

PILODIST®

laboratory & process technology

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PILODIST

250

CONTINOUS DISTILLATION SYSTEMS

Characteristics of continuous systems:

- **Continuous feed into a distillation column with separation of light and heavy phase**
- **Used for R&D (upscale), teaching purposes and production of special materials**
- **Reduced thermal stress for samples compared to batch distillations by reduced residence time**
- **Possibility to distill different sample volumes in one single system (< 1,0L up to > 1000L)**

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CONTINOUS DISTILLATION SYSTEMS

Key features of PILODIST 250 systems:

- **Every system is customized to ensure perfect fitting to individual requests**
- **Different materials and gaskets available for a wide range of purposes**
- **Available for feed rates between 0,1L/h and >10L/h**
- **Different types of column packings, reboiler and collector system**
- **Efficiency up to 100 theoretical plates**
- **In-house production of all glassware, mechanical components, electronic and software to guarantee performance and short delivery time**



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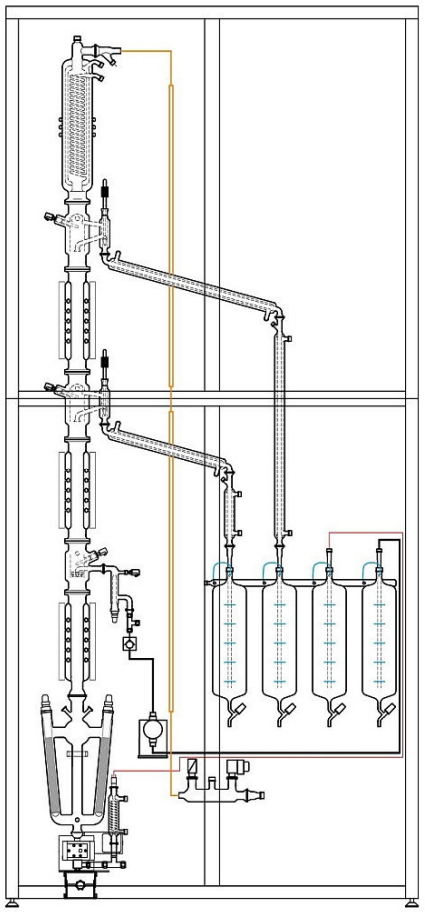
CONTINOUS DISTILLATION SYSTEMS

EXAMPLES:

PD250CA

- **ATMOSPHERIC DISTILLATION**
- **3 COLUMN SECTIONS**
- **WIRE MESH PACKING**
- **ADIABATIC HEATING MANTLES**
- **RECEIVERS UNDER SYSTEM PRESSURE**
- **ADDITIONAL REFLUX-DIVIDER FOR SIDE-WITHDRAW**





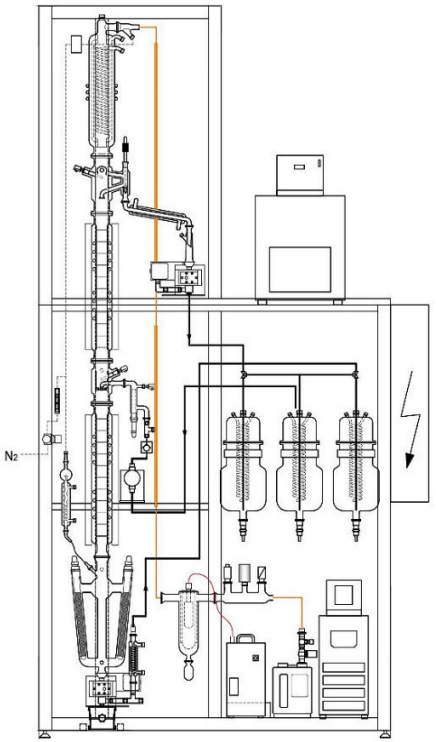
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CONTINOUS DISTILLATION SYSTEMS

PD250BB

- **ATMOSPHERIC & VACUUM DISTILLATION**
- **2 COLUMN SECTIONS**
- **SULZER EX PACKING**
- **ADIABATIC HEATING MANTLES**
- **AUTOMATIC MASS BALANCE**
- **TEMPERED RECEIVERS**
- **UNINTERRUPTABLE IN- AND OFFTAKE BY HERMETICALLY BLOCKED VACUUM TIGHT DISCHARGE PUMPS**
- **RECEIVERS VENTILATED**





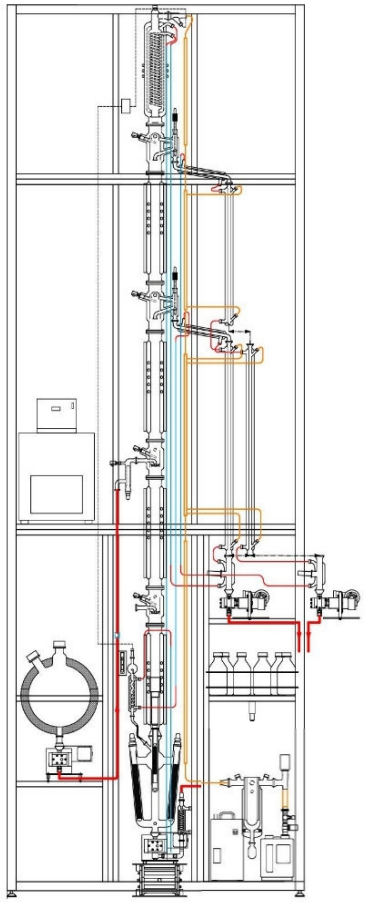
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CONTINOUS DISTILLATION SYSTEMS

PD250SD CONTI-MODE

- **ATMOSPHERIC & VACUUM DISTILLATION**
- **4 COLUMN SECTIONS**
- **SULZER DX PACKING**
- **ADIABATIC HEATING MANTLES**
- **TEMPERED FEED RECEIVER**
- **COMPLETE TEMPERED LINES FOR WAXY PRODUCTS**
- **UNINTERRUPTABLE IN- AND OFFTAKE BY HERMETICALLY BLOCKED VACUUM TIGHT DISCHARGE PUMPS**
- **PRODUCT CAN BE COLLECTED IN INDIVIDUAL FINAL RECEIVERS**
- **COMPLETELY CONTINOUS**
- **ADDITIONAL REFLUX-DIVIDER FOR SIDE-WITHDRAW**





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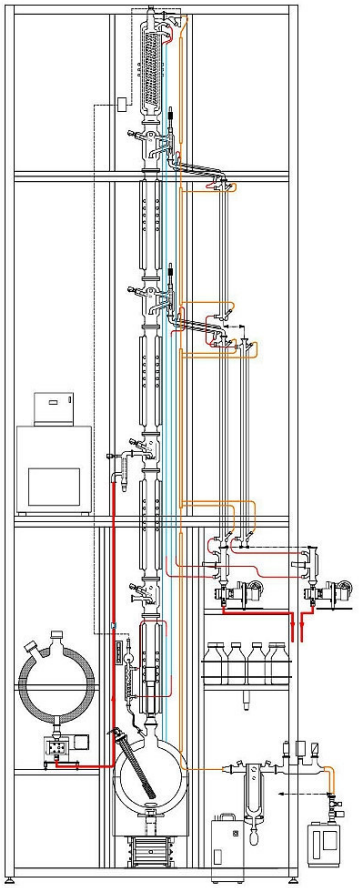
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CONTINOUS DISTILLATION SYSTEMS

PD250SD BATCH-MODE

- **ATMOSPHERIC & VACUUM DISTILLATION**
- **4 COLUMN SECTIONS**
- **SULZER DX PACKING**
- **ADIABATIC HEATING MANTLES**
- **20L-BATCH HEATER**
- **MAGNETIC STIRRER DRIVE**
- **COMPLETE TEMPERED LINES FOR WAXY PRODUCTS**
- **FRACTION COLLECTOR 10x1000ml**
- **USEFUL FOR TBP-ANALYSIS PRIOR TO CONTINOUS PROCESS**





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CONTINOUS DISTILLATION SYSTEMS

VARIATIONS:

A. TYPE OF COLUMN:

A1: COLUMN DIAMETER

DN20-DN60 (most common: 25mm & 50mm ID)

DN25: 1000mL/h < feed rate > 300mL/h

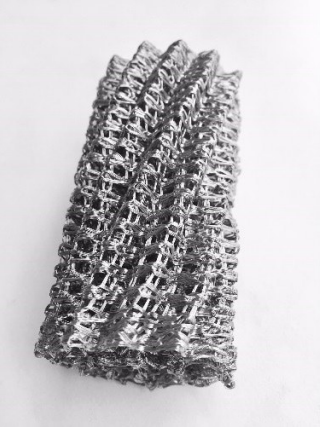
DN50: 5000mL/h < feed rate > 1000mL/h



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CONTINOUS DISTILLATION SYSTEMS

A2: COLUMN PACKING



- **WIRE MESH**
  - **STAINLESS STEEL AISI 316Ti**
  - **MID EFFICIENCY**
  - **LOW PRESSURE DROP**
  - **LOW COST INTENSIVE**
  - **FOR SYSTEM EFFICIENCY OF 5-50 TH.-PLATES**



- **SULZER EX**
  - **STAINLESS STEEL AISI 316Ti (HASTELLOY AVAILIBLE)**
  - **UPSCALE-POSSIBILTY**
  - **VERY HIGH EFFCIENCY**
  - **LOW PRESSURE DROP**
  - **HIGH COST INTENSIVE**
  - **FOR SYSTEM EFFICIENCY OF 5-100 TH.-PLATES**



- **SULZER DX**
  - **STAINLESS STEEL AISI 316Ti (HASTELLOY AVAILIBLE)**
  - **UPSCALE-POSSIBILTY**
  - **HIGH EFFCIENCY**
  - **LOW PRESSURE DROP**
  - **MID COST INTENSIVE**
  - **FOR SYSTEM EFFICIENCY OF 5-75 TH.-PLATES**

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CONTINOUS DISTILLATION SYSTEMS

- **PROPAK**
  - **STAINLESS STEEL AISI 316Ti**
  - **MID EFFCIENCY**
  - **HIGH PRESSURE DROP**
  - **MID COST INTENSIVE**
  - **FOR SYSTEM EFFICIENCY OF 5-25 TH.-PLATES**

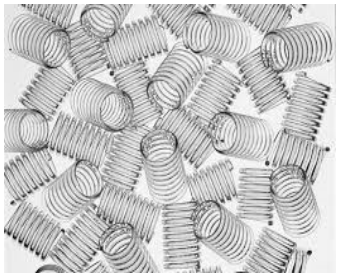


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- **RASCHIG RINGS**
  - **BOROSILICATEGLASS 3.3**
  - **LOW EFFCIENCY**
  - **HIGH PRESSURE DROP**
  - **LOW COST INTENSIVE**
  - **FOR SYSTEM EFFICIENCY OF 5-25 TH.-PLATES**



- **WILSON COILS**
  - **BOROSILICATEGLASS 3.3**
  - **MID EFFCIENCY**
  - **HIGH PRESSURE DROP**
  - **MID COST INTENSIVE**
  - **FOR SYSTEM EFFICIENCY OF 5-35 TH.-PLATES**



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- **BUBBLE CAP TRAY COLUMN**
  - **BOROSILICATEGLASS 3.3**
  - **MID EFFCIENCY**
  - **HIGH PRESSURE DROP**
  - **HIGH COST INTENSIVE**
  - **FOR SYSTEM EFFICIENCY OF 3-35 PLATES**
  - **SAMPLING AND MEASUREMENT POINTS ON EACH PLATE POSSIBLE**
  - **PERFECT FOR TEACHING PURPOSES**



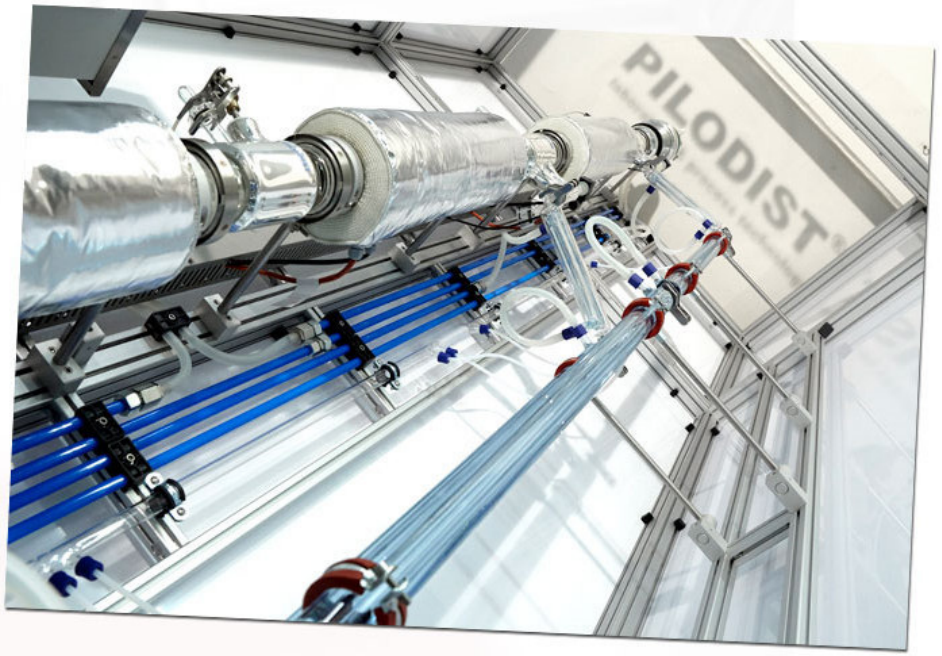
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CONTINOUS DISTILLATION SYSTEMS

A3: NUMBER AND LENGTH OF SEGMENTS

- **TOTAL EFFIECIENCY MAX. 100 PLATES AT 2500mm PACKAGE**
- **PACKAGE CAN BE SPLITTED IN SEGMENTS BETWEEN 300mm AND 1000mm**
- **POSSIBLITY TO MODIFY FEED POINT AND TAKE-OFF POSITION**

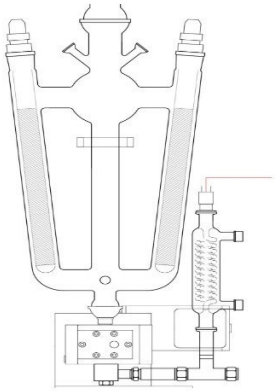




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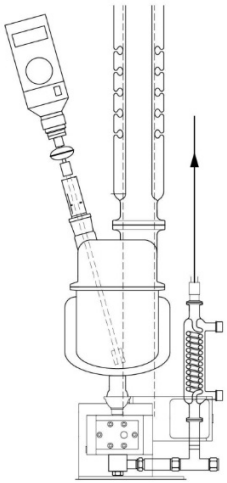
CONTINOUS DISTILLATION SYSTEMS

B. TYPE OF REBOILER



B1: CIRCULATION EVAPORATOR

- **ELECTRICAL HEATING**
- **MID VOLUME**
- **LOW COST**
- **EASY CONTROL**
- **FAST REACTION TIME**
- **HIGH TEMPERATURE > 300°C**
- **PURE GLASS CONSTRUCTION POSSIBLE**

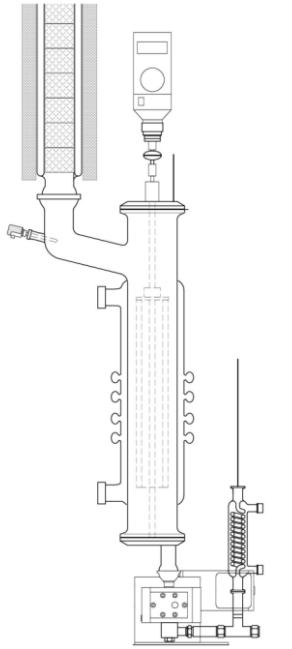


B2: OIL HEATED REACTOR

- **OIL HEATED FOR LOW SURFACE TEMPERATURE**
- **HIGH VOLUME**
- **MID COST (DEPENDING OF REQUIRED TEMPERATURE)**
- **CONTROL VIA THERMOSTAT**
- **SLOW REACTION TIME**
- **MID TEMPERATURE SYSTEM < 200°C**
- **HIGH TEMPERATURE SYSTEM < 300°C**
- **GLASS AND STAINLESS STEEL (HASTELLOY STIRRER SHAFT POSSIBLE)**

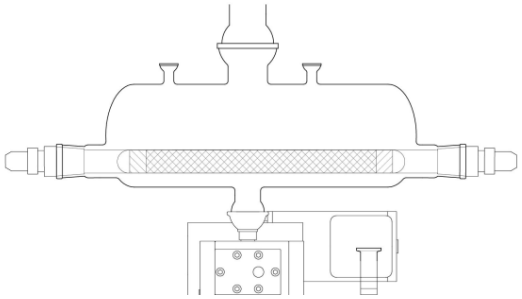
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CONTINOUS DISTILLATION SYSTEM



B3: OIL HEATED THIN FILM EVAPORATOR

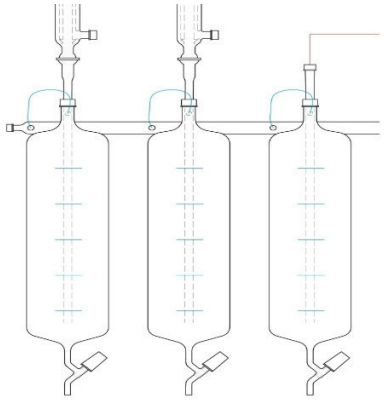
- **OIL HEATED FOR LOW SURFACE TEMPERATURE**
- **LOW VOLUME**
- **HIGH COST (DEPENDING OF REQUIRED TEMPERATURE)**
- **CONTROL VIA THERMOSTAT**
- **SLOW REACTION TIME**
- **MID TEMPERATURE SYSTEM < 200°C**
- **HIGH TEMPERATURE SYSTEM < 300°C**
- **FOR VERY SENSITIVE PRODUCTS**
- **GLASS EVAPORATOR AND STAINLESS STEEL DRIVE**



B4: HORIZONTAL REBOILER

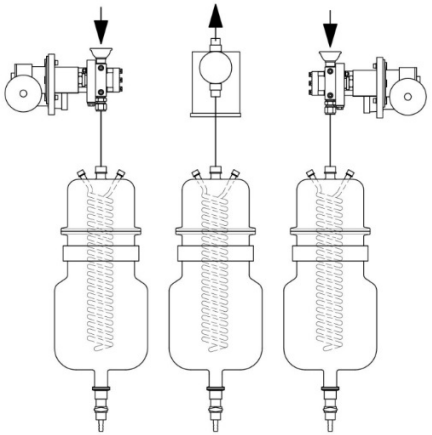
- **ELECTRICAL HEATING**
- **HIGH VOLUME**
- **LOW COST**
- **EASY CONTROL**
- **HIGH TEMPERATURE > 300°c**
- **PURE GLASS CONSTRUCTION POSSIBLE**
- **LARGE EVAPORATION SURFACE TO PREVENT FOAMING AND BUMPING**
- **FOR DEEP VACUUM APPLICATION**

C. TYPE OF RECEIVER:



C1: SIMPLE VESSEL SYSTEM

- DIRECTLY CONNECTED TO DISTILLATE LINE
- NO EXPENSIVE PUMP REQUIRED
- VESSELS UNDER SYSTEM PRESSURE
- LIMITED QUANTITIES
- NO CHARGE / DISCHARGE UNDER VACUUM
- OPTIONAL COOLED / HEATED BY LIQUID

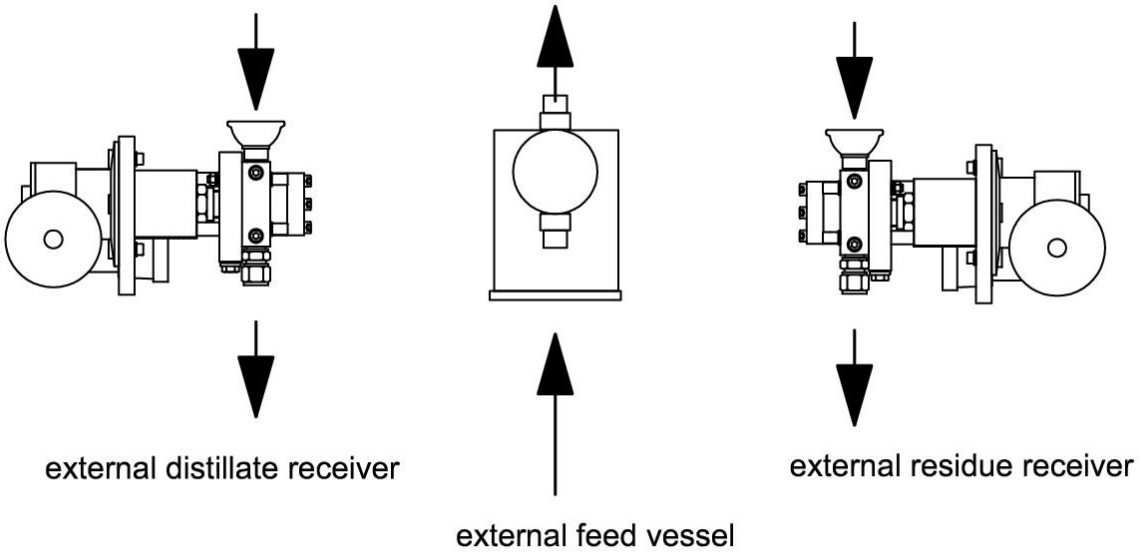


C2: SEPARATED VESSEL SYSTEM

- FEEDED BY HERMETICALLY SEALED GEAR PUMP
- NO INTERRUPTION OF VACUUM
- VESSELS VENTILATED
- FULL POSSIBILITY OF CHARGE / DISCHARGE UNDER VACUUM
- OPTIONAL COOLED / HEATED BY LIQUID
- OPTIONAL LOAD-CELL SYSTEM FOR MASS-BALANCE

C3: EXTERNAL FEED AND PRODUCT VESSELS

- **FEEDED BY HERMETICALLY SEALED GEAR PUMP**
- **NO INTERRUPTION OF VACUUM**
- **VESSELS VENTILATED**
- **FULL POSSIBILITY OF CHARGE / DISCHARGE UNDER VACUUM**
- **NO LIMITATION IN QUANTITY (BARRELS, IBC, ETC.)**
- **OPTIONALLY HEATED LINES**



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CONTINOUS DISTILLATION SYSTEMS

OPTIONAL EQUIPMENT:

- **VACUUM SYSTEM FOR OPERATION DOWN TO 1 TORR**
- **COLUMN HEATING MANTLES FOR ADIABATIC OPERATION (REQUIRED FOR HIGH-EFFICIENCY)**
- **TEMPERED RECEIVER**
- **HEATED LINES**
- **ADDITIONAL REFLUX-DIVIDER FOR SIDE-WITHDRAW**
- **EQUIPMENT FOR BATCH OPERATION**
- **AUTOMATIC FRACTION COLLECTOR**
- **REFLUX LINE SYSTEM**
  SPECIAL VALVE AND LINE SYSTEM FOR REFLUX OF DISTILLIATE AND/OR RESIDUE IN THE FEED-VESSEL. FOR EASY START UP AND CONENCENTRATION OF SAMPLES (RECYCLE OF DISTILLATE OR RESIDUE TO THE FEED)
- **LOAD-CELL SYSTEM FOR MASS-BALANCE**
- **ENERGY BALANCE WITH TEMPERATURE SENSORS AND FLOW METER IN COOLING WATER**

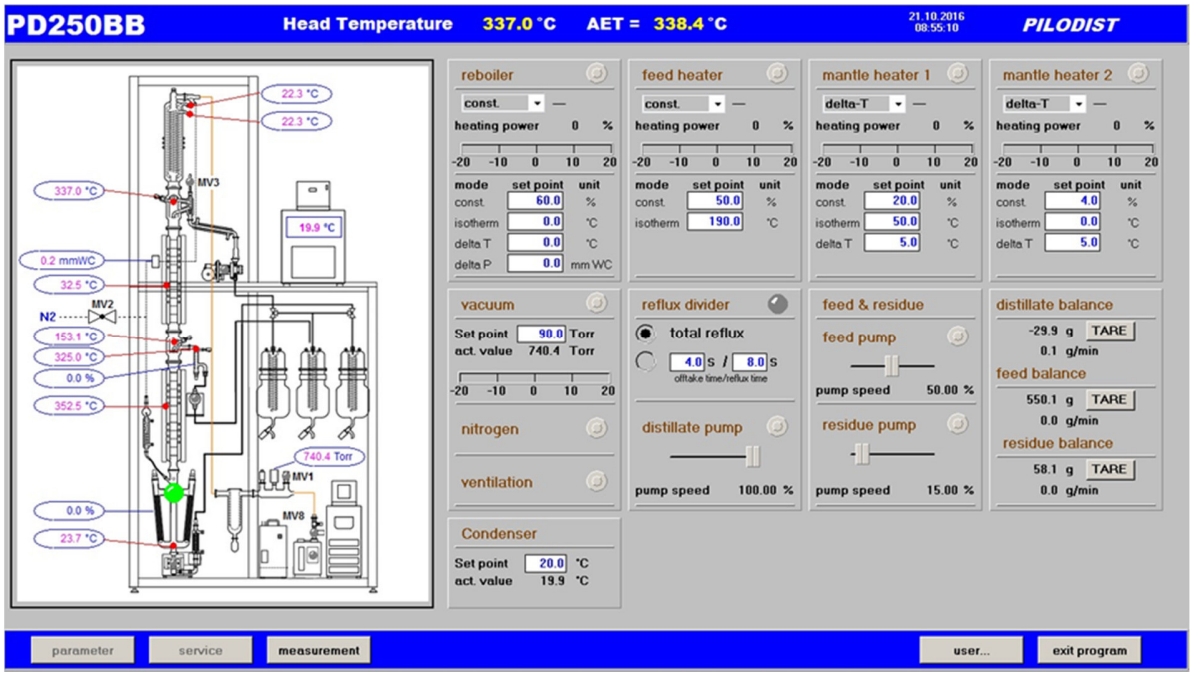
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CONTINOUS DISTILLATION SYSTEMS

CONTROLLER & SOFTWARE:

ALL SOFTWARE IS PRODUCED IN-HOUSE AND INDIVIDUALLY CUSTOMIZED

- **USER FRIENDLY**
- **SELF-EXPLAING**
- **INTEGRATED ALARM-SYSTEM**
- **PASSWORD PROTECTED CALIBARTION AREA**
- **AUTOMATIC AET-CALCUALTION**
- **POSSIBILTY FOR REMOTE-ACCESS**



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CONTINOUS DISTILLATION SYSTEMS

KEY-FACTS FOR PILODIST 250-SYSTEMS:

TEMPERATURE RANGE:	up to 350°C
VACUUM RANGE:	down to 1 mBar abs. (lower not recommended for packed columns)
COLUMN DIAMETER:	DN20mm up to DN60mm
FEED RATE:	0,1L/h up to 10L/h
COLUMN EFFICIENCY:	up to 100 theoretical plates
SYSTEM HEIGHT:	up to 5500mm
MATERIALS:	- Borosilicateglass 3.3
	- Stainless Steel AISI316Ti (1.4571)
	- Stainless Steel AISI316L (1.4404)
	- PTFE (Teflon)
	- FKM (Viton)
	- Other materials (Hastelloy, Kalrez, etc. upon request)