

Reactor System & Magnetic Drives

[A company based on advanced technology and reliable customer oriented products]

*Welcome to
HANWOUL ENGINEERING*

A company based on advanced technology and reliable customer oriented products, Hanwoul Engineering Co., Ltd. will always work hard for the customer satisfaction.

Currently, we are producing high pressure and high temperature reactor along with high or reduced pressure magnetic drive. However, we also develop various laboratory equipment needed for technology development as per the demand of our customers.

State-of-art shows that we are able to maintain customer safety and convenience on the basis of numerous know-how and technology that we possess. We are always pushing ourselves for continuous technology development to meet customer's needs.

I promise you that we will always be the platform in which our customers can have faith on. All the executives and staff members will work hand in hand, with sincerity to develop new and quality technology to always maintain the positive impression of our customers.

Thank You

President

Rah, Jong-Nam

Magnetic Drive

Magnetic Drive is mainly used for high temperature, high pressure reactions. The magnetic field separates the shaft and the body. Although the shaft is only separated with the magnetic field, it possesses no risk of leakage. Due to the absence of friction, it can be used semi-permanently. It is mainly being used in the sensitive electronic components, bio, semiconductors, food products, precise chemical and pharmaceutical fields.



** Pressure and temperature conditions other than the default specifications can be designed and produced after consultation*

Magnetic Drives			
Type	Upper & Bottom	Mounting	Flange, Clamp, Thread type
Material	316SS, Monel400, Titanium, Hast-C276, Inconel600, etc	Magnet	Neodymium, Samarium
Design Pressure	F.V. ~ 400 kg _f /cm ²	Bearing	Oilless Bearing, Rolling Bearing
Design Temperature	AMB ~ 400°C	Motor	AC Motor, DC Motor, Servo Motor
Explosion-Proof	D2G4, EG3		

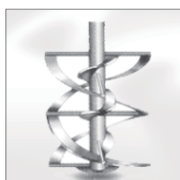
Impeller



Anchor



Dispersion



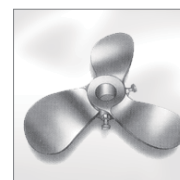
Helical



Paddle



Turbine



Propeller

HR-Series Reactor System

HR Series is mainly used for high temperature and high pressure reactors with magnetic bar and magnetic drive mixing system. The system has been designed with optimal conditions so that it can be easily used in research institutes and laboratories. It can be used as Hydrogenation, Hydrothermal, Supercritical and Polymerization reactors.

HR-8200



- Composed of Teflon-liner & cover in the reactor interior



- Teflon, Glass, Quartz liner can be installed



- Simultaneous isothermal heating of multiple reactors, Seesaw-Type stirrer (Tilting)

HR-8300



- Teflon-liner and coating possible in the reactor interior



- Magnetic drive stirring, reactor pressure control with BPR



- Magnetic drive stirring, Gas flow control with MFC, HPLC pump fuel injection

** Pressure and temperature conditions other than the default specifications can be designed and produced after consultation*

Type	HR-8100/8200 Reactor	HR-8300 Reactor
Capacity	100~2000cc	
Material	316SS, Monel400, Titanium, Hastelloy-C276, Inconel, etc.	
Design Pressure	10~400 kg _f /cm ²	
Design Temperature	AMB ~ 400°C	
Control System	Temperature Controller, RPM Controller & Indicator	
Heating	Electric Band Heater or Jacket Type	
Nozzles	Gas Inlet/Outlet Valve, Pressure Gauge, Pressure Safety Valve, Sampling Valve, Cooling Inlet/Outlet, etc.	
Mixing Type	Magnetic Bar	Magnetic Drive

HR-Series Reactor System

HR-8100



- Hydrothermal Reactor
- Interior: Teflon-liner & cover
- DT/DP: 200 °C / 30kg_f / cm²

Convection Oven Reactor



- Oven temperature control
- Stirrer for the reactor rotation
- 4~10 simultaneous stirring possible

HR-8300-3Port



- Individual temperature, pressure and stirring speed controller
- Upto 2~10 port control

HR-8300-RC



- Stirring with magnetic drive
- Mounting the reflux condenser

HR-8300-M



- Stirring at high temperature, high pressure using magnetic drive without leakage

HR-8300-G



- Glass reactor to view the interior
- DT/DP: 200 °C / 5kg_f/cm²

HR-8300-View Cell



- Glass window to view the interior of the reactor

HR-8300-6Port



- Individual Control
- Upto 2~10 port control

HR-8200&8300-2Port



- Two type stirrers which can be controlled individually

RM-Series Reactor System

RM Series reactor systems include magnetic drives and are being used as high pressure and high temperature reactors for different processes such as Hydrogenation reactions, Hydrothermal reactions, Supercritical reactions, Polymerization reactions.

RM-8100



· Vessel Up & Down (Handle)



· Vessel Up & Down (Motor)



· Vessel Up & Down (High Viscosity MD)

RM-8200



· Cover Up & Down (Pre-mixer → reactor → neutralization)



· Cover Up & Down (Tilting)



· Cover Up & Down

** Pressure and temperature conditions other than the default specifications can be designed and produced after consultation*

Type	RM-8100 Reactor	RM-8200 Reactor
Capacity	1~200L	
Material	316SS, Monel400, Titanium, Hastelloy-C276, Inconel, etc.	
Design Pressure	10~200kg _f /cm ²	
Design Temperature	AMB~400°C	
Control system	Temperature Controller, RPM Controller & Indicator	
Heating	Electric Band Heater or Jacket Type	
Nozzles	Gas Inlet/Outlet Valve, Pressure Gauge, Pressure Safety Valve Sampling Valve, Cooling Inlet/Outlet, etc.	
Mixing Type	Magnetic Drive	
Up & Down System	Vessel Down	Cover up

RM-Series Reactor System

RM-8100



- Vessel Up & Down

RM-8100



- Vessel Up & Down
- Teflon liner & Coating

RM-8100



- Multiple Reactors
- Vessel Up & Down

RM-8200-J



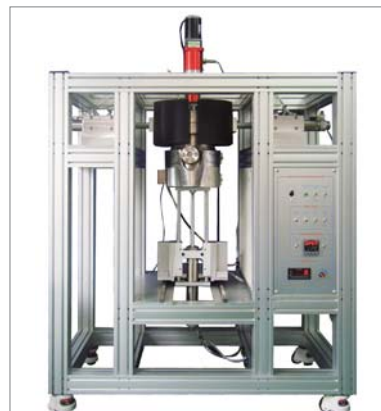
- Vessel Up & Down
(Jacket Heating & Cooling)

RM-8100-View Cell



- Vessel Up & Down
- View-Cell Reactor

RM-8100-View Cell



- Automatic Open/Close, Up/Down

RM-8100-CV



- Vessel Up & Down
- Control Valve

RM-8100-M



- Reactor, Condenser
- Receiver Tank

RM-8200-Handle



- Polymerization
- Cover Up & Down
- Jacket, Tilting (Handle)

Supercritical Reactor System

SC Series Reactor System uses the supercritical properties (permeability, diffusivity, solubility, etc.) of fluid, mainly CO₂ and H₂O and is used in chemical engineering for decontamination, deposition, extraction, nano-particle and is also actively being used in bio related research.



Coating System



Continuous Supercritical Water System



Phase Equilibrium System

Solubility System



Full Automation Solubility System



Manual Type Solubility System



Manual Type Solubility System

Dry System



Supercritical Dry System



Supercritical Aerogel Dry System



Supercritical Dry System

Supercritical Reactor System

Supercritical Water



Continuous Supercritical Water System



Supercritical Water System



Supercritical Water Oxidation System

Extraction System



Supercritical Extraction System



Supercritical CO₂ Oil Extraction



Supercritical Extraction System

Other System



Supercritical View Cell System



Supercritical Methanol Trans Esterification



Supercritical Enzyme System

Supercritical fluid process applications

Extraction	Natural products, pharmaceutical extracts	Synthesis	Supercritical hydrothermal synthesis
Drying	Aerogel production	Foaming	Polymer Foam
Water treatment	Supercritical Water Oxidation	Cleaning	Semiconductor cleaning
RESS & SAS	Preparation of pharmaceuticals, biodegradable polymeric micro particles		

Latest Products

Biomass Pyrolysis System



Continuous Fluidized Bed Reactor

- Fluidized Bed : Continuous Fast Pyrolysis
- Cyclone : Separation of Solid Particles
- Condenser & ESP : Collection of Condensate Oil
- Catalyst Bed : Oil Upgrading

Glass Reactor System



Glass Reactor with Magnetic Drive

- Glass Reactor : Transparent System
- Borosilicate Material : High Corrosion Resistance
- Stirrer : Magnetic Drives
- Max. Operating Pressure : $7\text{kg}_f/\text{cm}^2$
- Touch Panel Control & Data Acquisition

Hot Oil Circulator

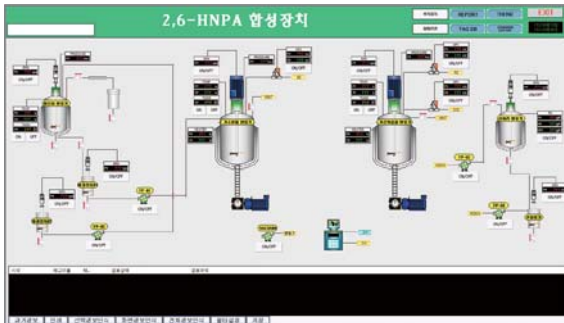


- Closed Type : Odor-Free From Circulation Oil
- Option: Explosion Proof

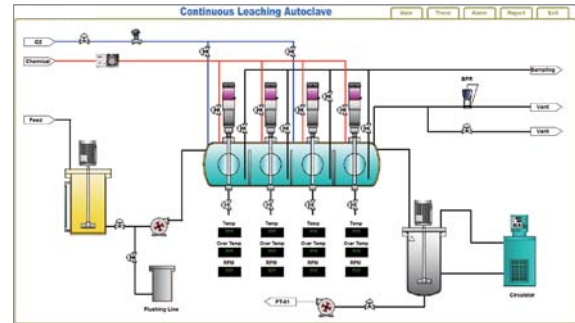
Specification

Model		HC7101H	HC7301H	HC7501H	HC7701H
Pump Data	Capacity (kW)	0.75	1.1	1.5	2.2
	Max. Flowrate (L/min)	30	63	67	103
	Max. Head of Pump	50	80	87	60
	Max. Working Temp.(°C)	350	350	350	350
	Max. Pressure (bar)	7	7	7	7
Heating	Power (kW)	3	12	20	26
Working Temp. Range (°C)		300	300	300	300
Power (kW)		220V(1P)	220V(3P), 380V(3P)	220V(3P), 380V(3P)	220V(3P), 380V(3P)
Connection	Hot Oil	1/2" PT	1/2" PT	3/4" PT	1" PT
	Cooling	1/2"	1/2"	3/4"	3/4"
Dimension	(w x d x h)	470 x 920 x 790	600 x 1050 x 850	750 x 1200 x 1000	800 x 1400 x 1100

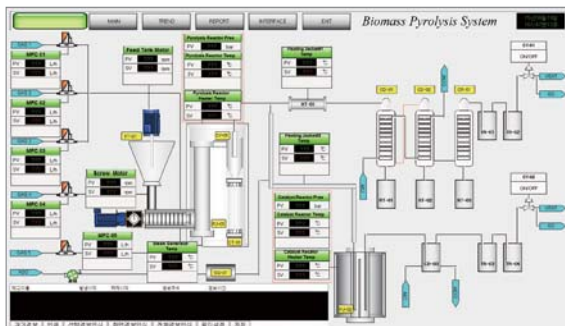
PLC & HMI System



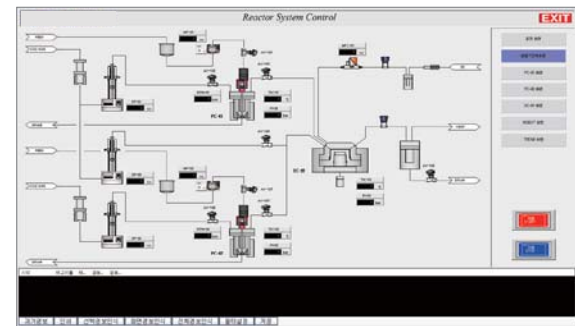
2-6-HNPA Synthesis Reactor System



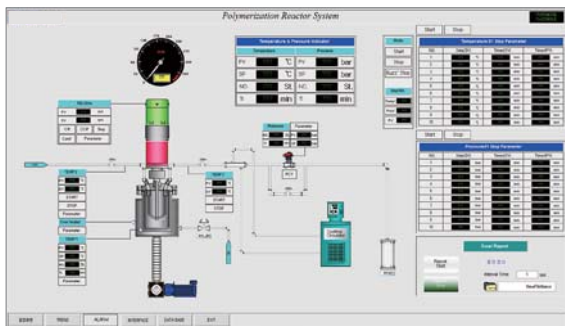
Continuous Leaching Reactor System



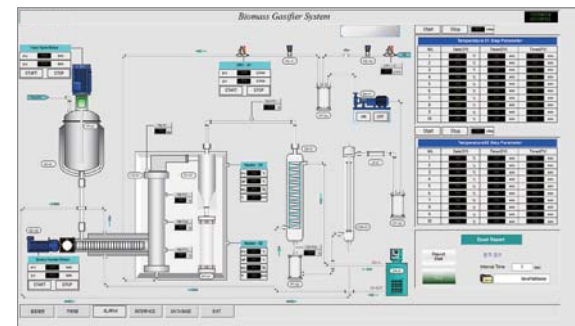
Biomass Pyrolysis System



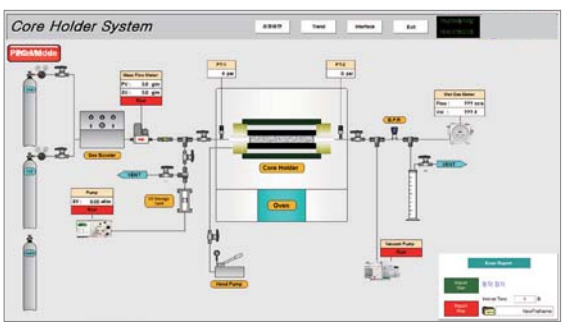
Wafer Deposition System



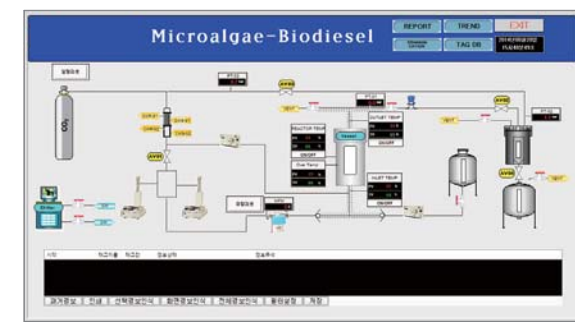
Polymerization Reactor System



Biomass Gasifier System



Core Holder System



Microalgae-Biodiesel Production System

Lab & Bench Scale

Gas Hydrate Reactor



Gas Hydrate Reactor



Hydrate Reactor System



500mm Core Cell System



Core Cell System with Oven



300mm Core Cell System

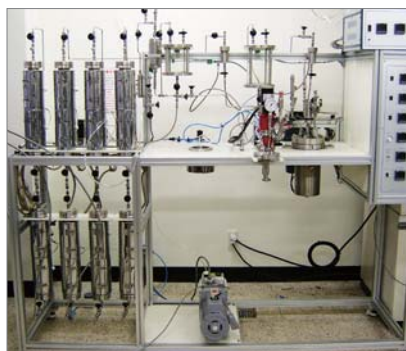


Core Cell & High Pressure

Purification Column



Gas Purification Column



Polymerization with Purification Column



Liquid Purification Column

Lab & Bench Scale

View Cell System



Hand Tight View Cell



View Cell Reactor



View Cell with Magnetic Drive



View Cell with Electrode

Polymerization Reactor



EO + PO Reactor System



Polymerization with Purification Column



Movable Polymerization System

Other Reactor System



Polymerization Reactor



Device for Preparation of DU Hydride



DU Hydride with Cell

Other Reactor System



Membrane Test System



Catalyst Reactor System



Wafer Deposition System



Solvent Extraction System



Solvent Recovery System



Tilting Reactor System



CO₂ Recovery System



Variable Volume View Cell



EO Gas Reactor System

Pilot Scale



Continuous Biomass System



Oil Esterification System



Hydrogenation System



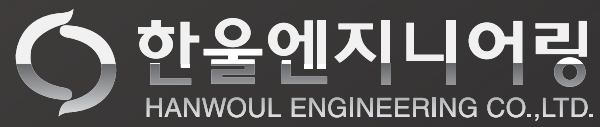
Polymerization Reactor System



Continuous Biomass Reaction System



Continuous Leaching Reactor System



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