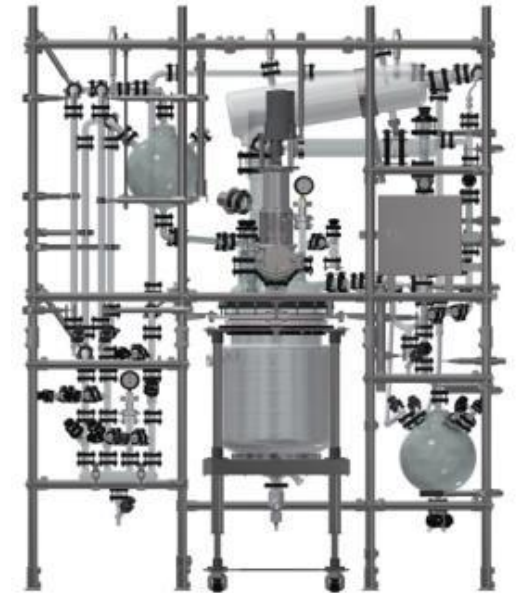
Pilot Plant Reactor
10 L, 20 L, and 30 L
-90 °C to +230 °C



Pilot Plant Reactor PLUS
10 L, 20 L, and 30 L
-90 °C to +230 °C



Pressure Reactor
10 Bar G
500 mL to 1.5 L
-90 °C to +200 °C



Universal Reactor
Max 100 L (TW), 300 L (DW), 400 L (SW)
Fully Customisable

Product Comparison



1 L – 5 L



10 L – 30 L



10 L – 30 L



50 L – 400 L



Max 400 L

	Benchtop reactor	Pilot Plant Reactor	Pilot Plant Reactor PLUS	Custom Pilot Plant reactor	Universal reactor
Heat, Stir and reflux	✓	✓	✓	✓	✓
Temperature Monitoring	✓	✓	✓	✓	✓
Solids and Liquid dosing	✓	✓	✓	✓	✓
Time to setup and run reaction	🐢🐢	🐢	🐢🐢	🐢	🐢🐢
Impeller change	🐢	🐢	🐢🐢	🐢	🐢🐢
Distillation	O	O	✓	O	O
Condensate cooler	X	X	✓	O	✓
Pressure monitoring and relief	X	X	✓	O	✓
Inert atmospheric reactions	X	X	✓	O	✓
Cost	\$	\$	\$\$	\$\$	\$\$\$

Why are AG! reactors best for you?



High Performance



Great User Experience



Best Return on Investment

Process Perfection = Higher yields & fewer impurities

What?	Why?	How?
Higher heat transfer	• Rapid vessel heat up and cool down • Even heat distribution = Reduced hot and cold spots	• Optimised glass wall thickness between jacket and reactor (custom made) • Low jacket volume • Unique jacket ring baffle increases heat transfer • High ΔT ($T_r - T_j$) up to 110°C enabled by superior design and manufacture
Higher mass transfer	• Agitation optimisable to process and scale	• Wide range of standard and custom impellers • Options for rapid impeller change • Vessel geometry (see below)
Consistency of process scale-up	• Consistent vessel geometry across the product range from lab scale to pilot plant	• Aspect ratio ID(W) : Height (H) • AG! = 1:1 to 1:1.5 • Competitors = 1:1 to 1:2.5

What?	Why?	How?
Quick set-up	• Quick vessel change • Quick impeller change	• Lid & accessories can remain in place when vessel is removed • Vessel lifting mechanisms • Extremely flexible hoses for thermoregulator fluid
Easy maintenance	• Easy to clean	• Detachable bottom outlet (flush) valves • Easy to access to remove vessels • Easy to drain thermal fluid • Groove less gasket, easy to replace and clean (For Pilot models)
Easily configurable to a range of processes	• Heat, stir, reflux • Liquid or solid additions • Vacuum distillation • Inert reactions • Wide temperature range	• Option for: • Dropping funnels • Distillation columns and receivers • N₂ inlet and vent • Typical temperature range of -90°C to + 230°C
Safe	• Eliminate unwanted pressure build-up • Avoid under or over-heating	• Pressure relief valves and rupture disk for pilot models • Excellent heat transfer • Options for temperature probes in bottom of vessel

What?	Why?	How?
Long Life	• Engineering design • High quality materials • Easy to replace parts	• Careful design process for high mechanical stability • High quality material of construction for chemical resistance • User behaviours taken into account while designing to ensure operation without damage to reactor
Easy to Implement	• World-wide support on implementing custom projects • On-site installation offers	• Manufacturing facilities in 5 countries around the world • Over 40 sales partners world-wide
Reactor Build to match your Process(es)	• Willingness to provide customer specific solutions at all scales	• Complete in-house engineering design and manufacturing facilities • Decades of experience in custom reactor manufacturing • Wealth of knowledge in process development procedures
Reduced Running Costs	• Great support • Lower energy costs • Excellent reliability	• Company ethos of high customer care • Efficient heat transfer and insulation • Quality by design

“

We have virtually no maintenance cost and our investment was worth it!

Multi-tube Heat Exchanger

Mr. Suzuki
Sanuki Chemical Industry Co., Ltd.
Japan

“

We reduced our running costs more than we expected!

Reaction Vessel, Double wall

Mr. Yoon-Seok Oh, Ph.D
Dong Wha Pharmaceuticals co., Ltd.
Korea

“

We received great support from AG! to design and install a distillation unit.

Oldershaw Distillation column

Mr. Ichimiya
Asahi Kasei Corp.
Japan

“

It was useful to try the device before making an investment.

Reaction Unit & Filtration Unit

Leading Pharma Manufacturer
Japan

“

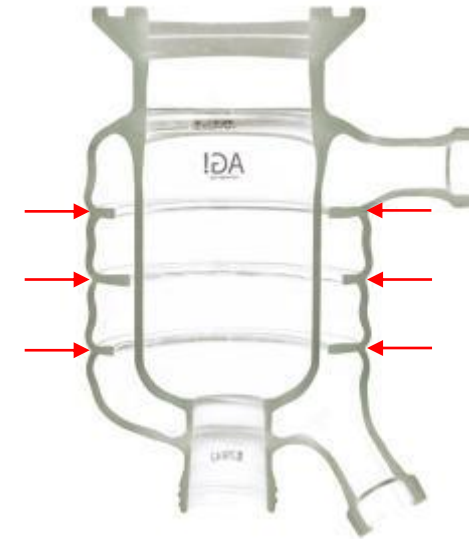
AG! gave great support and all the details we needed. All our requests were fulfilled!

Thin Film Evaporator

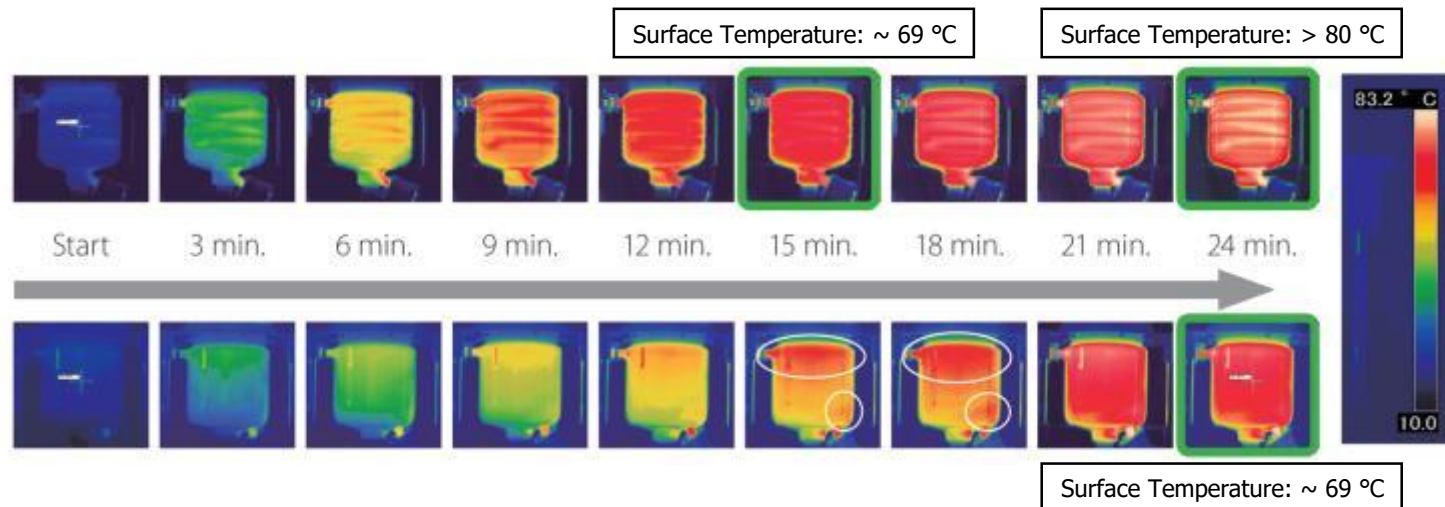
Leading Pharma Manufacturer
Russia

AG! Proprietary Ring Baffle technology

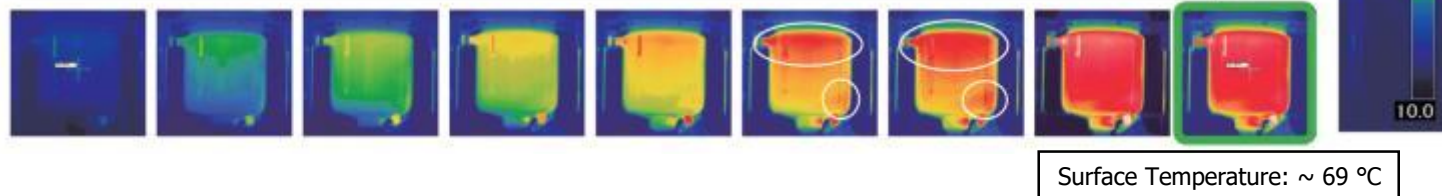
- Ring Baffle is located in the thermal jacket
- Directs thermal fluid flow to evenly distribute heat to the process
- Baffles create localized turbulent flow to maximize heat transfer
- Prevents hot and cold spots in the process
- Helps achieving process temperature faster compared to vessels without Ring Baffle



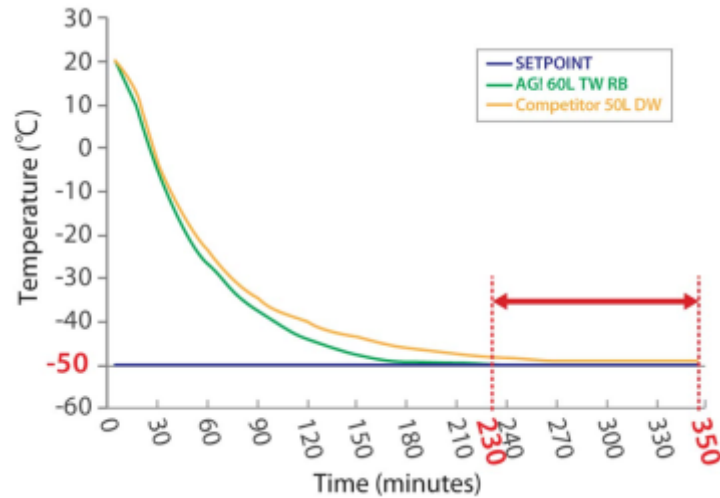
AG! Vessel with Ring Baffle



Competitor vessel without Ring Baffle



**Ring Baffle
improves
heat transfer
efficiency!**



120 min faster!

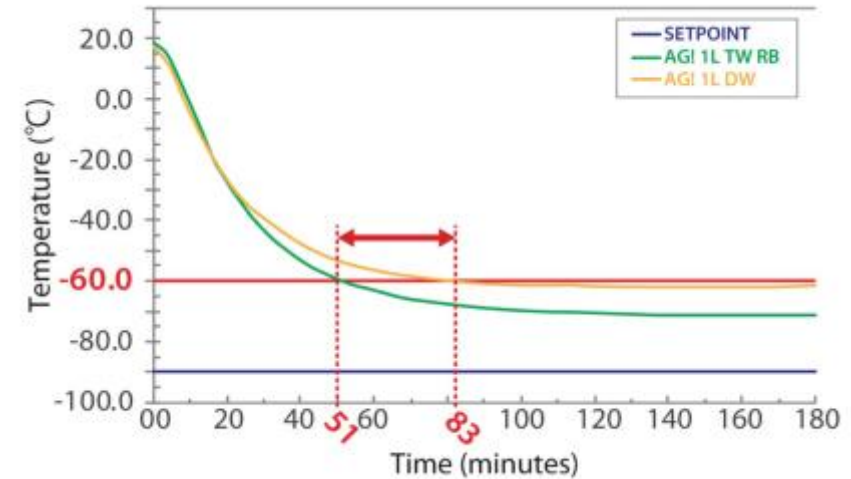
Process temperature achieved 120 minutes faster with AG! vessel compared to competitor vessel

AG! Triple Wall Ring Baffle 60 L Reactor

vs.

Competitor Standard Double Wall; Jacketed 50 L Reactor

Thermostat: HUBER Unistat 510w, HTF: Silicone Oil



30 min faster!

Process temperature achieved 30 minutes faster in a triple wall ring baffle vessel compared to Double wall vessel

AG! Triple Wall Ring Baffle 1 L Reactor

vs.

AG! Double Wall 1 L Reactor

Thermostat: LAUDA RP890C, HTF: Silicone Oil

Ring Baffle provides high heat transfer!

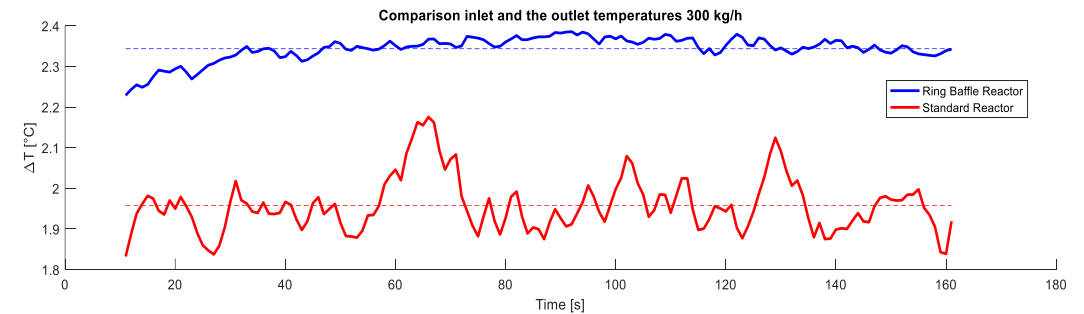
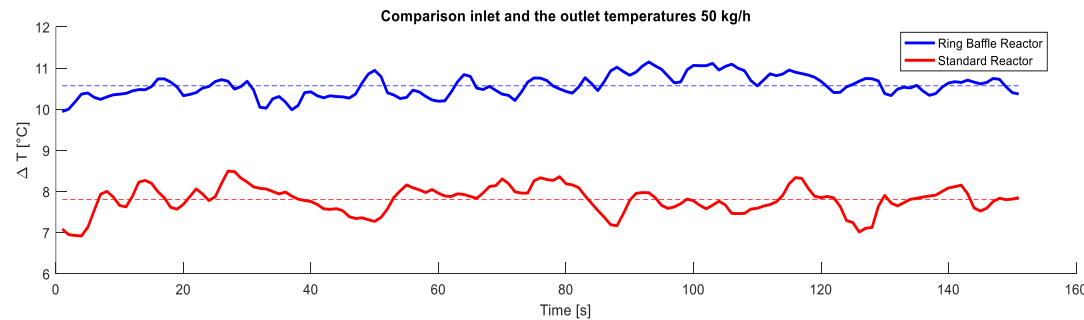
- Temperature at jacket inlet and outlet of vessels with and without Ring Baffle were measured while stirring 1 kg of water with 2 kg of ice
- Ring Baffles provided better heat transfer – Evident from higher ΔT in vessels with Ring Baffle



Vessel without
Ring Baffle



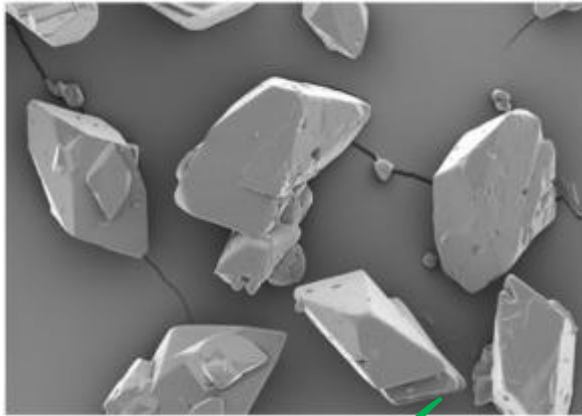
Vessel with
Ring Baffle



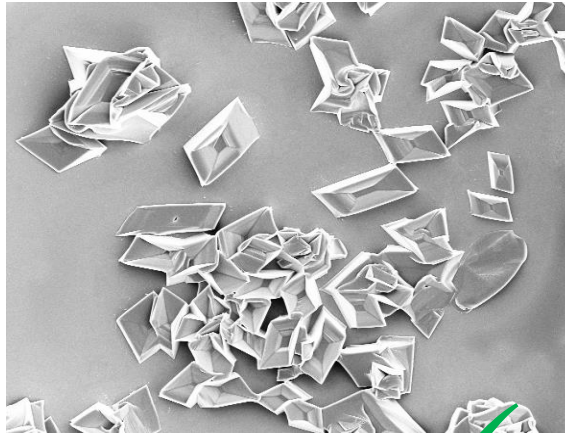
Ring Baffle provides higher ΔT = Better heat transfer

Better Crystal formation occurs in vessel with Ring Baffle

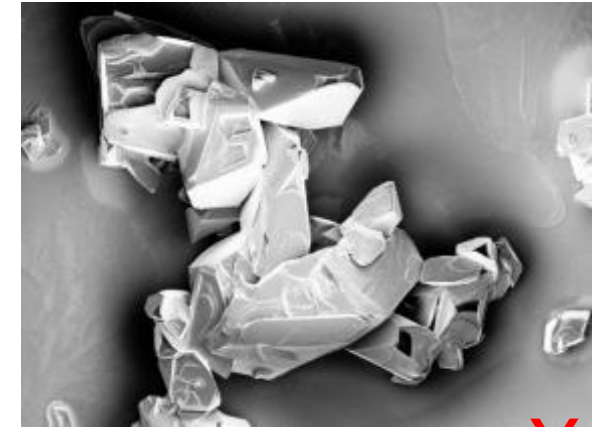
- Paracetamol crystal formation in vessels with and without Ring Baffle were studied
- Temperature stability essential for proper crystal formation
- Crystal structure was better in vessel with ring baffle – Evident from SEM imaging



Ideal crystal structure



Crystals from **vessel with Ring Baffle**



Crystals from vessel without Ring Baffle



Select a Reaction Product to Explore



Benchtop Reactor
300 mL to 5 L
-90 °C to +230 °C



Pilot Plant Reactor
10 L, 20 L, and 30 L
-90 °C to +230 °C



Pilot Plant Reactor PLUS
10 L, 20 L, and 30 L
-90 °C to +230 °C



Pressure Reactor
10 Bar G
500 mL to 1.5 L
-90 °C to +200 °C



Universal Reactor
Max 100 L (TW)
300 L (DW)
400 L (SW)
Fully Customisable



Advantages of AG! Benchtop Reactors

- Wide Process temperature range; -90 °C to +230 °C
- Thermal Jacket with Ring Baffle provides excellent temperature control
- High ΔT : 110 °C (Double wall), 60 °C (Triple wall)
- Removable drain valve for easy cleaning
- One support structure for vessels from 300 ml to 5 L
- Vessels and accessories are interchangeable
- Premium features provide great user experience



Various accessories allow multiple processes

- Reaction - vacuum to atm
- Temperature regulation
- Temperature monitoring
- Reflux condensation
- Agitation
- Dosing liquids
- Additional functions based on user request



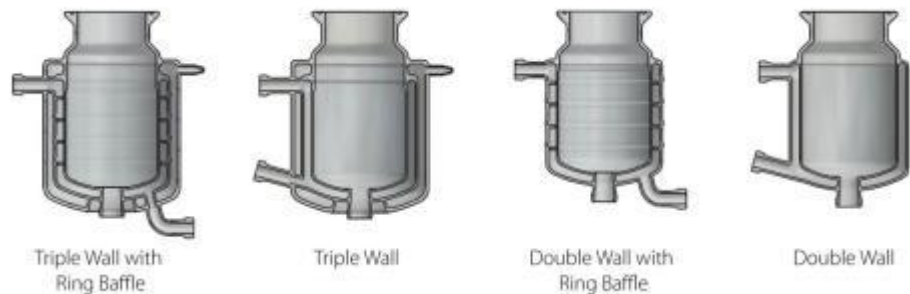
Standard Specifications

- Vessels: 300 ml, 500 ml, 1 L, 2 L, 3 L, 5 L
- Vessel type: Double wall and Triple wall (with or without Ring Baffle)
- Operating Pressure: Vacuum to atm
- Operating Jacket Pressure: Up to +0.5 bar G (+0.05 MPa)
- Operating Temperature: -90 °C to +230 °C
- ΔT : 110 °C (Double wall), 60 °C (Triple wall)

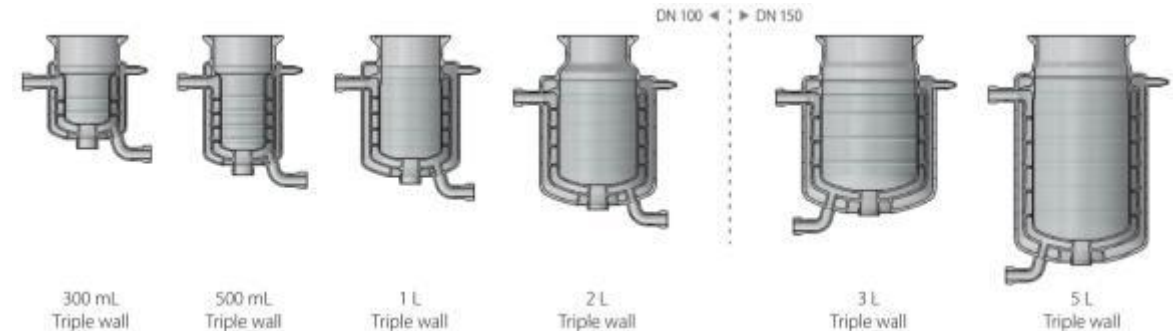
Great Selection of vessels that can be interchanged

- Convenience of swapping different in the same support structure
- Many options to choose from
- Double wall (Thermal Jacket) and Triple wall (Thermal and Vacuum Jacket) vessels from 300 ml to 5 L
- Optional Ring Baffle for all volumes

Vessel Selection



Interchangeable facility



Vessel Clamp and lid size vary for DN100 and DN150 vessels

Removable leak-proof drain valve

- Can be easily removed for cleaning
- Pressure sensitive spring loaded drain valve is suitable for operation from -90 °C to +230 °C
- Standard shaft: PTFE, Optionally in Glass or PEEK
- All parts are replaceable: Down time can be easily avoided



Drain valve attached to the vessel

Drain valve

Zero Dead Space

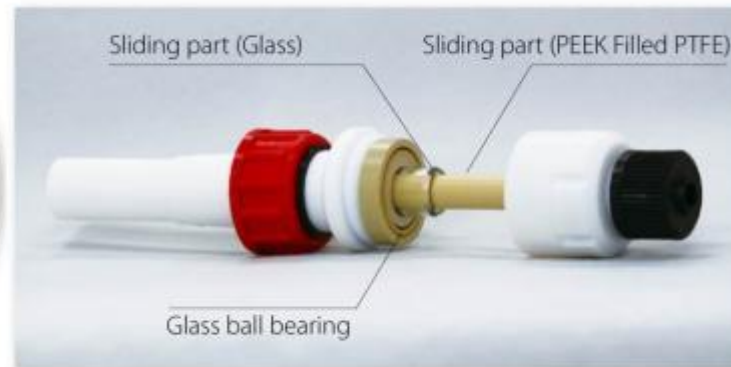
- No stagnation of reactants
- Perfect alignment of drain valve shaft with vessel orifice



Stable debris-free stirring by AG! stirrer guide design

- Unique AG! design prevents impeller vibration at high RPM
- Stable stirring at wide range of RPM
- No PTFE debris formation with continuous usage

AG! Stirrer Bearings



Conventional type Stirrer Bearing



AG! type Stirrer Bearing

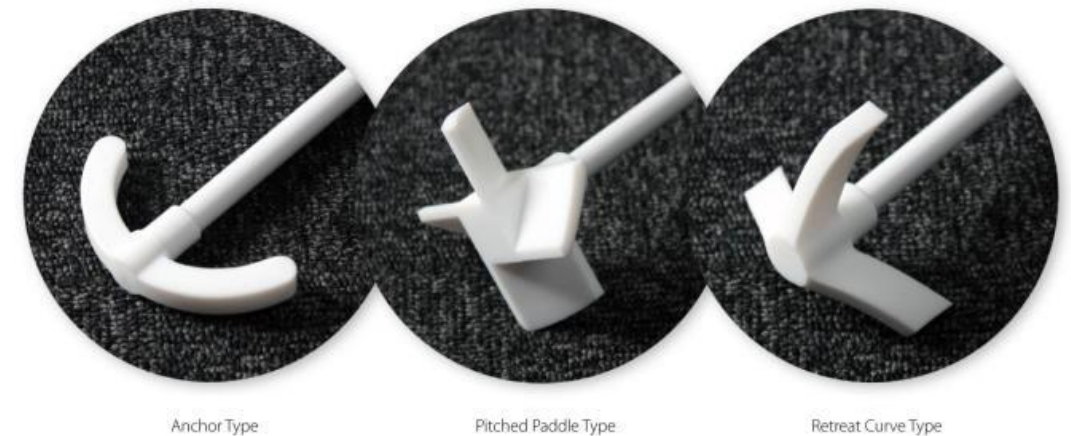
Easy vessel handling using vessel arm swing

- Useful for viscous/crystal product collection
- Quick cleaning



Impeller Options

- Selection of standard impeller options
- Different lengths available for different vessels
- PTFE encapsulated SS shafts



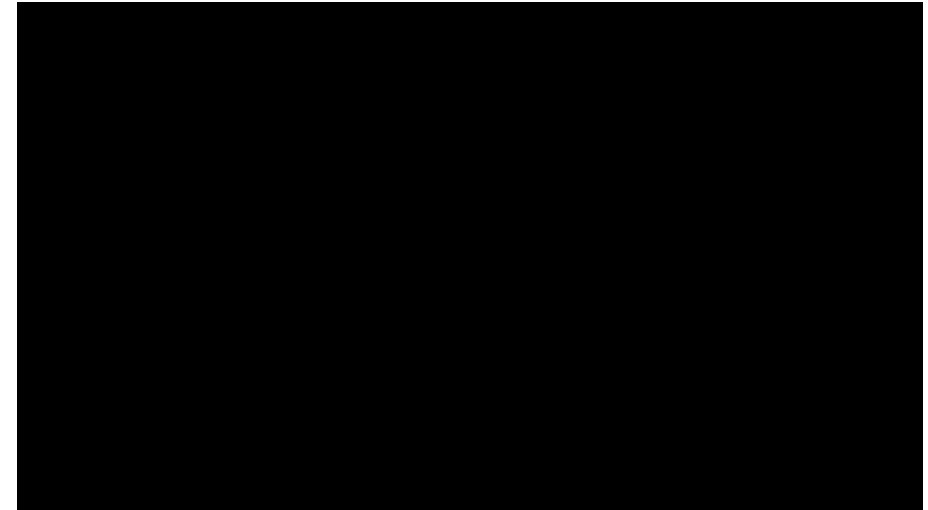
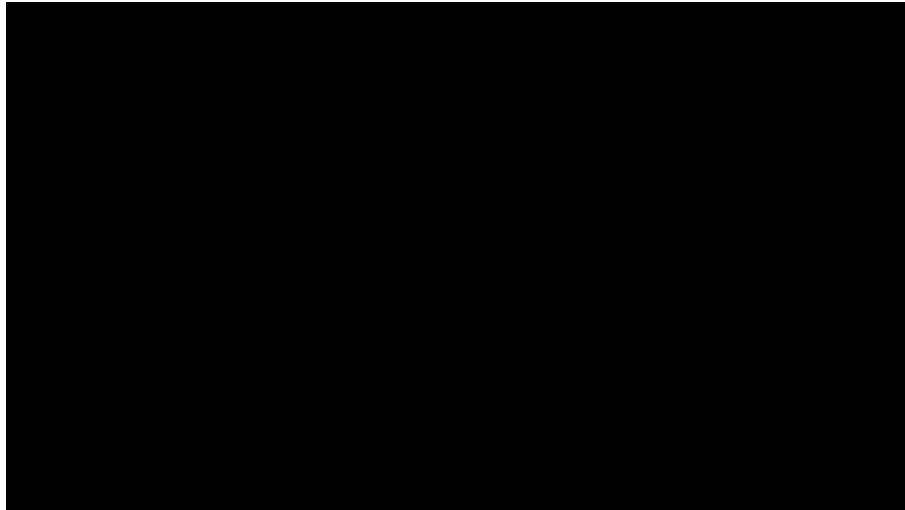
Anchor Type

Pitched Paddle Type

Retreat Curve Type

Lift Assist Mechanism

- Helps positioning the stirrer motor and/or vessel in the support structure
- Easy and hassle free operation
- Minimal effort is required
- Simplifies impeller changing process



Rotating vessel support mechanism

- Helps with easy collection of viscous or crystalline products
- Allows 360° rotation
- Allows easy access for quick cleaning



Flexible bearing coupling

- Circumvents motor-impeller misalignment problems
- Stable stirring even with bad alignment of motor
- Quick and easy decoupling



Flexible Bearing Coupling

Before setting in place over stirrer guide

After setting in place over stirrer guide

Lid Holder

- No need to remove accessories while changing vessels
- Prevents accidental breakage of lid and accessories
- Holds lid in place
- Simplifies vessel/impeller changing process



Lid holder supports lid while the vessel is removed

Flexible Insulated Hose

- Excellent insulation and flexibility
- Useful in situations where space is limited
- Operating temperature: -90 °C to +250 °C

Verification of Flexibility



AGI Tubing

Competitor Tubing

Hose Support Clamp

- Eliminates stress and breakage of jacket inlet and outlet
- Anchored on support structure and supports HTF tubing



Support Clamp removes stress on the glass inlet and outlet of the thermal jacket

Vent and Drain Valves

- Quick and easy to drain thermal liquid
- Mess free work space



Vent/Drain Valve

Vent valve
at thermal jacket inlet

Drain valve
at thermal jacket outlet

Advanced Impeller options

- Unique impeller designs for specific reaction mixtures
- Custom designs are offered in request



Glass Shaft



Metal Shaft



HB Impeller
for wide range of viscosities*



Wallwetter®
for improved evaporation efficiency*

*Temperature Probe must be inserted via drain port via a special drain valve design

See how HB Impeller works

See how Wall Wetter® works

In-line Pt100 sensor

- Useful for calculating energy absorbed/released by the reaction
- Essential for scale-up calculations
- Can be installed one or both the jacket ports
- Data logger (not supplied) is needed to read signals



In-line Pt100 Sensor



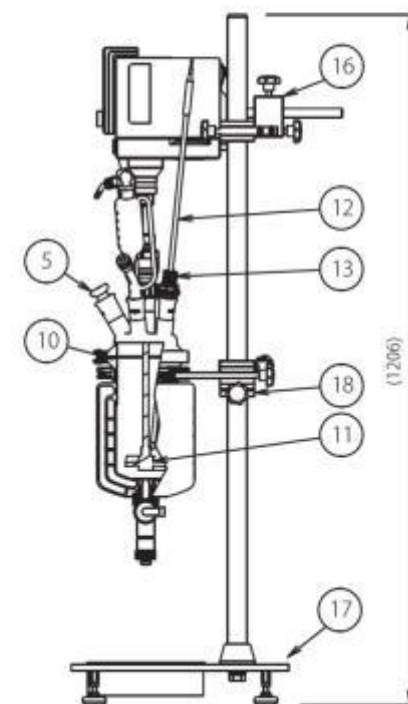
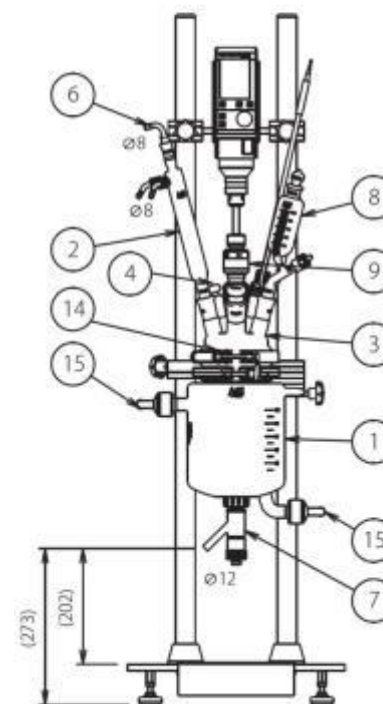
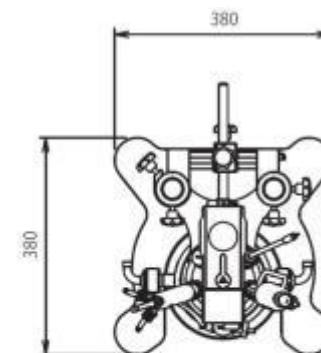
In-line Pt100 Sensor connected
to inlet of the thermal jacket

Benchtop Reactor – Standard Package

1. Vessel, DN 100 (300 mL to 2 L), DN 150 (3 L, 5 L)
2. Dimroth Condenser, TS24/40, TS15/25
3. Glass Cover, DN 100 (300 mL to 2 L), DN 150 (3 L, 5 L)
6 Ports (SQG29/42 x1, TS24/40 x4, TS29/42 x1)
4. Stopper for Additional Hole, TS24/40
5. Stopper for Hand Hole, TS29/42
6. Vent Adapter, TS15/25
7. Flush Valve with PTFE Shaft, SQG-29/42*
8. Dropping Funnel with Stopper, Graduated, TS24/40
9. PTFE Stirrer Guide, Glass Ball Bearing, SQG29/42, Shaft OD:10 mm
10. O-ring, FKM*
11. PTFE Stirrer Shaft, Shaft OD: 10 mm
12. Temperature Sensor Probe, OD:8mm, L:660 mm
13. Temperature Probe Holder, PTFE, TS24/40, Probe OD:8 mm
14. Quick Release Clamp, DN 100 (300 mL to 2 L), DN 150 (3 L, 5 L)
15. Metal Adapter for HTF, Screw Coupling, M16
16. Motor Support**
17. Support Structure
18. Swinging Clamp

* All O-rings are consumable parts

**Overhead stirrer motor is not included



Vessel Capacity : 1 L



Possibilities

AG! also offers customisations for benchtop reaction systems. We have experience in accommodating various customisation requests. Some of which are

- PTFE reaction vessel cover
- Modification of port orientation in glass cover
- Modification of port sizes to accommodate various accessories
- Special glass cover accessories
- Modification of reaction system to withstand operating pressure up to 0.5 bar G
- Up to 300 °C usage
- Addition of Distillation line
- Quartz version
- Glass internal Baffles
- Full jacket design
- EU and American standards of ports
- Joint variations including TS, Screw, GL



Advantages of AG! Pilot Plant reactor

- Vessel capacities: 10, 20 and 30 L
 - Thermal jacket (with optional Ring Baffle for superior heat transfer)
 - Optional triple (vacuum) jacket for superior insulation
- Wide Process temperature range; -90 °C to +230 °C
- Operating Pressure: Vacuum to atm
- High ΔT : 110 °C (Double wall), 60 °C (Triple wall)
- Removable drain valve for easy cleaning
- Sturdy stand with castors for mobility
- Custom models offer great flexibility in design and features

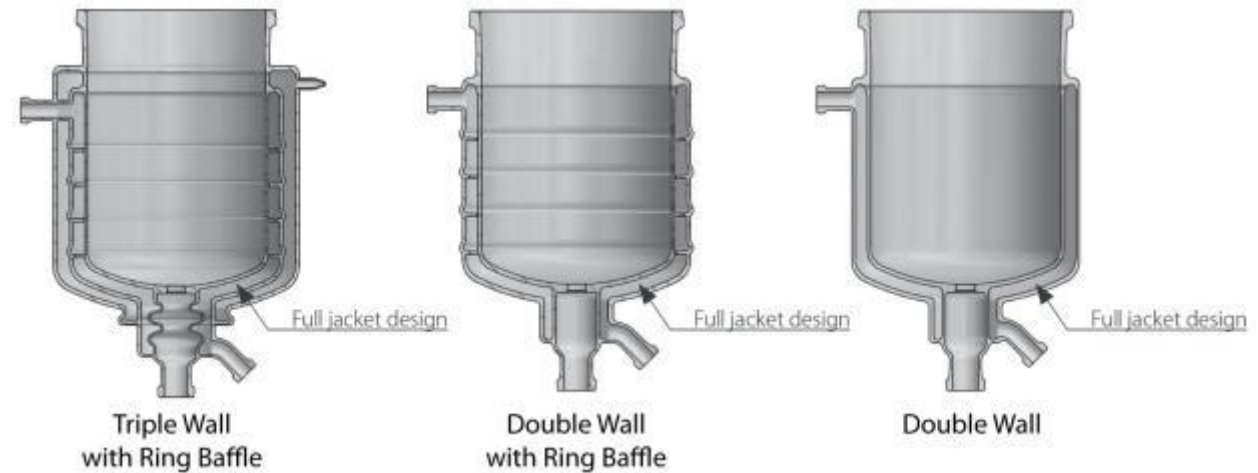


Various accessories allow multiple processes

- Reaction
- Temperature regulation
- Temperature monitoring
- Reflux condensation
- Agitation
- Dosing liquids and solids
- Additional functions based on user request

Vessel Options

- Double wall (Thermal Jacket) and Triple wall (Thermal and Vacuum Jacket) vessels for volumes 10 L, 20 L and 30 L
- Jacket designed to cover full working volume for effective thermal regulation
- Optional Ring Baffle for all double and triple wall reactors



Easy Scale up

- Vessel geometry is maintained to mimic industrial glass lined reactors
- Internal Diameter (ID) to Height (H) ratio is kept within 1:1 to 1:1.5 across different volumes
- Vessel bottom curvature is similar to glass lined industrial reactors
 - Larger radius of vessel bottom = radius of reactor body
 - Smaller radius (in "corner") = 10% of larger radius
- Consistency in design enables consistency in heat transfer and mass transfer > Easy scale up with reliable resource planning



AG! 10 L Triple wall



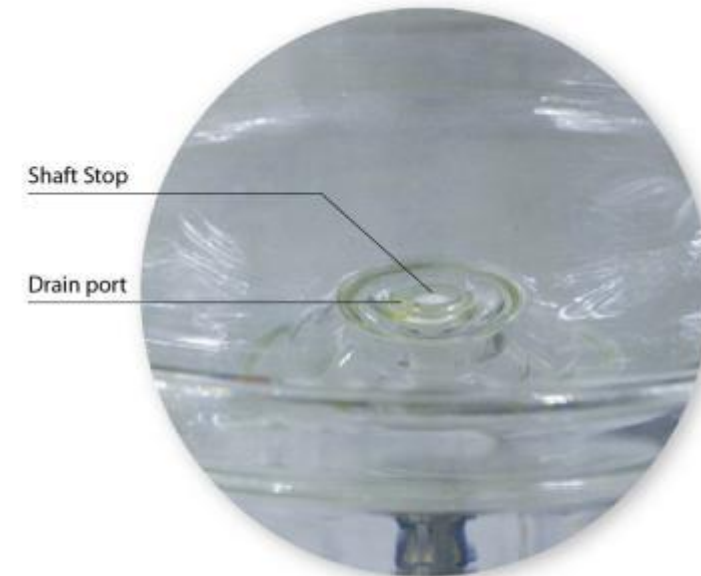
AG! 20 L Triple wall



AG! 30 L Triple wall

Minimal dead Space

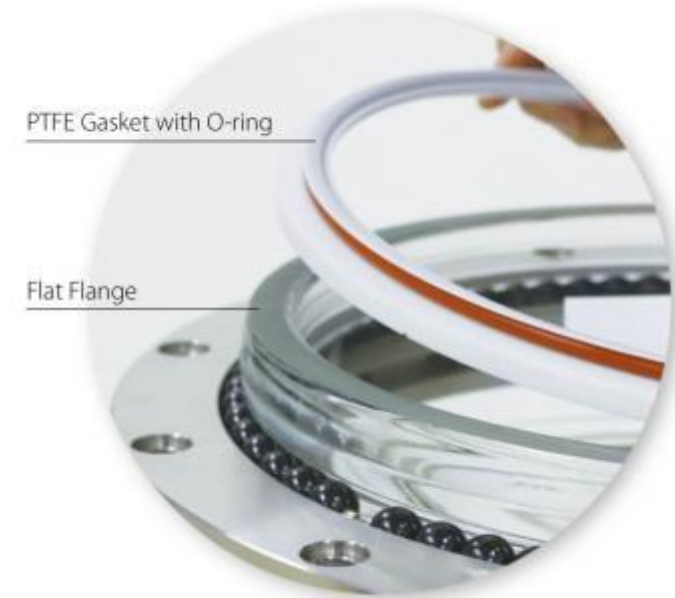
- Zero stagnation is achieved through the drain valve shaft fitting perfectly in the drain port
- All reactants are in one suspension and in motion when agitated



Bottom curvature of pilot plant reaction vessel showing drain port and shaft stop of flush valve

Easy to clean

- Drain valve is easy to remove for cleaning
- Vessels have flat flange with no grooves
- Flat flange makes it very easy to clean the vessel. No crevices = No contaminants

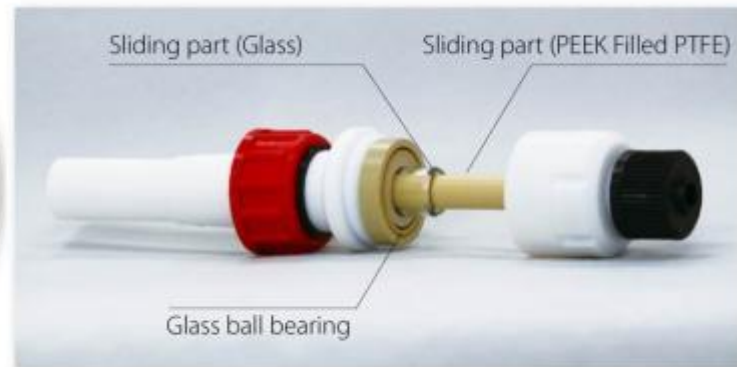


Unlike the flanges with grooves, flat flanges are very easy to clean and maintain.

Stable debris-free stirring by AG! stirrer guide design

- Unique AG! design prevents impeller vibration at high RPM
- Stable stirring at wide range of RPM
- No PTFE debris formation with continuous usage

AG! Stirrer Bearings



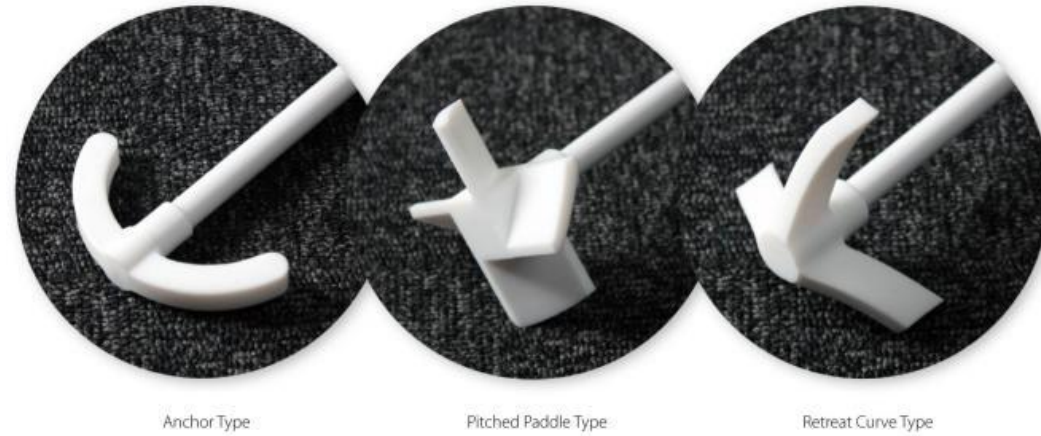
Conventional type Stirrer Bearing



AG! type Stirrer Bearing

Impeller Options

- Selection of standard impeller options
- Different lengths available for different vessels
- PTFE encapsulated SS shafts



Vent and Drain valves

- Quick and easy to drain thermal liquid
- Mess free work space



Insulate Flexible Hose

- Excellent insulation and flexibility
- Useful in situations where space is limited
- Operating temperature: -90 °C to +250 °C

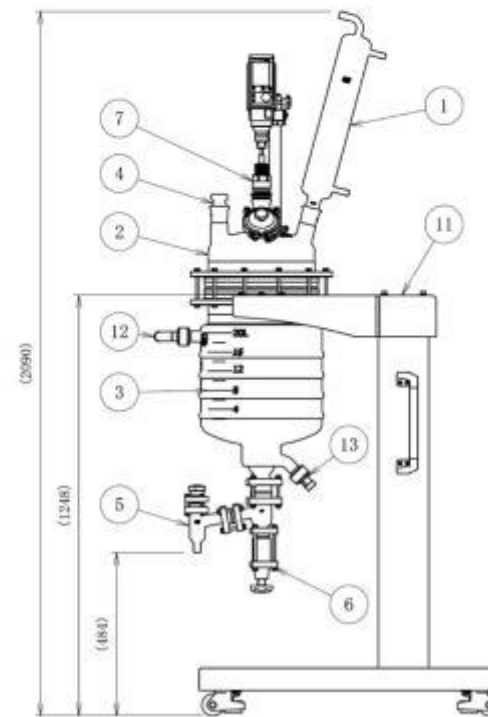
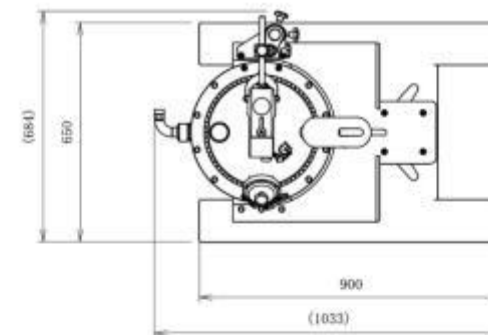
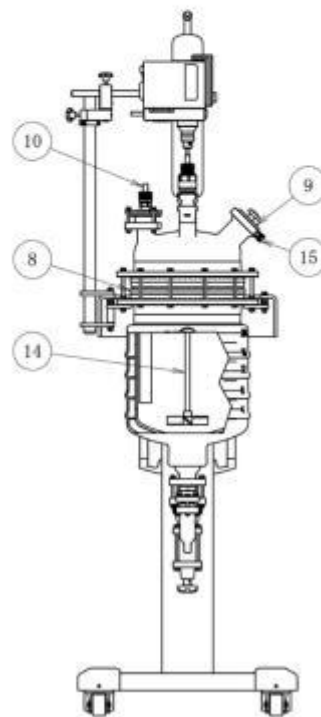


Pilot Plant Reactor – Standard Package

1. Condenser
2. Vessel Cover, 5 Ports
3. Vessel
4. Stopper for additional hole, TS 45/50
5. Drain Valve (PVD 25, $\phi 20$)
6. Flush Valve
7. PTFE Stirrer Guide, Glass Ball Bearing, TS 45/50*
8. PTFE Gasket with O-ring**
9. PTFE Cap for Hand Hole, DN 60
10. PT100 Sensor with Holder
11. Support Structure
12. Metal Adapter for HTF, M30
13. Metal Adapter for HTF, M30
14. PTFE Stirrer Shaft, Shaft OD: 16 mm
15. Quick Release Clamp, DN 60

*Overhead stirrer motor is not included

**All O-rings are consumable parts



Vessel Capacity: 20 L



Possibilities

- Custom vessels
 - Triple wall – max 100 L
 - Double wall – max 300 L
 - Single wall – max 400 L
- Plethora of features to suit any process
 - Custom skids
 - Feeding and receiving vessels
 - Modified glass covers for various measuring probes
 - Vacuum manifolds



Advantages of AG! Pilot Plant reactor **PLUS**

- Vessel capacities: 10, 20 and 30 L
 - Thermal jacket (with optional ring baffle for superior heat transfer)
 - Optional triple (vacuum) jacket for superior insulation
- Wide Process temperature range; -90 °C to +230 °C
- Vessel can be lifted up, down and moved sideways for easy access with minimal effort
- Easy to remove/exchange impeller
- Minimal time requirement for setting-up and starting the reaction process
- Removable drain valve for easy cleaning
- Operating Pressure: Vacuum to atm
- High ΔT : 110 °C (Double wall), 60 °C (Triple wall)
- Sturdy stand with castors for mobility
- Custom models offer great flexibility in design and features
- Lid has multipurpose 40 A ports for easy adaptation of accessories
- Great number of accessories for premium functionality



Superior Capabilities compared to Stationary Stand model

- Reaction - Low Pressure to atm
- Temperature regulation
- Temperature monitoring
- Reflux condensation
- Distillation
 - In-stand product cooling and collection
- Pressure monitoring and relief
- Inert atmospheric reactions made easy
- Vessel easily accessible via functional stand
- Agitation
- Dosing liquids and Solids
- Additional functions based on user request

Effortless Operation

- Easily lower, raise and swing sideways the reaction vessel
- Sturdy stand enables very smooth and stable movement of vessel
- Rotating knob can be fixed on either side based on user preference



Great variety of accessories

- Reactor lid is made of PFA coated SS with multipurpose 40 A ports
- Accessories include
 - Purge port
 - Pressure Gauge
 - Hand hole
 - Pressure safety valve
 - Condenser
 - Dropping funnel
 - Product cooler
 - Condensate Receiver
 - Stirrer Guide
 - Temperature Sensor Probe

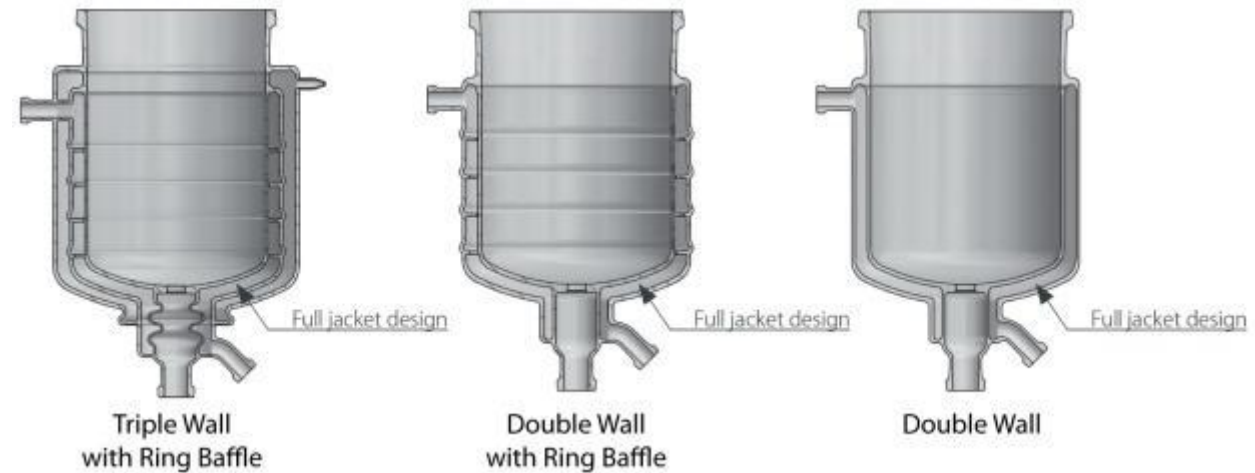


Numerous accessories provide safety, facilitates monitoring and control of process. All ports are multi-purpose 40 A

Note: 10 L model has vertical condenser. 20 L and 30 L models have diagonal condenser.

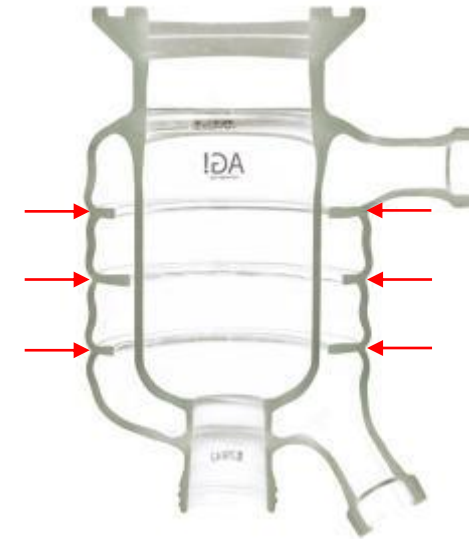
Vessel Options

- Double wall (Thermal Jacket) and Triple wall (Thermal and Vacuum Jacket) vessels for volumes 10 L, 20 L and 30 L
- Jacket designed to cover full working volume for effective thermal regulation
- Optional Ring Baffle for all double and triple wall reactors

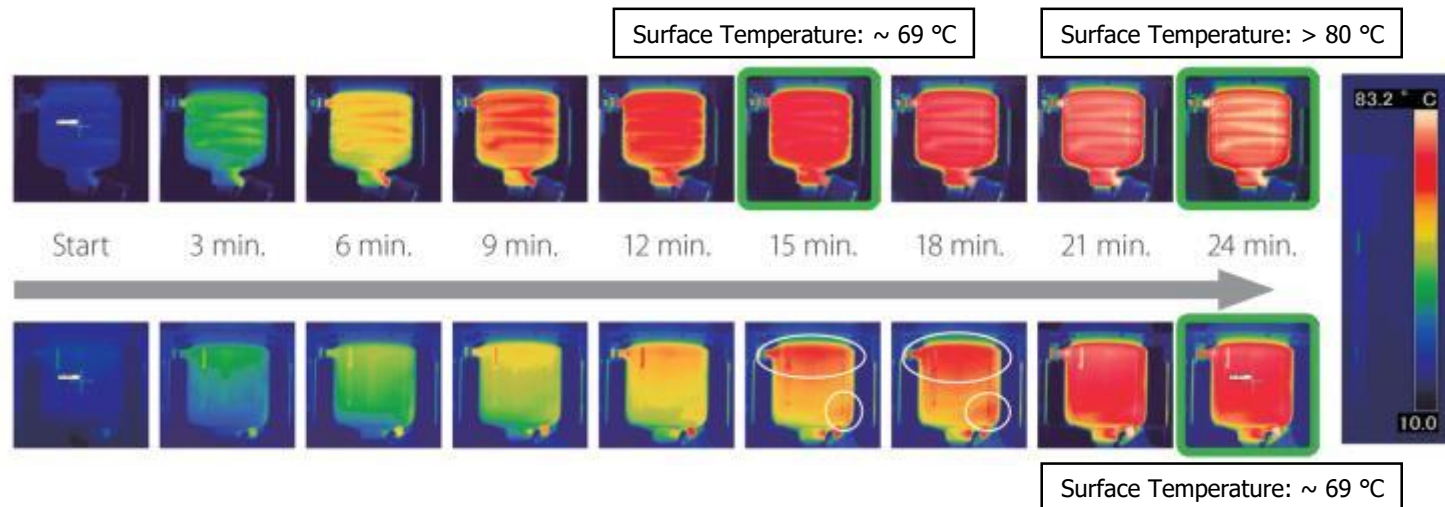


AG! Proprietary Ring Baffle technology

- Ring Baffle is located in the thermal jacket
- Directs thermal fluid flow to evenly distribute heat to the process
- Baffles create localized turbulent flow to maximize heat transfer
- Prevents hot and cold spots in the process
- Helps achieving process temperature faster compared to vessels without Ring Baffle



AG! Vessel with Ring Baffle



**Ring Baffle
improves
heat transfer
efficiency!**

Easy Scale up

- Vessel geometry is maintained to mimic industrial glass lined reactors
- Internal Diameter (ID) to Height (H) ratio is kept within 1:1 to 1:1.5 across different volumes
- Vessel bottom curvature is similar to glass lined industrial reactors
 - Larger radius of vessel bottom = radius of reactor body
 - Smaller radius (in "corner") = 10% of larger radius
- Consistency in design enables consistency in heat transfer and mass transfer > Easy scale up with reliable resource planning



AG! 10 L Triple wall



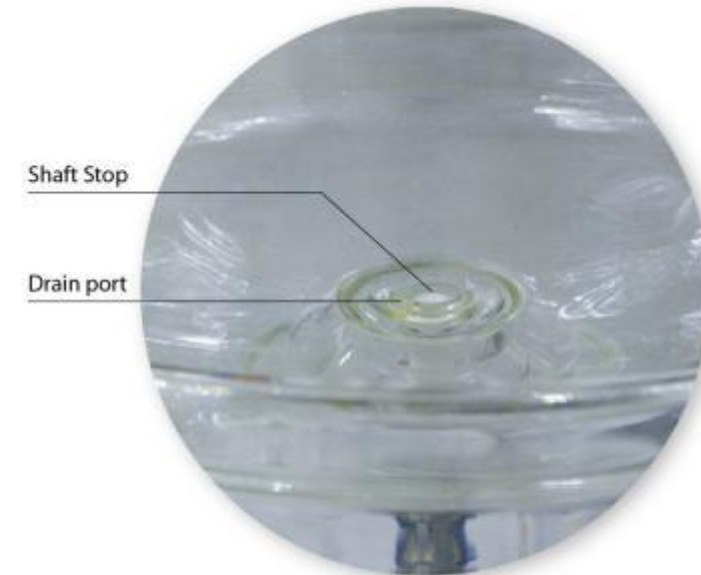
AG! 20 L Triple wall



AG! 30 L Triple wall

Minimal dead Space

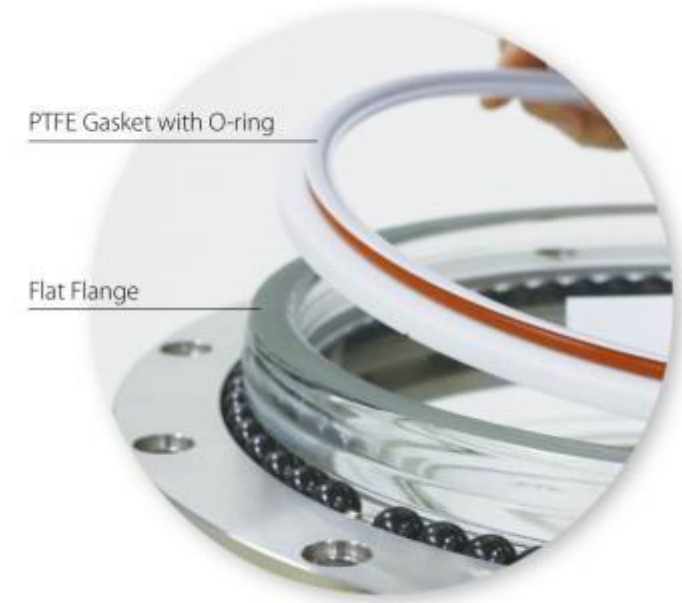
- Zero stagnation is achieved through the drain valve shaft fitting perfectly in the drain port
- All reactants are in one suspension and in motion when agitated



Bottom curvature of pilot plant reaction vessel showing drain port and shaft stop of flush valve

Easy to clean

- Drain valve is easy to remove for cleaning
- Vessels have flat flange with no grooves
- Flat flange makes it very easy to clean the vessel. No crevices = No contaminants

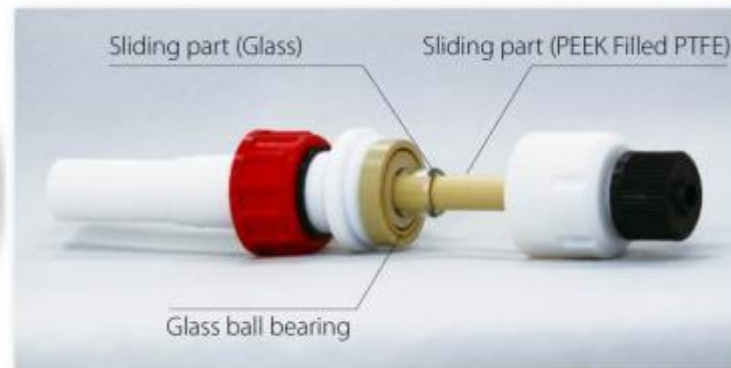


Unlike the flanges with grooves, flat flanges are very easy to clean and maintain.

Stable debris-free stirring by AG! stirrer guide design

- Unique AG! design prevents impeller vibration at high RPM
- Stable stirring at wide range of RPM
- No PTFE debris formation with continuous usage

AG! Stirrer Bearings



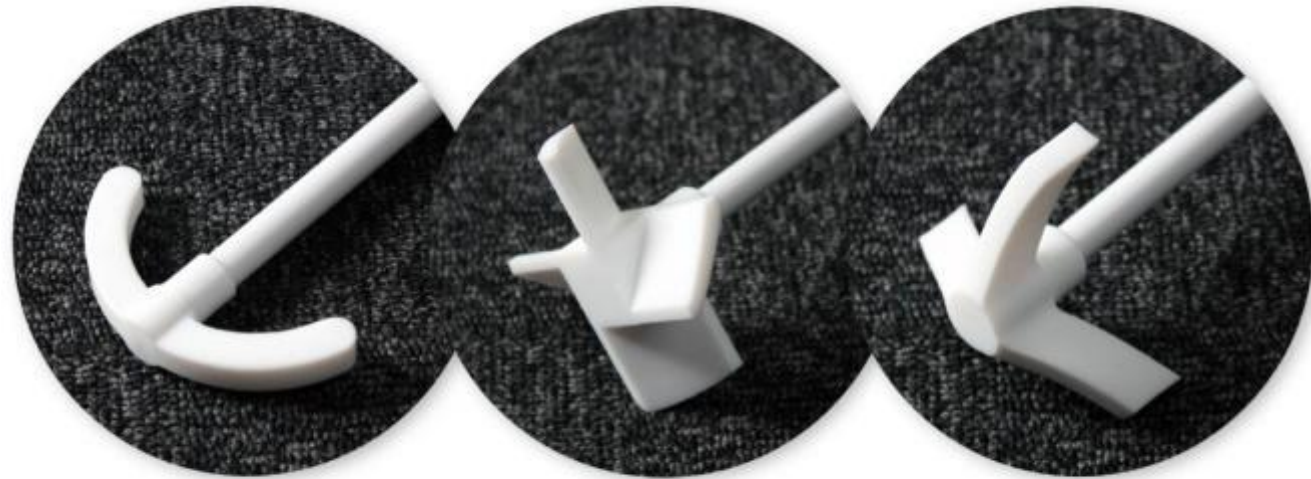
Conventional type Stirrer Bearing



AG! type Stirrer Bearing

Impeller Options

- Selection of standard impeller options
- Different lengths available for different vessels
- PTFE encapsulated SS shafts



Anchor Type

Pitched Paddle Type

Retreat Curve Type

Vent and Drain valves

- Quick and easy to drain thermal liquid
- Mess free work space



Insulate Flexible Hose

- Excellent insulation and flexibility
- Useful in situations where space is limited
- Operating temperature: -90 °C to +250 °C



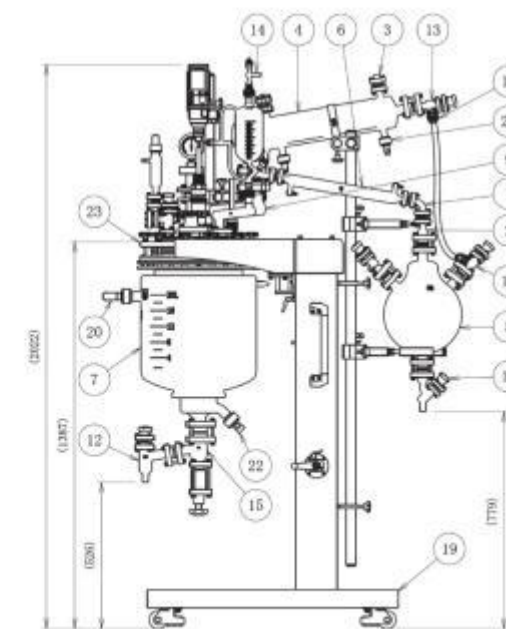
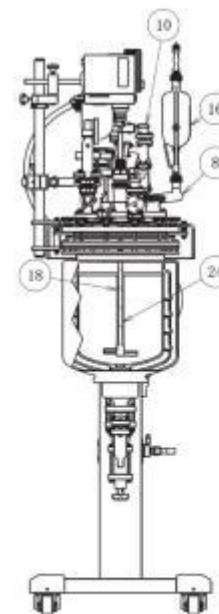
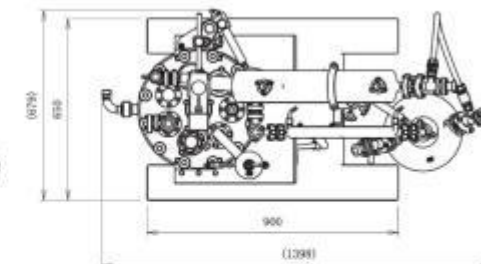
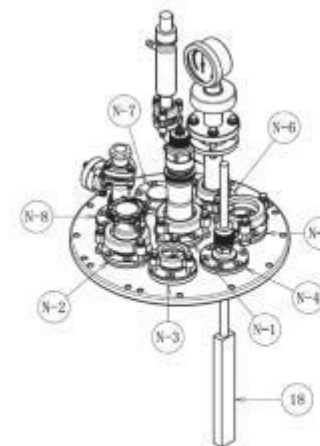
Pilot Plant Reactor **PLUS** - Standard Package



1. Bend Adapter (80°)
2. Reducer
3. Thermometer Pocket
4. Condenser with Reflux Divider
5. Receiver
6. Product Cooler
7. Vessel
8. Adapter (25 A, SQG 24/40)
9. Adapter (40 A, 50 A)
10. Straight Valve, L Type
11. Drain Valve (PVD 25, $\phi 20$)
12. Drain Valve (PVD 25, $\phi 20$)
13. Vacuum Vent Valve (PVH 25, $\phi 19$)
14. Greaseless Valve (SQG 24/40, $\phi 12$)
15. Flush Valve
16. Dropping Funnel
17. Fitting
18. PTFE Stirrer Shaft, Shaft OD: 16 mm
19. Support Structure
20. Metal Adapter for HTF, M30
21. Adapter for HTF, 15 A
22. Metal Adapter for HTF, M30
23. Cover Plate, SUS304, PFA coating

- N-1 Port for PTFE Stirrer Guide
 N-2 Hand Hole
 N-3 Port for Dropping Funnel
 N-4 PT100 Sensor with Holder
 N-5 Port for Condenser
 N-6 Compound Pressure Gauge, Safety Valve
 N-7 Spare Port
 N-8 Purge Port (Rc 3/8)

- * Ports on Cover Plate: 7 Ports (10 L),
8 Ports (20 L, 30 L)
- * 8 Ports include a Spare Port
- * All O-rings are consumable parts.
- * Overhead stirrer motor is not included.



Vessel Capacity: 20 L



Advantages of AG! Pressure Reactor

- Glass reactor for pressure up to 10 bar
- Drain port with removable glass shaft
- Individually inspected and tested for max pressure
- Visual monitoring of pressurized reactions
- Wide temperature range: -90 °C to +200 °C
- Optional +300 °C version
- Support structure with integrated safety barrier
- Made of highly chemical resistant materials (SS316 or optionally Hastelloy)



Standard Specifications

- Vessel capacity: 500 mL, 1 L, 1.5 L
- Vessel type: Double wall DN 80
- Operating pressure: Vacuum to +10 bar G (1 MPa)
- Operating Jacket Pressure: Up to +0.5 bar G (0.05 MPa)
- Operation Temperature: -90 °C to +200 °C
- ΔT : 110 °C (Double wall)

Notes

Overhead stirrer, circulator and chiller are not included

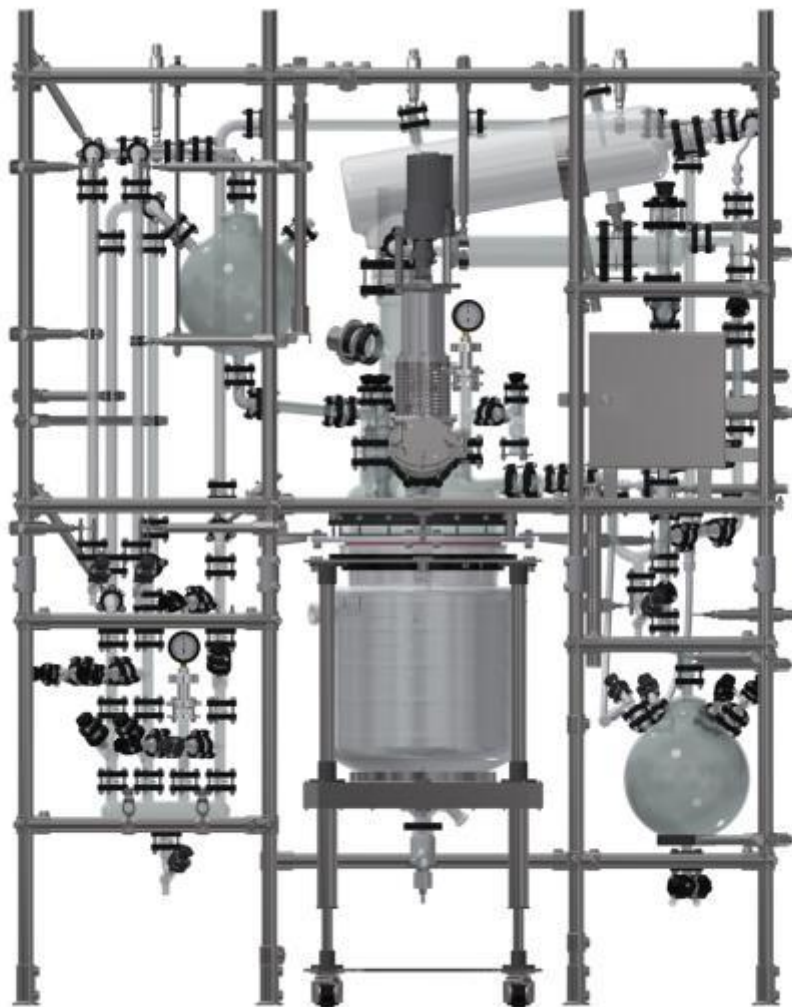
Support structure: Poly-carbonate sliding window, epoxy coating

Flush valve shaft: PTFE or PEEK or Glass

Impeller: SS316

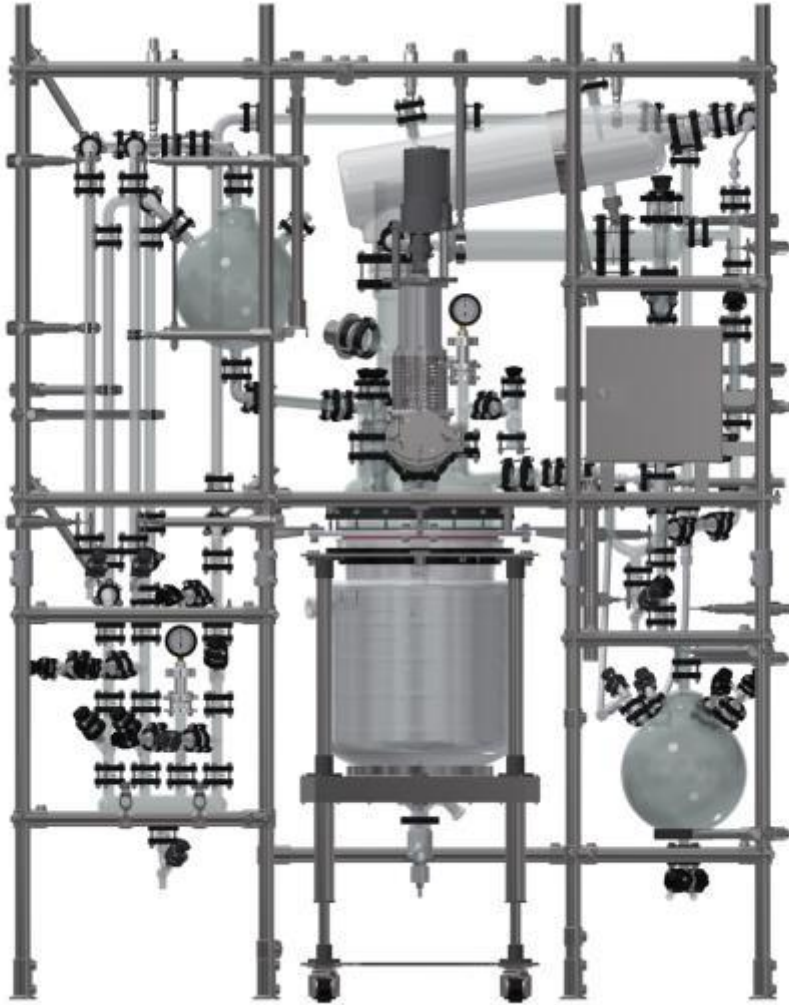
Wetted Parts: Borosilicate glass 3.3, PTFE, SS316 (Optionally Hastelloy) and FFKM

Customisations are possible on request



Advantages of AG! Universal Reactor

- Truly multipurpose reactor system with variety of features
- Vessel capacity up to 100 L triple wall (with vacuum jacket and thermal jacket)
- Easy preparation and running of reactions
- Robust AG! mechanical seal for heavy duty performance
- Endless possibilities for customisations
- Highly suitable for continuous industrial processes
- Complete engineering, on-site installation and troubleshooting support around the world



All in one system for Plethora of Processes

- Reaction - Vacuum to atm
- Temperature regulation
- Temperature monitoring
- Agitation
- Reflux condensation
- Phase separation
- Distillation
- Product cooling and collection
- Pressure monitoring and relief
- Inert atmospheric reactions
- Dosing liquids and solids
- Additional functions based on user request



- **AG! is trusted because of its:**
 - Demonstrated successful history
 - Technical excellence
 - Customer focus

- **AG! reactors are:**
 - High performance
 - Great user experience
 - Best return on investment

- **AG! has a wide range of reactor products on a wide range of scales**
 - We hope that you may join our family of happy customers

- **Do you have any questions?**



AG!
Asahi Glassplant Inc.

Innovation | Sincerity | Progress

www.asahiglassplant.com

