

R-401 Series

Supercritical Fluid Extraction System & SCWO



- ▶ "K" Type Thermocouple & Thermowell
- ▶ Pressure Gauge & Pressure Transmitter (0~10,000 Psig)

Chiller Module

- ▶ Temperature Rang : -25°C ~ 80°C
- ▶ Pump Capacity : 14 L/min
- ▶ Bath : 11 Liter
- ▶ Case : 426(D) x 350(W) x 690(H)
- ▶ Cooling Capacity : 2100 BUT -7°C
- ▶ Heater Capacity : 1200 W

Back Pressure Regulator

- ▶ Pressure Range : 200~ 10,000 Psig
- ▶ Inlet & Outlet Size : 1/4" NPT
- ▶ Materials : 316 Stainless Steel
- ▶ Accuracy : ± 10%

Separator

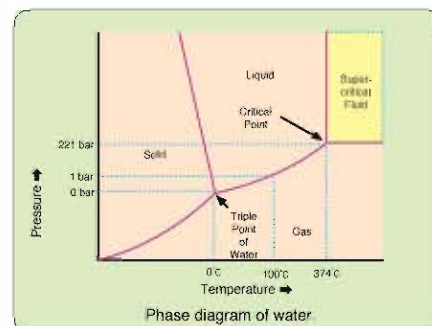
- ▶ Capacity : 100 ml ~ 10 Liter
- ▶ Materials : 316SS
- ▶ Design Pressure : 5000 Psig at 100

Condenser

- Type : Shell & Tube Type
- Design Pressure : 10,000 Psig at 200°C
- Materials : 316SS

Feed Pump

- ▶ Flow Range : 10 ml/min
- ▶ Pressure : 0 ~ 10,000 Psig
- ▶ Materials : 316SS
- ▶ Connections : 1/4" ~ 1/8" NPT(F)



Feature

1. SFE & SCWO can be selected according to its purpose of use.
2. Supercritical Fluid Extractions and Reactions' Capacity, Pressure, Temperature, etc, are all optional selections available.
3. As for Capacity, it is standard from 20ml up to 2-Liter, and when more than 2-Liter it should be an optional.
4. Designing is available from 20ml up to 500ml for 10,000psig, and for 5,000psig when 1 Liter and 2-Liter.
5. SFE & SCWO will be LabVIEW Software using for design so as to be controlled.

General

- ▶ Capacity : 50 ml ~ 10 Liter
- ▶ Design Pressure : 10,000 Psig
- ▶ Design Temperature : 0~ 500 °C
- ▶ Materials : 316SS, Hastelloy C.-276
- ▶ Heater Capacity : 0.5 Kw ~ 5Kw
- ▶ Support Stand : Floor Stand

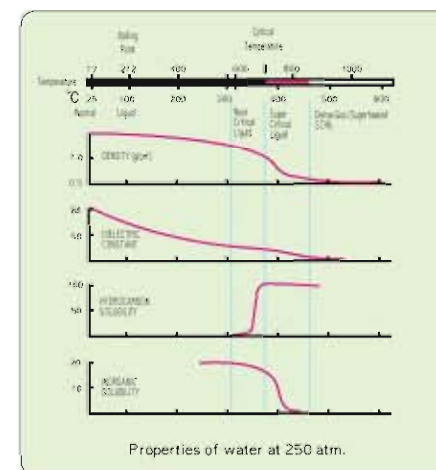
R-401 Series Data Acquisition System

- ▶ Process Control System Box
- ▶ PID Control Power Regulator (SCR)
- ▶ Power Supply (±15V, +5V)
- ▶ Thermocouple AD Converter (Signal Conditioner) : 0 ~ 100°C
- ▶ Voltage Follower & Filter for Analog Input & Output (Pressure)
- ▶ TRIAC Circuit (Digital Output-SSR) (Solenoid Valve (5A))
- ▶ Spark Filter (250V) : SCR
- ▶ Noise Filter (Main Power (20A))
- ▶ PLC Panel & Panel Case
- ▶ R-401 Process Control System Software & Devices
- ▶ R-401 Process Control Software
- ▶ Sensor Calibration Calculator Software for R-401 Process Sensor - Temperature, Pressure
- ▶ R-401 Process Control Software Manual
- ▶ DAQ Board (Data Acquisition Board)
- ▶ 37pin Cable (2m)
- ▶ 40pin to 37pin Converter Cable

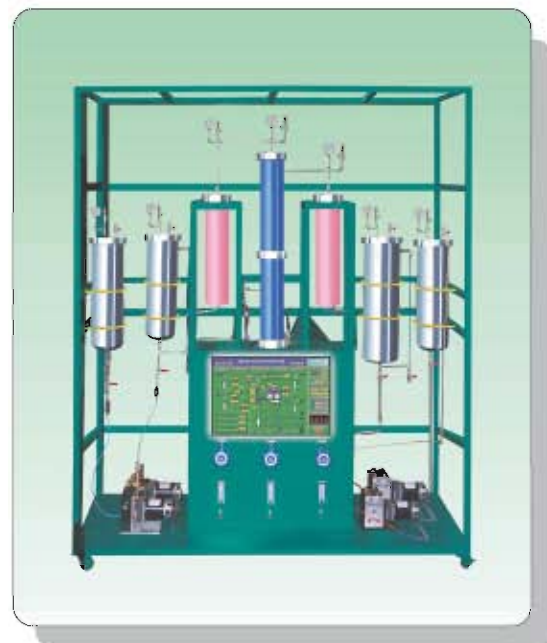


Physics and Chemical Feature of Supercritical Modulus

Pure water becomes supercritical state when



its temperature and pressure come up more than to 374°C, 218atm of critical value. The Water in the vicinity of critical point is compressible fluid and, in addition, the Density, Inductivity, Viscosity, Heat capacity, Internal-energy, Electricity conductivity, etc, are all totally different in its Physics and Chemical Feature. In the vicinity of critical point, Water act as a superior Solvent against the Nonpolar Compound. The high Internal-Energy of Supercritical Modulus keeps farther distances between the Water-Molecule and consequently, the intensity of Hydrogen bond between Molecules in closer neighborhood becomes forcedly reduced. In the scope of Supercritical, the Water Degree of Dissociation can be shown by the Density and Mathematical Function of Temperature, and in this case, Density affects much more. By the same token, the Dissociation Constant of Salt and Acid in the Supercritical Modulus being very much affected by the Water Density.



in high level of treatment even with a small capacity Reactor.

Supercritical Fluid Extraction Advantages for removing analytes from solid and semi-solid samples

- Reduced sample preparation time
- Higher recovery rates
- Economic
- Safety from organic solvents

Carbon Dioxide CO₂ is the gas most commonly used as a supercritical fluid. CO₂ is:

- Safe
- Inexpensive
- Readily available
- An ideal substitute for many hazardous and toxic solvents

The increased density followed by the increased pressure under fixed temperature can accelerate the Dissociation of Salt and strong Acid.

Likewise, the Electrical Conductivity of Electrolyte in the Supercritical Modulus being tremendously affected by the Density of Water. Viscosity is, as well known, an important factor in order for us to understand the Transfer Phenomenon of Molecule in the Supercritical Modulus, and the Supercritical Modulus Viscosity increases according to the increase of the Density.

Oxidation Process of the Supercritical Modulus

The Supercritical Modulus Oxidation Process, which make use of characteristic feature of Solvent, has various advantages in the Waste Water Treatment, as it goes on in a rapid period of time under high temperature and pressure the Wet Process of Oxidation can, differently from other Subcritical Oxidation Process, decompose a big amount of waste water within a short period of time

Tubular Reactor

Applications : Polymers, Pharmaceutical Production, Food and Cosmetics, Other Applications

Materials :

316SS and Hastelloy-C276

Max.Pressure:

6,000psig at 800°C

Ordering Information

Model NO	Capacity	Design Pressure	Design Temperature	Materials	Outside Diameter	Outside Depth	Connections
R-401-8	8 ml	6000 Psig	800°C	316SS & Hast-C276	3/8"	200 mm	1/8"NPT(F)
R-401-12	12 ml	6000 Psig	800°C	316SS & Hast-C276	3/8"	300 mm	1/8"NPT(F)
R-401-16	16ml	6000 Psig	800°C	316SS & Hast-C276	1/2"	200 mm	1/8"NPT(F)
R-401-24	24 ml	6000 Psig	800°C	316SS & Hast-C276	1/2"	300 mm	1/8"NPT(F)
R-401-160	160 ml	6000 Psig	800°C	316SS & Hast-C276	1"	300 mm	1/4"NPT(F)
R-401-380	380 ml	6000 Psig	800°C	316SS & Hast-C276	1"	500 mm	1/4"NPT(F)
R-401-590	590 ml	6000 Psig	800°C	316SS & Hast-C276	2"	300 mm	1/4"NPT(F)
R-401-980	980 ml	6000 Psig	800°C	316SS & Hast-C276	2"	500 mm	1/4"NPT(F)

Separator Module

Purpose

- ▶ Cooling of Effluent gas, and separation of Gas and Liquid

Conditions

- ▶ Cooling water should be used for Condenser
- ▶ Condenser line to be installed
- ▶ By-pass valve to be installed for Separator's liquid level control for an emergency case in the level control valve
- ▶ No 'Flow hunting' by Condenser is allowed in no case

Specification

- ▶ Max temperature : 250°C ▶ Max pressure : 2000 Psig

Ordering Information

ORDER NO	Capacity	Pressure	Dimensions(mm)				
			A	B	C	D	E
S-301-SS3	300 ml	2000 Psig	111	220	71	51	150
S-301-SS5	500 ml	2000 Psig	115	300	75	55	230
S-301-SS1	1000 ml	2000 Psig	146	250	108	86	180
S-301-SS2	2000 ml	2000 Psig	154	350	118	94	280
S-301-SS4	4000 ml	1000 Psig	187	400	155	127	330
S-301-SS8	8000 ml	1000 Psig	215	530	185	155	460
S-301-SS10	10000 ml	1000 Psig	263	654	233	203	584



Compositions

- ▶ Condenser
- ▶ High pressure separator
- ▶ Level gauge
- ▶ Level control valve
- ▶ Condenser by-pass line(valve)
- ▶ Block valve
- ▶ Glove valve

High Pressure Metering Pumps

TECHNICAL SPECIFICATIONS

FEATURE

- ▶ Repetitive accuracy ± 0.3.
- ▶ Pressures to 6000 psig.
- ▶ Low dead volume.
- ▶ Compatible with most solvents.
- ▶ Continuously variable flow rates.
- ▶ Economical to purchase and maintain.
- ▶ Constant volume delivery.

Specifications

Flow rates	0.01 to 9.99 mL/min. 50 µl head 0.04 to 40 mL/min. 200 µl head
Pressure	0 to 6,000 psi 50 µl head 0 to 1,500 psi 200 µl head
Accuracy	2%
Precision	0.2% RSD
Dimensions	5.5"H × 10.4"W × 17.5"D
Weight	24 pounds (12kg)
Power	100/110 Volts ac:220 Volts ac 50/60 Hz
Features	Prime-purge valve Pulse damper LED display RS-232 input

Standard Model for Dual heads Type

Model	Flow rate (mL/min)	Delivery pressure (psig)	Head Material	Wetted Parts Material
MMP-ss-10-s	0.1-10	6,000	STS316	Plunger(Zro2) Ball(Zro2)
MMP-ss-20-s	0.2-20	3,000	STS316	
MMP-pk-10-s	0.1-10	5,000	PEEK	Seal(PCTFE,PE)
MMP-pk-20-s	0.2-20	6,000	PEEK	



Ordering information

Part No.	Description
210SFP01	Series II Pump, self-flush, 0.01-9.99 mL/min., Stainless steel, 110/220V
240SFP01	Series II Pump, self-flush, 0.04-40.00 mL/min., Stainless steel, 110/220V
210PPF01	Series II Pump, self-flush, 0.01-9.99 mL/min., PEEK, 110/220V
240PPF01	Series II Pump, self-flush, 0.04-40.00 mL/min., PEEK, 110/220V



RC-401 Series Refrigerated Bath Circulator



RC-8

Features

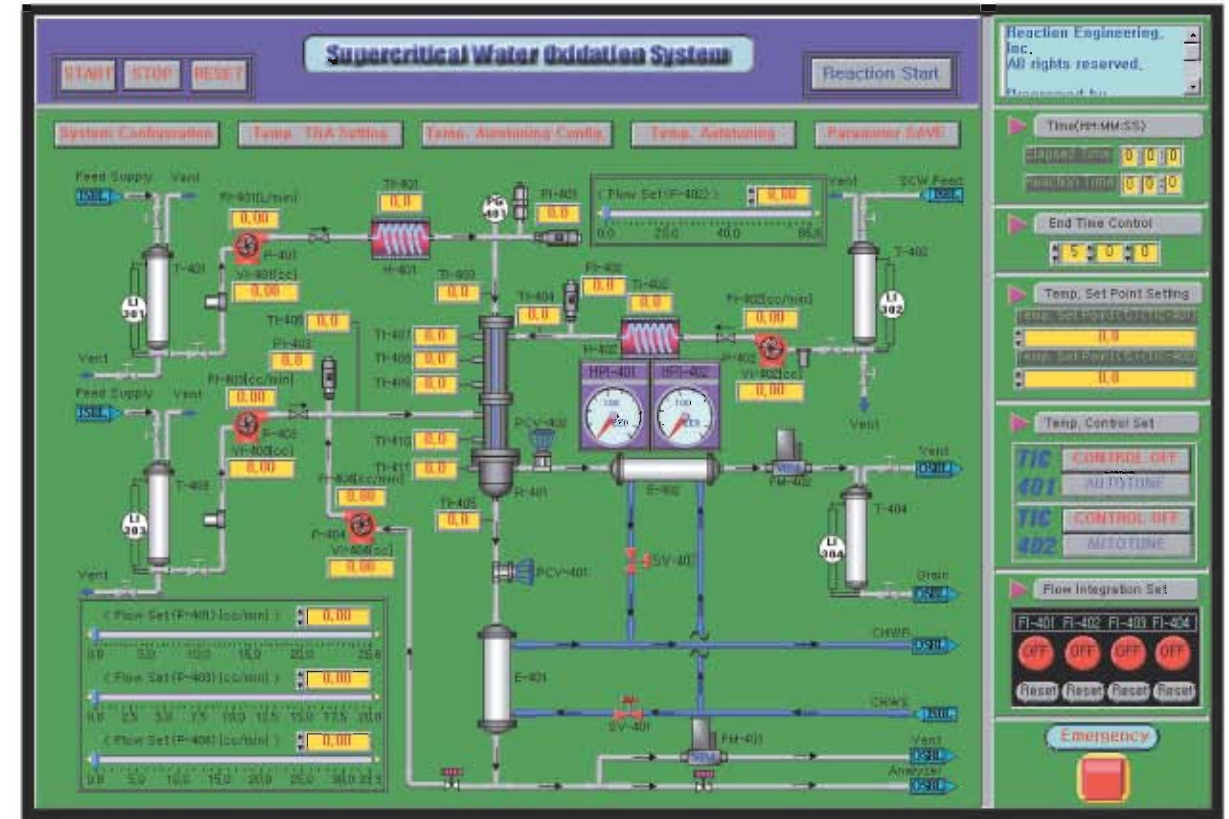
- On account of combined functions of Cooling & Heating system, you can use this Circulator in a wide range of temperature from -45.0°C up to 120.0°C
- Maintains high Accuracy ($\pm 0.02^\circ\text{C}$ ~ $\pm 0.05^\circ\text{C}$) controlled by PID Control system
- Easy temperature setting. Temperature is controlled automatically by Auto Tuning
- Suitable for providing high-grade analytical equipment with constant warm water by installed-in circulating pump. Also, because pressure and suction is being done simultaneously, circulation itself can be done much more efficiently
- Over Current Breaker installed in, which shut off the power when the Circulator is over-currented
- Power is automatically shut off when the circuit is out of order
- Water Level Sensor & Buzzer systems equipped, both which can shut off the power to Heater when the water level inside the Bath goes down
- The system is semi-permanent because every component has been carefully selected and used under strict test. Thus, a flaw developing possibility is extremely low
- High efficiency Cold System used
- Perfect insulation using Urethane foam for maintaining low temperature
- Excellent external appearance on account of triple paintings in 2-tone color



RC12
RC22

Model	RC8	RC12	RC22	
Bath Volume	8L	12L	22L	
Temp	Set Range	-20° C~80° C	-20° C~120° C	
	Accuracy	$\pm 0.02^\circ\text{C}$ at 10° C		
	Unigormity	$\pm 0.1^\circ\text{C}$ at 10° C		
	Controller	PID Auto tuning Controller		
Material	Bath	Stainless Steel (304SS)		
	External	SS41/1.2T/Doublepaint & baked		
	Insulation	Polyurethane foam(12mm)	Polyurethane foam(20mm)	
Heater	1800W			
Pump	Capacity/Height 11L/min/1.2M Out-In 1et			
Size	Bath(D×W×H)	190×320×150	250×320×150	320×320×220
	Overall(D×W×H)	220×380×535	380×400×730	380×400×730
	Top Open(D×W)	190×165	250×170	320×160
Safety	Over current & Leakage Current Switch/ Over Temp. Switch/ (OPTION : Low Level Switch)			
Refrigerator	1/4Hp	1/4Hp	1/2Hp	
Weight(net)	30kg	40kg	45kg	
Electric requirement & Power Consumption	220V AC 60Hz, 240V AC 50Hz			

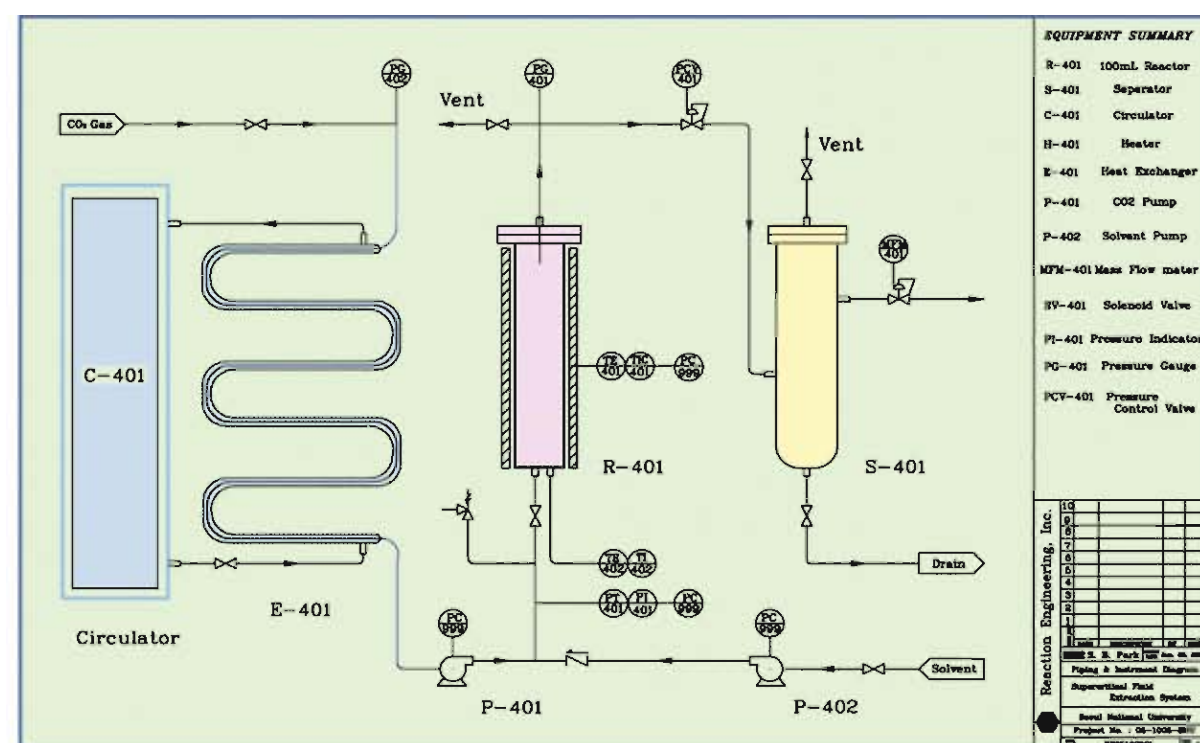
R-401 Series SCS Software System



P-401 Feed Pump System

Ordering Information

Model	Pressure Ratio	Displ Volume (in.³)	Maximum Discharge Pressure (PSI)	Connections*		Weight (lbs)
				Suction	Discharge	
L10-2	1.20	4.57	3,190	1"	1/2"	42
L15-2	1.30	3.17	4,785	1"	1/2"	
L25-2	1.54	1.80	8,555	1/2"	1/2"	
L35-2	1.78	1.25	12,325**	1/2"	1/2"	
L60-2	1.118	0.79	18,705**	1/2"	1/2"	
L100-2	1.200	0.44	30,450	1/2"	1/4"	49
L150-2	1.270	0.36	42,050	1/2"	1/4"	
L250-2	1.480	0.18	65,250	1/2"	1/4"	
L300-2	1.580	0.15	65,250	1/2"	1/4"	
L400-2	1.740	0.12	79,750	1/2"	1/4"	
L500-2	1:1000	0.09	79,750	1/2"	1/4"	



Ordering Information

R-401	A	B	C	D	E
Series	Capacity	Pressure	Temp	Power	Control System
• SPE	1:20ml	1:3000Psig	1:100°C	1:220/60/1	1:PID/Tach/PG
• SCWO	2:50ml	2:4000Psig	2:200°C	2:220/60/3	2:PID/Tach/PLC
	3:100ml	3:5000Psig	3:300°C	3:110/60/1	3:R&S/Tach/PLC
	4:300ml	4:6000Psig	4:400°C	4:Other	4:R-SCS Software
	5:500ml	5:10000Psig	5:500°C		
	6:1 L	6:Other	6:Other		
	7:2 L				
	8:Other				

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