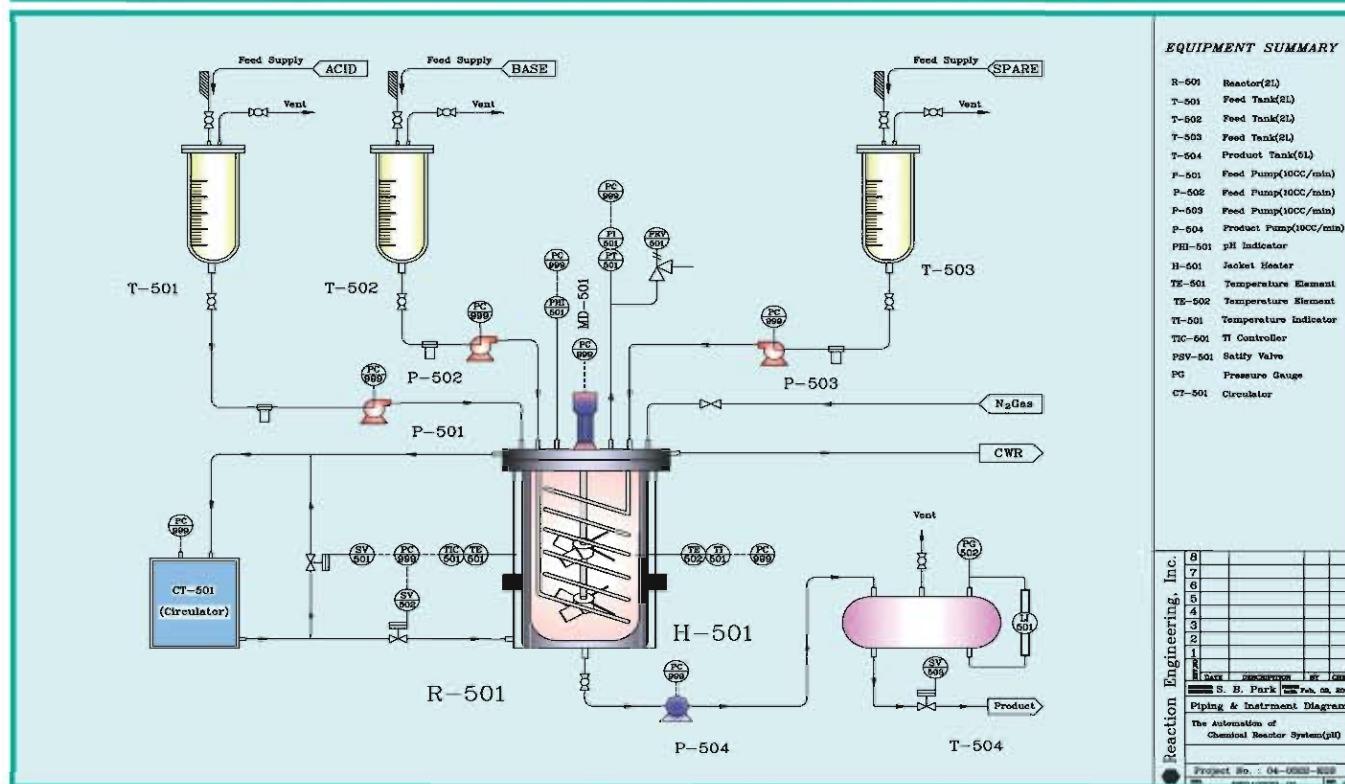


R-501 Series The Automation of Chemical Reactor System (pH)



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R-501 Series The Automation of Chemical Reactor System(pH)

GENERAL

- R-501 Series is designed to be able to continuously control pH during reaction.
- The volume of Acid and Base and reaction procedure can be controlled and temperature, RPM also be controlled and monitored.
- Reactants such as, Acid and Base, Spare are supplied to reactor using Feed Pump.
- Product as much as reactant is pulled out to Storage tank by rotary motion of Pump not to overflow.
- Feed Pump and Product Pump can measure fluid up to the degree of $\pm 0.1\%$ and fluid also be controlled by computer. The volume of feeds to be supplied can be calculated as well.
- Temperature, pressure, Torque, RPM and pH, so on, can be controlled and monitored. (Accuracy $\pm 0.1\%$)
- R-SCS software system can indicate temperature, pressure, RPM(Torque), Feed Pump as the type of chart on computer.
- This reactor is convertible type, so users can replace the vessel as their demands, such as 1L, 2L, 4L.
- Basically, glass is used for material of vessel, but if users want to use reactor for high pressure, it is possible that reactor is used for high pressure if they add to purchase vessel for high pressure.

- This reactor is multi-purpose reactor which can be used for Continuous Stirred Tank Reactor (CSTR) and be used with Catalyst Basket.
- The pH controlling and monitoring can be performed by using pH Transmitter and electrode.
- This reactor is designed for the purpose of measuring Conductivity, ORP, DO and ANTI-Form as well.
- Users can select Feed Pump according to user demand and spec.
- Pump can be replaced by Liquid MFC.
- Balance can be used to calculate the volume of Acid, Base and Feed at user's option.
- According to reaction purpose, condenser, column and separator can be attached to reactor.
- R-SCS Software System of reactor is used as external-type of REI-100.

FEATURES

- Capacity : 1L ~ 10L(Options : 20L ~ 500L).
- Design Pressure : 220psig.
- Design Temperature : - 30°C ~ 250°C.
- Materials : Glass & Stainless Steel.
- Power : 220 VAC, 220VAC/3-Phase.
- DC Motor : 90W, 1/4Hp, 1/2Hp, 1Hp, 2Hp.
- Magnetic Drive : 16in-lbs, 32in-lbs, 64in-lbs.
- RPM : 0 ~ 2500rpm.
- Heater : 0.5 ~ 10Kw.
- Stand : Bench and Floor Stand.
- Gas Inlet Nozzle and Valve.
- Sample Nozzle and Valve.
- Thermowell and "K" type Thermocouple.
- Cooling Coil Inlet and Outlet Nozzle.
- Pressure Gas and Pressure Transmitter.
- Relief Valve.
- Materials: 316SS, Hastelloy C-276, Monel, Inconel, Titanium, Zirconium.

R-501 Series is designed for automation of experimental synthesis.

- R-501 Series- the intelligent automatic laboratory reactor from Reaction Engineering, Inc. for the automation of basic physical operation and chemical reactions.
- You can run experiments automatically - safely, reproducibly and around the clock.

Automatic Lab Reactor

- R-501 Series the Automation of Chemical Reactor System (pH) is a computer-controlled, automatic lab reactor, a compact system ready for 24-hour operation in the chemical research and development lab.

Automated Syntheses

- Entire chemical syntheses are automatically performed, monitored, recorded and stored on the hard disk of the PC.
- A safety and alarm concept independent of the PC allows R-501 Series to be used around the clock even in the absence of the laboratory staff.

Reproducible Experiments

- With the automatic lab reactor, the chemist achieves high accuracy and reproducibility of the experiments.
- R-501 Series is especially suitable for time consuming series experiments and complex optimizations.
- With the purchase of R-501 Series, you free up capacity for demanding tasks, as monitoring duties and routine work are now finally relegated to the past.

Advantages

- Improvement of the development process.
- Increase in the lab capacity through automatic, unsupervised operation.
- Outstanding reproducibility.
- More efficient and More precise process optimization.
- Work under conditions mirroring those in production.
- Improved safety at the workplace.
- Complete and easily surveyed documentation of the experiment.

Temperature Control

- Jacket Temperature
- Temperature of the reaction mass
- Distillation and reflux
- Crystallization

Dosing Control

- Gravimetric addition control
- With pumps for liquids
- With valves for liquids, gases (optional)
- With solids feeders (optional)



Stirring and Mixing

- Speed control.
- Measurement of viscosity changes. (characteristic value)

pH Control

- pH control single (With base or acid) or dual (With base and acid) possible setting and holding pH.

Pressure Control

- Ramp control to preset pressure, vacuum to ambient pressure. (overpressure possible on use of suitable reactors and final control elements)

Reactor

- Double-walled 2 liter glass reactor with standard taper cover.

Heating System

- Band heater type.
- Jacket type. (optional)

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R-501 Series

The Automation of Chemical Reactor System(pH) pH Transmitter

MODEL : HI 8614 (HANNA instruments®)

- High impedance input to accept signals directly from a pH electrode.
- Isolated output.
- Automatically temperature compensated.
- The HI 8614 is a water-resistant pH transmitter designed with a high impedance input to accept signals directly from a pH electrode.
- The signal is then processed by a special high-impedance amplifier, which transmits an output current directly proportional to the input signal but independent of changes in load or cable capacitance.
- Calibration is performed by adjustment of two independent trimmers for slope and offset.



Specifications

RANGE	4 ~ 20mA
RESOLUTION	0.01mA
ACCURACY	± 0.02mA at 20°C
TYPICAL EMC DEVIATION	± 0.25mA
CALIBRATION OFFSET	± 2.2mA
CALIBRATION SLOP	± 0.5 mA
TEMPERATURE	Fixed/automatic 0 to 100°C
COMPENSATION	temp. probe (optional)
OUTPUT	4~ 20mA
POWER	18 to 30VDC
ENVIRONMENT TEMP.	0 to 50°C
DIMENSIONS	165 x 110 x 90 mm (L x W x H)

Accessories

- Temperature probe with 3m Cable.
- Electrode holder for in-line applications.
- pH 4.01 buffer solution, 500ml bottle.
- pH 7.01 buffer solution 500ml bottle.
- pH 10.01 buffer solution 500ml bottle.

Electrode Specifications



pH Range	Temperature Range	Diameter	Length	Internal Reference Element
0-13	1 to 100°C	12mm	110mm	Ag/AgCl Refillable
Application : Water, Education Purpose, Micro Samples				



pH Range	Temperature Range	Diameter	Length	Internal Reference Element
0-13	0 to 80°C	12mm	115mm	Ag/AgCl Sealed
Application : Water, Education Purpose, Field Use, Sea Water, Swimming Pools				

Equipments to inject fixed quantity of Acid and Base into reactor



Low Flow - High Precision (Fluid Metering Pump)

- ▶ Ceramic and Kynar standard wetted materials.
- also available in Tefzel.
- ▶ 0 to .10 milliliters per stroke.
- ▶ Precision stroke to stroke 0.5% or better.
- ▶ From -10 to 100 psig.
- ▶ Needs only 17 inch ounces of torque.
- ▶ Adjustable while running or at rest.



Mass Flow Controller (LIQUI-FLOW)

- ▶ Lowest range 0.1 ~ 5g/hr H₂O.
- ▶ Highest range 20 ~ 1000g/hr H₂O.
- ▶ Thru-Flow measurement.
- ▶ 1° C temperature rise in sensor .
- ▶ Superstable zero.
- ▶ Attitude insensitive.
- ▶ Wide flow ranges 1 : 50.
- ▶ Sterilizable.

Tubing Pump to get sample or drain solution



Tubing Pump (Easy-Load L/S)

- ▶ Over - center cam design for fast tubing change.
- ▶ Deliver flow rates form 0.06 to 2300ml/min.
- ▶ Precision mated housing and tubing cavity.
- ▶ Fixed occlusion for good flow repeatability.
- ▶ Accepts several tubing sizes.
- ▶ Pump housing : Polysulfone, Polyphen.

Control Panel to increase the accuracy of equipment



Feature

- ▶ Signal conditioning.
- ▶ Connection using D-sub or RJ - 45.
- ▶ Easy to repair.
- ▶ Long life by using SSR.

Specification

- ▶ Temperature Control.
- ▶ pH Control.
- ▶ RPM Control.
- ▶ Flow rate Control.
- ▶ Pressure Indicating.

R-501 Series

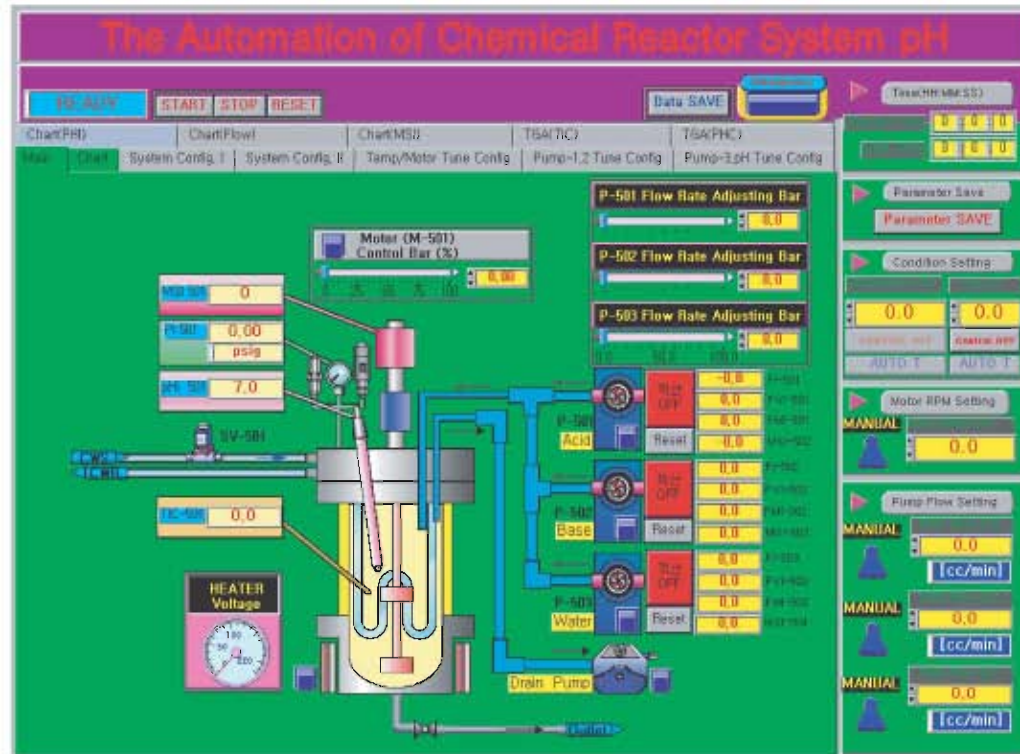
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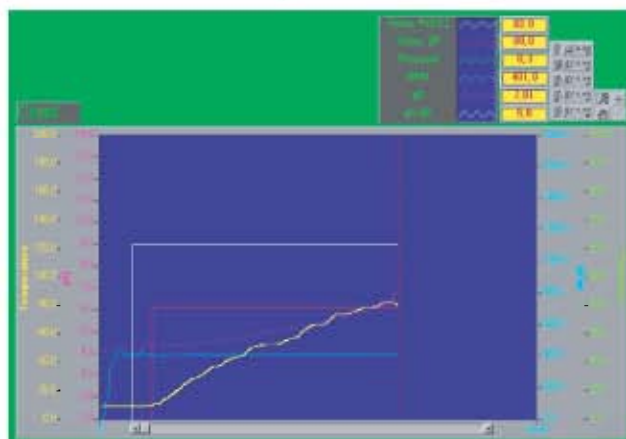
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R-501 Series Software System



- You can install the software in general-purpose computer at Institute and office.
- It is operated easily and simply by handling mouse and pushing the button on computer.
- Temperature, pressure, RPM and so on can be controlled in real-time.
- With the software, users can measure and control pH by continuous method.

Convenient Chart function to experiment



- All data which result from experiment come out as a chart on screen in real-time.
- Users can identify graphs varying the range of X and Y.
- If users move the time scroll bar, former chart is observed by users.

Section of software to make more safe.

1. System End Time Control Setting

1-1. Hour : Minute : Second

100 0 0

- ▲ It is very safe because there are functions that all heaters and motors should be stopped after advanced setting time.

8. Warning Setting

8-1. Temperature difference from Emergency Set.

10

8-2. Pressure difference from Emergency Set.

10

9. Emergency Setting

9-1. Temperature Max. Limit (TIC-501) [°C]

50

9-2. Pressure Max. Limit (PI-501) [psig]

100

- ▲ After setting maximum limit of temperature and pressure, if temperature and pressure go up the limit, which causes Emergency to work.

Convenient Function

Time	Temp	Pressure	pH	Flow	RPM	Heater
00:00	20.0	0.0	7.0	0.0	0.0	0.0
00:01	20.1	0.0	7.0	0.0	0.0	0.0
00:02	20.2	0.0	7.0	0.0	0.0	0.0
00:03	20.3	0.0	7.0	0.0	0.0	0.0
00:04	20.4	0.0	7.0	0.0	0.0	0.0
00:05	20.5	0.0	7.0	0.0	0.0	0.0
00:06	20.6	0.0	7.0	0.0	0.0	0.0
00:07	20.7	0.0	7.0	0.0	0.0	0.0
00:08	20.8	0.0	7.0	0.0	0.0	0.0
00:09	20.9	0.0	7.0	0.0	0.0	0.0
00:10	21.0	0.0	7.0	0.0	0.0	0.0
00:11	21.1	0.0	7.0	0.0	0.0	0.0
00:12	21.2	0.0	7.0	0.0	0.0	0.0
00:13	21.3	0.0	7.0	0.0	0.0	0.0
00:14	21.4	0.0	7.0	0.0	0.0	0.0
00:15	21.5	0.0	7.0	0.0	0.0	0.0
00:16	21.6	0.0	7.0	0.0	0.0	0.0
00:17	21.7	0.0	7.0	0.0	0.0	0.0
00:18	21.8	0.0	7.0	0.0	0.0	0.0
00:19	21.9	0.0	7.0	0.0	0.0	0.0
00:20	22.0	0.0	7.0	0.0	0.0	0.0
00:21	22.1	0.0	7.0	0.0	0.0	0.0
00:22	22.2	0.0	7.0	0.0	0.0	0.0
00:23	22.3	0.0	7.0	0.0	0.0	0.0
00:24	22.4	0.0	7.0	0.0	0.0	0.0
00:25	22.5	0.0	7.0	0.0	0.0	0.0
00:26	22.6	0.0	7.0	0.0	0.0	0.0
00:27	22.7	0.0	7.0	0.0	0.0	0.0
00:28	22.8	0.0	7.0	0.0	0.0	0.0
00:29	22.9	0.0	7.0	0.0	0.0	0.0
00:30	23.0	0.0	7.0	0.0	0.0	0.0
00:31	23.1	0.0	7.0	0.0	0.0	0.0
00:32	23.2	0.0	7.0	0.0	0.0	0.0
00:33	23.3	0.0	7.0	0.0	0.0	0.0
00:34	23.4	0.0	7.0	0.0	0.0	0.0
00:35	23.5	0.0	7.0	0.0	0.0	0.0
00:36	23.6	0.0	7.0	0.0	0.0	0.0
00:37	23.7	0.0	7.0	0.0	0.0	0.0
00:38	23.8	0.0	7.0	0.0	0.0	0.0
00:39	23.9	0.0	7.0	0.0	0.0	0.0
00:40	24.0	0.0	7.0	0.0	0.0	0.0
00:41	24.1	0.0	7.0	0.0	0.0	0.0
00:42	24.2	0.0	7.0	0.0	0.0	0.0
00:43	24.3	0.0	7.0	0.0	0.0	0.0
00:44	24.4	0.0	7.0	0.0	0.0	0.0
00:45	24.5	0.0	7.0	0.0	0.0	0.0
00:46	24.6	0.0	7.0	0.0	0.0	0.0
00:47	24.7	0.0	7.0	0.0	0.0	0.0
00:48	24.8	0.0	7.0	0.0	0.0	0.0
00:49	24.9	0.0	7.0	0.0	0.0	0.0
00:50	25.0	0.0	7.0	0.0	0.0	0.0
00:51	25.1	0.0	7.0	0.0	0.0	0.0
00:52	25.2	0.0	7.0	0.0	0.0	0.0
00:53	25.3	0.0	7.0	0.0	0.0	0.0
00:54	25.4	0.0	7.0	0.0	0.0	0.0
00:55	25.5	0.0	7.0	0.0	0.0	0.0
00:56	25.6	0.0	7.0	0.0	0.0	0.0
00:57	25.7	0.0	7.0	0.0	0.0	0.0
00:58	25.8	0.0	7.0	0.0	0.0	0.0
00:59	25.9	0.0	7.0	0.0	0.0	0.0
01:00	26.0	0.0	7.0	0.0	0.0	0.0

- ▲ As all data are saved as TXT format, users can identify and edit them later.



- ▲ On account of programming function for 16 steps temperature setting, users don't have to modify set point during experiment.

Easy Installation Network Module (External Type)



Model : REI-100S

- ▶ Network Interface : 10M Base - T Ethernet, RS-232 / 485
- ▶ AD : 11Ch [0~10V, 4~20mA]
- ▶ DA : 6Ch, 12bit [0~10V]
- ▶ CPU : 22MHz
- ▶ Windows 98 / 2000 / XP Mode Setup