Process Control Overview

Automatic process control in continuous production processes is a combination of control engineering and chemical engineering disciplines that uses industrial control systems to achieve a production level of consistency, economy and safety which could not be achieved purely by human manual control. It is implemented widely in industries such as oil refining, pulp and paper manufacturing, chemical processing

SR-RP 113 TEMPERATURE CONTROL DEMONSTRATION UNIT

Dimensions (L*W*H) mm:900×550×1550

Description:

This apparatus is used for observing the working principle of temperature control. The unit is mainly composed of: an electric heater installed in a storage tank and a plate heat exchanger which is responsible for heat transfer between the hot and cold water circuits.

Specifications

- Centrifugal pump
- Plate heat exchanger
- Electrical heating element
- Control valve

• HMI touch panel and PLC software
• Storage tank
• Rotameters
• Thermometer
• Temperature gauge
• Piping system with valves and fitting
• Wheeled carbon steel structure
• Installation and training video included
• Instructions manual included
• 10 years warranty

Note: Direct contact with sales department is required to confirm the last updated technical specification and pictures.

Applications:

1. Construction of a temperature control loop
2. Effect of PID coefficient on unit performance

SR-RP 114 PRESSURE CONTROL DEMONSTRATION UNIT

Dimensions (L*W*H) mm:900×550×1550

Applications:

Description:

This experimental unit offers every basics of learning pressure control systems. This unit contains a constant volume tank where trapped air is pressurized inside by inserting water in a confinedenviroment.

Specifications

- Centrifugal pump
- Inverter
- Feed tank
- Pressure vessel made of Stainless Steel
- Relief valve
- Pressure transmitter
- Pressure gauge
- HMI touch Panel and PLC software
- Piping system with valves and fitting
- Wheeled carbon steel structure
- Installation and training video included
- Instructions manual included

• 10 years warranty

Note: Direct contact with sales department is required to confirm the last updated technical specificationand pictures.

1. Observing the working principle of a pressure control system
2. Effect of PID coefficient on unit performance

SR-RP 115 LEVEL CONTROL DEMONSTRATION UNIT

Dimensions (L*W*H) mm:900×550×1550

Applications:

Description:

This experimental unit is a comprehensive trainer for level control. The setup comes with a user-friendly interface; All components are clearly laid out on a panel where a large-format process schematic provides an aid to understanding. The device basically works by a pump which delivers water from a storage tank into the transparent level-controlled tank. The level is measured by a pressure sensor installed at the base of the level-controlled tank. All of the different control parameters can easily be altered, allowing the user to observe the effect of each one.

Specifications

• Centrifugal pump

• Inverter

• Storage tank
• Piping system with valves and fitting
• Pressure transmitter
• Transparent scaled plexiglass tank
• HMI touch panel and PLC software
• Wheeled carbon steel structure
• Installation and training video included
• Instructions manual included
• 10 years warranty

Note: Direct contact with sales department is required to confirm the last updated technical specificationand pictures.

1. Effect of PID coefficient on unit performance
2. Observing the working principle of a level control system

SR-RP 116 FLOW CONTROL DEMONSTRATION UNIT

Dimensions (L*W*H) mm:900×550×1550

Applications:

Description:

Flow control is one of the important goals in different industries. This unit provides an easy to use system for understanding the basics of flow control. The device basically works by a pumpwhich delivers water from a storage tank into the transparent level-controlled tank. The flow rate ismeasured by a flow meter. The rotameter is used for validating and comparing the measured databy the electronic flow-transmitter. The flow rate is controlled by changing pump frequenc

Specifications

- Centrifugal pump
- Inverter
- Rotameter
- Storage tank
- Piping system with valves and fitting
- Flow transmitter
- HMI touch panel and PLC software
- Wheeled carbon steel structure

• Installation and training video included

• Instructions manual included

• 10 years warranty

Note: Direct contact with sales department is required to confirm the last updated technical specificationand pictures.

1. Effect of PID coefficient on unit performanc

2. Familiarizing with the flow-control equipment precise control of flow with a precise software

SR-RP 117 PH VALUE CONTROL UNIT

Dimensions (L*W*H) mm:1500×750×1400

Description:

This unit is used for easily understanding the working principle of pH control. The pH of the solution is measured by pH meter and in the case of difference pH value between sample and the set point, acid or base will be inserted by peristaltic pump to achieve the required pH. The solutions are stored in glass containers equipped with stirrer.

Specifications

• Primary and secondary solution tanks

• Transparent tank with stirrer

• Peristaltic pumps

• PH meter sensors

• Piping system with valves and fitting
• Rotameter
• HMI touch panel and PLC software
• Wheeled carbon steel structure
• Installation and training video included
• Instructions manual included
• 10 years warranty

Note: Direct contact with sales department is required to confirm the last updated technical specificationand pictures.

1. Observing the working principle of a PH control system
2. Effect of PID coefficient on unit performance

SR-RP 118 FLOW AND LEVEL CONTROL DEMONSTRATION UNIT

Dimensions (L*W*H) mm:900×550×1550

Description:

For most chemical processes controlling of inlet and outlet flow rate from reactors and materialslevel plays an essential role. Flow rate should be adjusted according to rate of the reaction otherwise the result would not be desirable. There are several methods to control flow rate which are mostlybased on turbine flow meters or ultrasonic methods. This unit is used for easy learning all the basicsof flow and level control with a user-friendly setup

Specifications

• Centrifugal pump
• Rotameter
• Feed reservoir
• Transparent scaled plexiglass tank
• Flow transmitter
• Pressure Transmitter
• Inverter
• Piping system with valves and fitting
• HMI touch panel and PLC software
• Wheeled carbon steel structure
• Installation and training video included
• Instructions manual included
• 10 years warranty

Note: Direct contact with sales department is required to confirm the last updated technical specificationand pictures.

1. Effect of PID coefficient on unit performance
2. Familiarizing with all of the flow and level control equipment
3. Precise control of level and flow with a professional software

SR-RP 119 CONTROL OF FOUR VARIABLES (TEMPERATURE, PRESSURE, LEVEL AND FLOW)

Dimensions (L*W*H) mm:1500×1000×1500

Description:

Controlling of various effective parameters plays an essential rule in engineering processes. This unit facilitates practical learning in the control of four controlled variables which are commonplace in process engineering. A circuit with a transparent tank is provided for the control of flow rateand level. The system is also equipped with Stainless Steel pressure vessel and double pipe heat exchanger for controling of pressure and temperature respectively. The device includes a variable-speed pump which acts as an actuator.

Specifications

- Centrifugal pump
- Transparent tank equipped with ruler
- Pressure gauge
- Reservoir tank with electrical heater
- Pressure transmitter
- Relief valve
- Thermometer
- Inverter
- Rotameter
- Flow transmitter
- Temperature transmitter
- Double pipe heat exchanger
- HMI touch panel and PLC software
- Piping system with valves and fitting
- Wheeled carbon steel structure
- Installation and training video included
- Instructions manual included
- 10 years warranty

Note: Direct contact with sales department is required to confirm the last updated technical specificationand pictures.

1. Effect of PID coefficient on device performance
2. Familiarizing with control of level, flow rate, pressure and temperature

SR-RP 120 STIRRED TANKS IN SERIES

Dimensions (L*W*H) mm:1300×7500×1600

Description:

Stirred tanks in series are continuous stirred tank reactors connected in series. They enable a higher conversion than a single stirred tank reactor. Stirred tanks in series enable flexible process controlas the temperature and retention time can be set separately for each individual reactor. Presented unit is used for control liquid concentration.

Specifications

- Three transparent stirred tank
- Liquid concentration sensors (EC meter)
- Stirrers
- Pumps and tanks
- Suitable data acquisition system
- Specified softwar
- Wheeled carbon steel structure
- Piping system with valves and fitting
- Electrical control Panel
- Wheeled carbon steel structure
- Installation and training video included
- Instructions manual included

• 10 years warranty

Note: Direct contact with sales department is required to confirm the last updated technical specificationand pictures.

1. Investigating stirred tanks in series and their response due to different inputs
2. Obtaining liquid concentration response under step function and pulse inputs
3. Study the response of the system to different inputs
4. Determination of the response to a/an impulse, unit step, unit lag inputs

Unit Operation Overview

In chemical engineering and related fields, a unit operation is a basic step in a process. Unit operations involve a physical change or chemical transformation such as separation, crystallization, evaporation, filtration, polymerization, isomerization, and other reactions.

SR-RU 091 WET COOLING TOWER

Description:

Wet cooling towers are a proven method of closed-circuit cooling and heat dissipation. Typical areas of application are: air conditioning, heavy industry and power plants. In wet cooling towers the water to be cooled is sprayed over a wet deck surface. Water and air come into direct contact in the counter flow. The water is cooled by convection. Some of the water evaporates and the evaporation heat removed further cools down the water.

Specifications:

- Air fan
- Heaters 0.5 Kw and 1 Kw
- Sensors for measuring temperature
- Manometer
- Feed tank
- Transparent plexiglass channel
- Electrical control panel with displays and switches

• Make up tank
• Rotameter
• Pump
• Plexiglass packings
• Water distribution system
• Wheeled Carbon steel structure
• Installation and training video included
• Instructions manual included
• 10 years warranty

Note: Direct contact with sales department is required to confirm the last updated technical specifications and pictures.

Applications:

1. Investigation the effect of air speed parameters on the rate of mass transfer
2. Validating the first law of thermodynamics through experiment
3. Examining the psychometric curve of the water cooling process by air
4. Examining the law conservation of mass

SR-RU 092 SOLID-LIQUID EXTRACTION UNIT

The extraction is a basic operation of mass transfer based on the dissolution of one or some components of a mixture, liquid or part of a solid, through a suitable solvent. In the liquid-liquid extraction, the mass to be extracted is in a liquid, and in the solid-liquid extraction is in a solid. The way of performing the extraction will depend on the proportion of the component to be extracted, on the distribution of this component in the solid, on the nature of the solid and on the of particle size. The unit allows a continuous solid-liquid process of extraction in countercurrent which is the most commonly used in industry because it is the one with the highest efficiency.

Specifications:

- Glass Solvent distillation column with glass rushing
- Boiler with heating element
- Condenser
- Rotameter
- Electrical heating element
- Pioing system with valves and fittings
- Solid compartment
- product tank
- Electrical control panel with displays and switches
- Wheeled carbon steel structure
- Installation and training video included
- Instructions manual included
- 10 years warranty

Note: Direct contact with sales department is required to confirm the last updated technical specifications and pictures.

Applications:

1. Separation of solid from liquid

SR-RU 093 LIQUID-LIQUID EXTRACTION UNIT

Description:

The basis of this method is the difference in solubility of a component in two insoluble solvents. If two nonyextractable solvents are liquid, this method is called liquid-liquid extraction. The process is used to separate vitamins from aqueous solutions or aromatic compounds from crude oil. The present device is used to familiarize users with hydrodynamics and calculations related to liquid-liquid separation efficiency.

Specifications:

- Glass column with glass rushing fill on it
- Feed pump
- Stainless steel Feed tanks
- Tanks for product and inlet water to the system
- Piping system with valves and fittings
- Fluid flow measuring system
- Electrical control panel with displays and switches
- Wheeled carbon steel structure
- Installation and training video included
- Instructions manual included
- 10 years warranty

Note: Direct contact with sales department is required to confirm the last updated technical specifications and pictures.

Applications:

1. Separation of two different liquid

SR-RU 094 GAS ABSORPTION AND DESORPTION UNIT

Gases produced in various industrial processes are often mixed or contain impurities. Therefore, before using these gases in the next processes, the impurities must be separated. This is done in the absorption tower. Absorption is a process in which a component is transferred from the gas phase to the liquid phase with which it is in contact. In fact, absorption is the transfer of mass from the gas phase to the liquid phase. If mass transfer takes place in the opposite direction, then the action is called desorption. This device includes a packed tower installed on a structure along with necessary components to store solutions, transfer feed and measure temperature and other related applications.

Specifications:

- Glass column with glass rushing fill on it
- Fiberglass feed and product tank
- Pump
- Digital sensors for measuring temperatures
- Rotameter or regulator for air, water and CO2
- Connections, pipes and valves
- Co2 tank
- Inclined manometer
- Electrical control panel with displays and switches

• Wheeled carbon steel structure
• Installation and training video included
• Instructions manual included
• 10 years warranty
*Compressed air line or a compressor is required for operation
Note: Direct contact with sales department is required to confirm the last updated technical specifications and pictures.
Applications:
1. Study gas absorption and desorption in packed column
2. Estimate pressure drop in process of absorption and desorption

SR-RU 096 CONTINUOUS TRAY DISTILLATION COLUMN

Continuous distillation, a form of distillation, is an ongoing separation in which a mixture is continuously (without interruption) fed into the process and separated fractions are removed continuously as output streams. Distillation is the separation or partial separation of a liquid feed mixture into components or fractions by selective boiling (or evaporation) and condensation. The process produces at least two

output fractions. These fractions include at least one volatile distillate fraction, which has boiled and been separately captured as a vapor condensed to a liquid, and practically always a bottoms (or residuum) fraction, which is the least volatile residue that has not been separately captured as a condensed vapor.

Specifications:

- Glass Column
- Liquid and steam temperature sensors in all trays
- Sensors for measuring temperatures in different points of thecolumn
- Electrical control panel with displays and switches
- Adjustable feed flow rate pumps
- Waste and product tanks
- Reflex pump from product tank
- Heat exchanger for cooling waste
- Sampling valves in each tray
- Electrical heating element
- Rotameter
- Wheeled carbon steel structure
- Installation and training video included
- Instructions manual included
- 10 years warranty

Note: Direct contact with sales department is required to confirm the last updated technical specifications and pictures.

Applications:

1. Investigating the performance of column on complete reflex
2. Investigating the performance of column in different flow rate of feeds
3. Investigating the effect of condenser on column

SR-RU 100 CONTINUOUS TRAY DISTILLATION COLUMN

Continuous distillation, a form of distillation, is an ongoing separation in which a mixture is continuously (without interruption) fed into the process and separated fractions are removed continuously as output streams. Distillation is the separation or partial separation of a liquid feed mixture into components or fractions by selective boiling (or evaporation) and condensation. The process produces at least two output fractions. These fractions include at least one volatile distillate fraction, which has boiled and been separately captured as a vapor condensed to a liquid, and practically always a bottoms (or residuum) fraction, which is the least volatile residue that has not been separately captured as a condensed vapor.

Specifications:

- Stainless steel Column
- Liquid and steam temperature determination in all trays
- Sensors for measuring temperatures in different points of the column
- Electrical control panel with displays and switches
- Pump
- Waste and product tanks
- Reflex pump from product tank
- Heat exchanger for cooling waste
- Sampling valves in each tray
- Electrical heating element
- Rotameter

• Wheeled carbon steel structure
• Installation and training video included
• Instructions manual included
• 10 years warranty

Note: Direct contact with sales department is required to confirm the last updated technical specifications and pictures.

Applications:

1. Investigating the performance of column on complete reflex
2. Investigating the performance of column in different flow and heat rate of feeds
3. Investigating the effect of condenser on column

SR-RU 97 BATCH TRAY DISTILLATION COLUMN

Using the difference in boiling point to separate the components of a liquid mixture forms the basis of the distillation process. In most of the cases where their boiling point difference is significant, they can be separated by heating, in this case the substance with lower boiling temperature boils faster and the substance with high boiling temperature remains, and this forms the basis of the distillation process.

The process that takes place in a tray distillation tower is the separation of materials. In this process, the heat source provides the necessary heat to carry out the distillation process and the technique of the constituent materials of a solution. The steam rising from the tower comes into direct contact with the

liquid moving down from the top of the tower on the trays. This contact causes the temperature of the liquid on the tray to increase and finally causes the temperature of the liquid to approach the bubble temperature. Gradually, the first vapor particles are obtained, which are rich in volatile matter. On the other hand, in the vapor phase, substances that have a lower boiling point. It undergoes condensation and moves to the bottom of the tower as a liquid phase.

Specifications:

- Glass Column
- Liquid and steam Temperature determination in all trays
- Electrical control panel with displays and switches
- Sampling valves in each tray
- Electrical heating element
- Rotameter
- Pumps
- condenser
- Product tank
- Wheeled carbon steel structure
- Installation and training video included
- Instructions manual included
- 10 years warranty

Note: Direct contact with sales department is required to confirm the last updated technical specifications and pictures.

Applications:

1. Investigating the function of distillation column in state of full reflex
2. Investigating the function of distillation column in state of continuous or specific return ratio

SR-RU 101 BATCH TRAY DISTILLATION COLUMN

Batch distillation refers to the use of distillation in batches, meaning that a mixture is distilled to separate it into its component frac-tions before the distillation still is again charged with more mixture and the process is repeated. This is in contrast with continuous distilla-tion where the feedstock is added and the distil-late drawn off without interruption. Batch distil-lation has always been an important part of the production of seasonal, or low capacity and high-purity chemicals.It is a very frequent separation process in the pharmaceutical industry.

Specifications:

- Stainless steel coloumn
- Product tank
- Liquid and steam temperature determination in all trays
- Boiler with electrical heating element
- Condenser
- Rotameter for flow control
- Temperature thermocouples
- Sampling valves in each tray
- Valves, links and pipes
- Electrical control panel with displays and switches
- Pumps
- Wheeled carbon steel structure

• Installation and training video included

• Instructions manual included

• 10 years warranty

Note: Direct contact with sales department is required to confirm the last updated technical specifications and pictures.

Applications:

1. Investigating the function of distillation column in state of full reflex
2. Investigating the function of distillation column in state of continuous or specific return ratio

SR-RU 098 PACKED CONTINUOUS DISTILLATION COLUMN

The rectification columns are used for the separation of liquid phases. They operate according to the principle of distillation. Distillation is a separation process that includes the partial evaporation of a liquid phase and the condensation of the resulting gas phase. The separation process of rectification is an energyyefficient distillation process with several stages. The substance mix recommended for the operation of the experimental plant is water-ethanol.

Specifications:

• Glass column with glass rushing fill on it

• Temperature sensors in different points of the column

• Electrical control panel with displays and switches

• Adjustable flow rate feed pump
• Fiberglass product tank and waste tank
• Reflux pump from product tank
• Heat exchanger for cooling waste
• Electrical heating element
• Pump with ability to set the flow for transfer
• Rotameter
• Condenser
• Wheeled carbon steel structure
• Installation and training video included
• Instructions manual included
• 10 years warranty

Note: Direct contact with sales department is required to confirm the last updated technical specifications and pictures.

Applications:

1. Investigating performance of column in complete reflux mode
2. Investigating the performance of condenser on function of column
3. Investigating the effect of feed's flow rate on performance of column

SR-RU 102 PACKED CONTINUOUS DISTILLATION COLUMN

The rectification columns are used for the separation of liquid phases. They operate according to the principle of distillation. Distillation is a separation process that includes the partial evaporation of a liquid phase and the condensation of the resulting gas phase. The separation process of rectification is an energyyefficient distillation process with several stages. The substance mix recommended for the operation of the experimental plant is water-ethanol.

Specifications:

• Stainless steel column with glass rushing fill on it
• Temperature sensors in different points of the column
• Electrical control panel with displays and switches
• Adjustable flow rate feed pump
• Fiberglass product tank and waste tank
• Reflux pump from product tank
• Heat exchanger for cooling waste
• Electrical heating element
• Pump with ability to set the flow for transfer
• Rotameter
• Condenser
• Wheeled carbon steel structure
• Installation and training video included
• Instructions manual included
• 10 years warranty

Note: Direct contact with sales department is required to confirm the last updated technical specifications and pictures.

Applications:

1. Investigating performance of column in complete reflux mode
2. Investigating the performance of condenser on function of column
3. Investigating the effect of feed’s flow rate on performance of column

SR-RU 099 PACKED BATCH DISTILLATION COLUMN

This device is used for familiarizing with the operation of packed bactch distillation columns. With the instrumentation and other equipment installed on the device, the batch distillation process can be extensively investigated.

Specifications:

- Glass column with glass rushing fill on it
- Temperature sensors in different points of the column
- Electrical control panel with displays and switches
- Reflux pump
- Electrical heating element
- Heat exchanger for cooling waste
- Rotameter
- Condenser
- Wheeled carbon steel structure
- Installation and training video included
- Instructions manual included
- 10 years warranty

Note: Direct contact with sales department is required to confirm the last updated technical specifications and pictures.

Applications:

Note: Direct contact with sales department is required to confirm the last updated technical specifications and pictures.

1. Investigating performance of the column under the heated feed rate at the boiler
2. Investigating the performance of condenser on column's function

SR-RU 103 PACKED BATCH DISTILLATION COLUMN

This device is used for familiarizing with the operation of packed bactch distillation columns. With the instrumentation and other equipment installed on the device, the batch distillation process can be extensively investigated.

Specifications:

- Stainless Steel column with glass rushing fill on it
- Temperature sensors in different points of the column
- Electrical control panel with displays and switches
- Reflux pump
- Electrical heating element
- Heat exchanger for cooling waste
- Rotameter

• product tank
• Condenser
• Wheeled carbon steel structure
• Installation and training video included
• Instructions manual included
• 10 years warranty

Note: Direct contact with sales department is required to confirm the last updated technical specifications and pictures.

Applications:

1. Investigating performance of the column under the heated feed rate at the boiler
2. Investigating the performance of condenser on function of column

SR-RU 104 DISCONTINUOUS CHEMICAL REACTOR

Chemical reactions take place in reactors. These reactions are conducted to change raw materials to desired materials in chemical processes. Chemical reactors are tanks designed to carry out a chemical reaction. The design of chemical reactors deals with chemical engineering concepts. In the industry, there are various types of chemical reactors such as continuous stirred reactors, semi continuous reactors and discontinuous reactors.

Specifications:

• Reactor with cooling coil and electrical heating element
• Working pressure up to 10 bar
• Working temperature up to 120 degrees Celsius

• 3 liters stainless steel tank
• Cooling water flow controlling system
• Magnetic Stirrer
• Connections and pipes
• Thermocouples
• Condenser
• Pressure Gauge and pressure switch
• Pressure Switch
• High Pressure Valves
• Electrical control panel with displays and switches
• Wheeled carbon steel structure
• Installation and training video included
• Instructions manual included
• 10 years warranty

Note: Direct contact with sales department is required to confirm the last updated technical specifications and pictures.

Applications:

1. Investigating the effect of fluid flow on reaction process
2. Investigating the effect of reactor temperature on reaction process

SR-RU 105 CONTINUOUS CHEMICAL REACTOR

A chemical reactor is an enclosed volume in which a chemical reaction takes place. In chemical engineering, it is generally understood to be a process vessel used to carry out a chemical reaction, which is one of the classic unit operations in chemical process analysis. The design of a chemical reactor deals with multiple aspects of chemical engineering. Chemical engineers design reactors to maximize net present value for the given reaction.

Specifications:

- Reactor with cooling coil and heating element
- Working pressure of 10 bar discontinuously and Continuously 5 bar pressures
- Working temperature up to 120 degrees Celsius
- 3 liters stainless steel reactor
- Stainless steel feed and product tanks
- Magnetic Stirrer
- Connections and pipes
- Thermocouples
- Condenser
- Pumps
- Pressure Gauge and pressure switch
- High Pressure Valves

• Electrical control panel with displays and switches
• Wheeled carbon steel structure
• Installation and training video included
• Instructions manual included
• 10 years warranty

Note: Direct contact with sales department is required to confirm the last updated technical specifications and pictures.

Applications:

1. Investigating the effect of fluid flow on reaction process
2. Investigating the effect of reactor temperature on reaction process
3. Investigating the effect of contact time on reaction process

SR-RU 106 ATMOSPHERIC CHEMICAL REACTOR

Chemical reactions occur in the reactors. These reactions are used to change the material into desired substances in chemical processes. In the industry, there are various types of chemical reactors, such as continuous mixing reactors, continuous reactors and discontinuous reactors. Continuous reactors are reactors that are the feed added during operation, in other words, feed flow is also an effective factor in the efficiency of the reactor. This unit designed for working temperature range: up to 120°C

Specifications:

• Glass stirrer reactor with cooling coil and heating element
• Stainless steel Feed tanks
• Stainless steel Drain tanks
• Fluid flow control system
• Pumps
• Rotameter
• Valves, pipes and linkage
• Thermocouples
• Electrical control panel with displays and switches
• Working bench made from carbon steel
• Installation and training video included
• Instructions manual included
• 10 years warranty

Note: Direct contact with sales department is required to confirm the last updated technical specifications and pictures.

Applications:

1. Determination of concentration with titration
2. Performing different chemical reaction

SR-RU 107 TRAY DRYER UNIT

Convection dryers are often used for drying solids in food technology. The tray drying unit can be used to investigate and demonstrate the process of convection drying of granular solids. Four corrosion resistant removable plates are available for drying the solid. They are placed in a drying channel. The plates containing the solid to be dried are exposed to an air flow in the channel. The air flow heats the solid and also removes any moisture released. Air velocity can be adjusted by the speed of a fan. An adjustable heater allows the heating of the air. The transparent door in the drying channel allows the drying process to be observed. A digital balance can be used to follow the changes in weight of the solid due to evaporation or vaporization of moisture during operation. The air temperature and the relative humidity of the air are measured and digitally displayed by a single combined temperature and humidity sensor before and after the air flow passes over the solid. A further sensor measures the air velocity. The well-structured instructional material sets out the fundamentals and provides a step-by-step guide through the experiments.

Specifications:

• Fan for producing inlet air to the system
• Three rows of heating element
• Main channel
• Trays of dryer
• Thermo meter (wet and dry bulb) before and after trays
• Anemometer
• Electrical control panel with displays and switches
• Wheeled Carbon steel structure
• Installation and training video included
• Instructions manual included
• 10 years warranty

Note: Direct contact with sales department is required to confirm the last updated technical specifications and pictures

Applications:

1. Investigating the performance of tray dryer
2. Observing the effect of the Different parameters such as temperature in drying process

SR-RU 108 TWO-FLUID NOZZLE SPRAY DRYER

Spray drying is a method of producing a dry powder from a liquid or slurry by rapidly drying with a hot gas. This is the preferred method of drying of many thermally-sensitive materials such as foods and pharmaceuticals.

A consistent particle size distribution is a reason for spray drying some industrial products such as catalysts.

All spray dryers use some of type of spray nozzle to disperse the liquid or slurry into a controlled drop size spray.

Specifications:

- Stainless steel chamber
- Stainless steel cyclone for separating particles from exhausting air
- Spray nozzle
- Air speed adjustment system
- 9 kw power blade heater
- Feed tank
- Peristaltic pump with maximum capacity of 2 L/H
- Suction fan
- Temperatures sensors
- Fittings, valves and pipes

• Electrical control panel with displays and switches
• Wheeled carbon steel structure
• Installation and training video included
• Instructions manual included
• 10 years warranty
*Compressed air line or a compressor is required for operation
Note: Direct contact with sales department is required to confirm the last updated technical specifications and pictures
Applications:
1. investigating the effect of inlet air temperature on output humidity of product
2. Investigating the effect of fluid flow on humidity of output product

SR-RU 109 TWO-FLUID NOZZLE SPRAY DRYER

Spray drying is a method of producing a dry powder from a liquid or slurry by rapidly drying with a hot gas. This is the preferred method of drying of many thermally-sensitive materials such as foods and pharmaceuticals.
A consistent particle size distribution is a reason for spray drying some industrial products such as catalysts.
All spray dryers use some of type of spray nozzle to disperse the liquid or slurry into a controlled drop size spray.

Specifications:

- Stainless steel chamber
- Stainless steel cyclone for separating particles from exhausting air
- Spray nozzle
- Air speed adjustment system
- 9 kw power blade heater
- Feed tank
- Peristaltic pump with maximum capacity of 4 L/H
- Suction fan
- Temperatures sensors
- Fittings, valves and pipes
- Electrical control panel with displays and switches
- Wheeled carbon steel structure
- Installation and training video included
- Instructions manual included
- 10 years warranty

*Compressed air line or a compressor is required for operation

Note: Direct contact with sales department is required to confirm the last updated technical specifications and pictures

Applications:

1. investigating the effect of inlet air temperature on output humidity of product
2. Investigating the effect of fluid flow on humidity of output product

SR-RU 110 TWO-FLUID NOZZLE SPRAY DRYER

Spray drying is a method of producing a dry powder from a liquid or slurry by rapidly drying with a hot gas. This is the preferred method of drying of many thermally-sensitive materials such as foods and pharmaceuticals.

A consistent particle size distribution is a reason for spray drying some industrial products such as catalysts.

All spray dryers use some of type of spray nozzle to disperse the liquid or slurry into a controlled drop size spray.

Specifications:

- Stainless steel chamber
- Stainless steel cyclone for separating particles from exhausting air
- Spray nozzle
- Air speed adjustment system
- 12 kw power blade heater
- Feed tank
- Peristaltic pump with maximum capacity of 6 L/H

• Suction fan
• Temperatures sensors
• Fittings, valves and pipes
• Electrical control panel with displays and switches
• Wheeled carbon steel structure
• Installation and training video included
• Instructions manual included
• 10 years warranty

*Compressed air line or a compressor is required for operation

Note: Direct contact with sales department is required to confirm the last updated technical specifications and pictures

Applications:

1. investigating the effect of inlet air temperature on output humidity of product
2. Investigating the effect of fluid flow on humidity of output product

SR-RU 111 STATIC FLUIDIZED BED DRYER UNIT

The dryer works by blowing ambient air and passing it through the electric heater, which increases the air temperature is adjusted by changing the voltage. The amount of air and, as a result, the air exit speed

from the dryer chamber can be adjusted by a valume. In order to keep the temperature constant a thermostat is used. The air enters under the Plexiglas chamber where the samples are placed. A chamber is considered for placing the test materials and drying them by the fixed bed method. In order to reduce the effect of the environment, the body of the preheater chamber and the relaxation chamber are completely insulated the air speed is measured by a digital anemometer.

Specifications:

- Transparent Column
- Electrical motor and centrifugal fan
- Air flow adjustment system
- Elecrtical control panel with displays and switches
- Fluid bed compartment
- Ability to measure the pressure of column
- Anemometer
- Heating element and adjustment system of voltage
- Temperature sensors
- Wheeled carbon steel structure
- Installation and training video included
- Instructions manual included
- 10 years warranty

Note: Direct contact with sales department is required to confirm the last updated technical specifications and pictures

Applications:

1. Investigating the effect of food’s thickness on dryer velocity
2. Investigating the temperature of compartment on working time

SR-RU 290 DIFFUSION IN LIQUIDS

The phenomenon of mass transfer in fluids is a common phenomenon in nature and all engineering branches. Examples of the application of this phenomenon in the industry: removing pollutants from the output of gases and polluted water, diffusion of neutrons inside nuclear reactors, diffusion of materials into the pores of activated carbon, biological and chemical speed of catalysis reactions.

Specifications:

- Stirrer with adjustable speed
- Conductivity meter
- Temperature sensor
- Transparent plexiglass tank for distilled water
- Heater with the ability to adjust the temperature inside the tank
- Electrical control panel with displays and switches
- Installation and training video included
- Instructions manual included
- 10 years warranty

Note: Direct contact with sales department is required to confirm the last updated technical specifications and pictures.

Applications:

1. Function of Fick's law to calculate diffusion coefficient
2. Calculation of mass transfer and molar concentration rate
3. Observing the effect of molar concentration on diffusion coefficient

SR-RU 296 VAPOR-LIQUID EQUILIBRIUM UNIT

Accurate data of the equilibrium between liquid and vapour for two phases mixture is a vital part of designing of chemical pro-cesses and distillation devices. In this unit we study the liquid-vapor equi-librium of the mixture of ethanol and water the present experiments were conducted at various temperature at 1 atm and the ex-perimental data were collected and some were compared with theorical results.

Instrumentation is provided to measure the temperature at different points.

Specifications:

- Equipped with Stainless steel boiler located at the bottom of the device
- Equipped with electrical heater
- Condenser
- Rotameter to adjust the flow
- Temperature sensors
- Fittings, pipes and valves
- Product tank made of glass
- Electrical control panel with displays and switches
- Wheeled carbon steel structure
- Installation and training video included
- Instructions manual included
- 10 years warranty

Note: Direct contact with sales department is required to confirm the last updated technical specifications and pictures.

Applications:

1. Obtaining equilibrium data for ethanol and water mixtures at different tempera-tures and atmospheric pressures

SR-RU 291 ADSORBTION

Adsorbtion is the process of disposing of particles dissolved in water using absorbent materials. During this process, various factors affect the absorption of solution, such as temperature, type and diameter of absorbent, pH, etc. In this unit, two glass columns are used. Activated carbon is used as absorbent and methylene blue solution is used as absorbate.

Specifications:

- Two glass columns filled with activated carbon
- Water rotameter
- Pressure gauge and thermometer
- Circulation pump
- Tank with electrical heater
- Sampling valve in different position of column
- Glass specimen tubes
- Electrical control panel with displays and switches
- Peristaltic pump

• Wheeled carbon steel structure
• Installation and training video included
• Instructions manual included
• 10 years warranty

*Compressed air line or a compressor with 10 bar pressure and 10 m3/h flow rate capacity is required for operation

Note: Direct contact with sales department is required to confirm the last updated technical specifications and pictures.

Applications:

1. Calculation of mass transfer
2. Equilibrium of adsorption mass
3. Study the concentration profile