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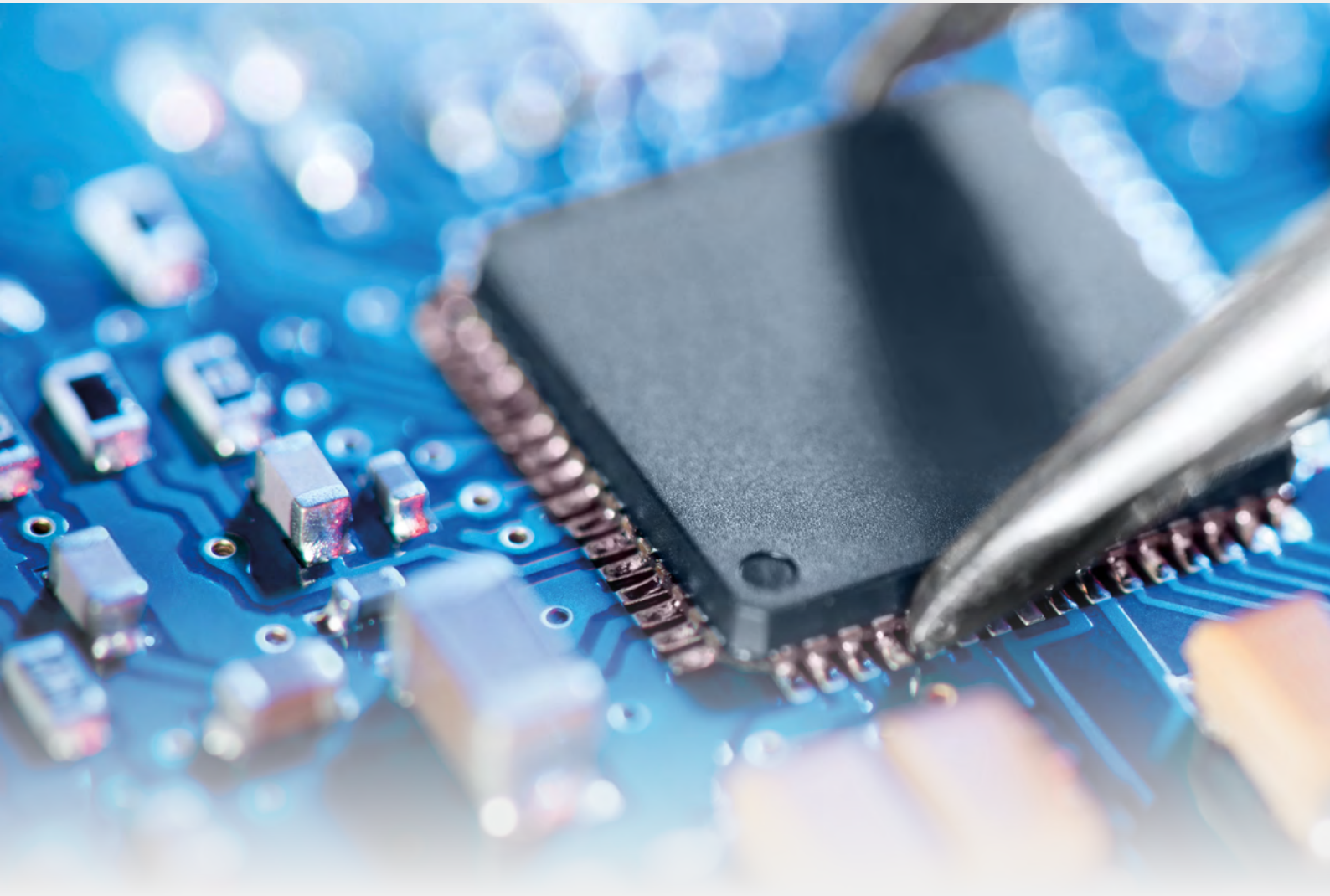
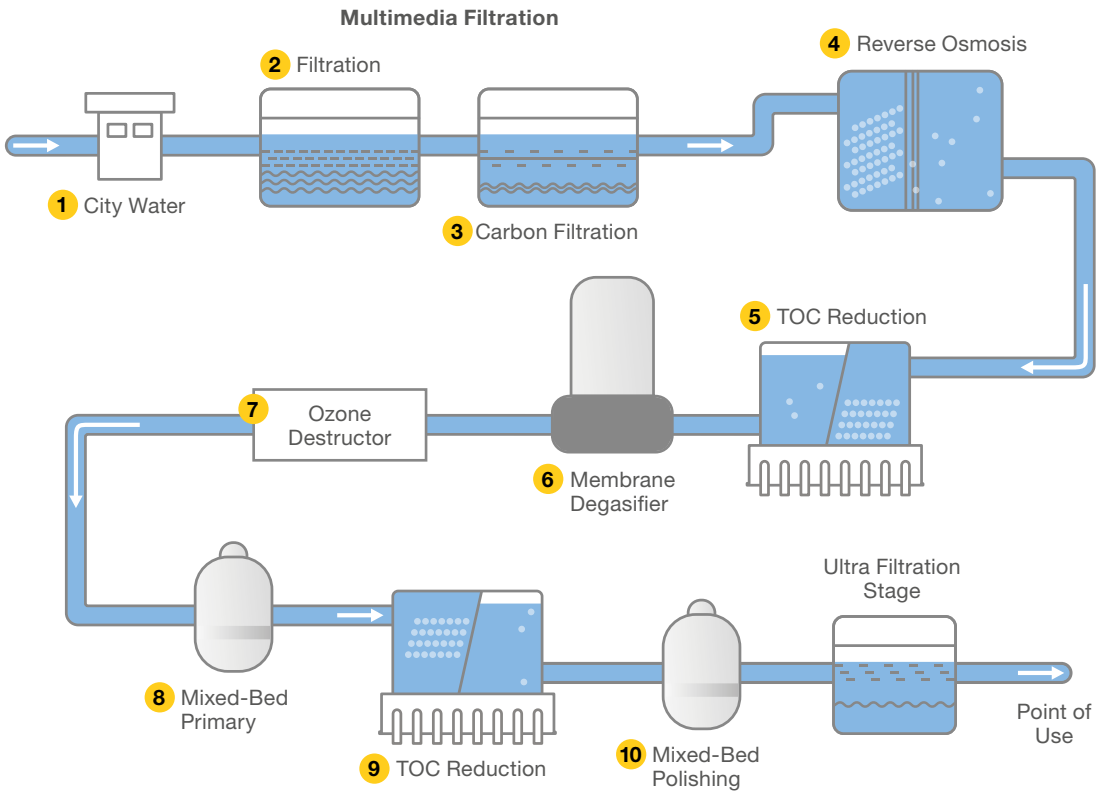
ANALYTICAL INSTRUMENTS



Reliable Online Monitoring of Ultrapure Water for the Semiconductor Market

Typical Ultrapure Water Treatment Systems Steps



Monitoring Points and Key Parameters

1	City Water	pH, TOC, TURB
2	Multimedia Filtration	FCL, TURB
3	Pre Filter (ACF)	DISF, FCL, TURB
4	Reverse Osmosis	pH , ORP, Conductivity
5	TOC Reduction	TOC
6	Membrane Degasifier	O_2
7	Ozone Destructor	O_3
8	Mixed-Bed Primary	RES, Na, SiO_2
9	TOC Reduction	TOC
10	Mixed-Bed Polishing	Na, RES, SiO_2, TOC

ACF = Activated Carbon Filter
DINF = Disinfectant
FCL = Free Chlorine
Na = Sodium
O_3 = Dissolved Ozone
O_2 = Dissolved Oxygen
ORP = Oxidation/Reduction Potential
pH = pH Value
RES = Resistivity
SC = Specific Conductivity
SiO_2 = Silica
TOC = Total Organic Carbon
TURB = Turbidity

Conductivity (Specific)/Resistivity

AMI Powercon S

Complete monitoring system for the automatic, continuous measurement of the specific (total) conductivity

- Complete system with dedicated transmitter, high precision conductivity sensor, flow cell with needle valve and digital sample flow meter
- Quick sensor release with patented slot-lock design
- Factory tested and ready for use

Specific Conductivity
0.055 µS/cm - 30 mS/cm

AMI Rescon

Online monitoring for specific resistivity/specific conductivity according to USP <645>

- In-situ verification with ultra-high precision resistor
- High temperature flow cell with integrated sensor for flow measurement
- Automatic selectable temperature compensation for different sample conditions
- Automatic measurement range switching
- Flow rates from 70-100 l/hr

Resistivity
0.01-18.18 MΩ
Specific Conductivity
0.055-1000 uS/cm

Disinfectants

AMI Trides

Amperometric measurement and control system for disinfectant concentrations

- Reagent-free – low operating costs with durable, membrane-free sensor design
- Low maintenance, high zero point stability, high longevity with automatic sensor cleaning
- Reliable measurements with integrated monitoring of redox potential and/or pH value (incl. compensation)

Free Chlorine
0-5 ppm
Chlorine Dioxide
0-3 ppm
Ozone
0-1 ppm

AMI Codes-II

Photometric measurement for disinfectant concentrations according to AWWA 4500-Cl G/EN ISO 7393-2

- Insensitive to cross-measurements, chemicals and ion interferences
- Automatic zero-value calibration prior to each measurement for high accuracy and reproducibility
- Reduced maintenance with optional cleaning module and high tolerance against fouling

Free Chlorine
0-5 ppm
Chlorine Dioxide
0-6 ppm
Ozone
0-1 ppm

Dissolved Oxygen

AMI Oxytrace

Amperometric measurement of trace dissolved oxygen concentrations

- Sensor with 3 electrode set-up (gold cathode, silver anode and silver guard) and temperature sensor. Faster initial response time after maintenance due to silver guard
- Automatic temperature and air pressure compensation for simple calibration using ambient air
- Automatic surveillance of electrolyte
- Available on a compact panel (280 x180 mm)

Dissolved Oxygen
0-20 ppm
Saturation
0-200%

AMI Oxytrace QED

Measurement of dissolved oxygen including integrated auto-verification

- Faraday electrode setup for automatic or manual verification by electrochemically generated oxygen concentration in the ppb range
- Monitoring of electrolyte and membrane integrity through faraday verification
- Easy to handle membrane and electrolyte exchange, sensor cap for up to 24 months of operation
- Available on a compact panel (400 x 420 mm)

Dissolved Oxygen
0-20 ppm
Saturation
0-200%

pH/Redox Potential

AMI pH-Redox QV-Flow

Potentiometric determination of pH value or redox potential for low conductivity samples

- pH or redox electrode with liquid electrolyte reference sensors, and Pt1000 temperature probe
- Automatic temperature compensations models for pH measurement
- Straightforward calibration procedure without sensor disassembling
- Economical operation of the instrument due to refillable liquid electrolyte

pH Range
pH 1-12
Redox Potential (ORP)
–500 to +1500 mV

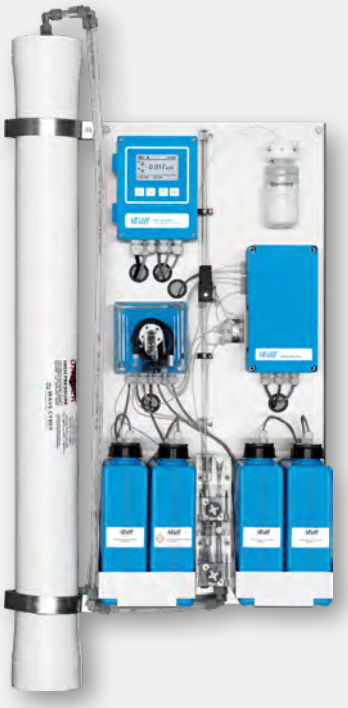
Silica

AMI Silitrace

Determination of trace concentrations of silica

- Detection limit of 0.5 ppb
- Automatic sample heating and regulated reaction time features for highest precision
- Automatic zero verification (daily)
- Programmable, automatic calibration
- Optional 2nd sample channel, or automatic sample sequencer; up to 6 sample streams

Silica
0-1000 ppb



AMI Silitrace Ultra

Colorimetric measurement of trace amounts of silica

- Real time and gap free monitoring through Swan Plug Flow System
- Heated photometer for low sample temperatures
- Programmable verification and calibration
- Integrated constant-temperature reaction chamber
- Reagent dosing system and reagent containers use reverse osmosis to concentrate sample

Silica
0.005-25 ppb

Sodium

AMI Soditrace

Measurement of trace sodium concentration

- Lowest available detection limit for sodium ion concentrations of 0.001 ppb
- pH controlled alkalization reagent addition for diisopropylamine to a pH 12, via maintenance-free air pump
- Programmable automatic three-point known addition calibration in ppb-range (detection limit for sodium remains: 0.001 ppb)
- Programmable automatic regen-eration of sodium electrode

Sodium
0.001-10000 ppb

AMI Sodium A

Dissolved sodium measurement for samples with pH≥2 and pH<8

- Detection limit of 0.1 ppb
- pH controlled alkalization reagent addition for diisopropylamine with maintenance-free air pump
- Optional 2nd sample channel, or automatic sample sequencer; up to 6 sample streams

Sodium
0-10000 ppb

Total Organic Carbon

AMI-II LineTOC Compact

Online monitoring for Total Organic Carbon (TOC) according to USP <643> and EP 2.2.44

- Reagent-free operation for fast trend identification without costly lab analysis
- Automatic performance verification (SST)
- Integrated grab sample function
- Optimized cost of ownership: auto-shutoff and safe ramp-up depending on sample flow to protect equipment
- Optional stainless-steel cover for extra protection of equipment and easy cleaning

Total Organic Carbon (TOC)
0-1000 ppb

Turbidity

AMI Turbitrace

Nephelometric system for low level turbidity measurement, according to ISO 7027 (EN 27027, DIN 38404)

- Programmable automatic zero point measurement for drift compensation
- Fast response time (T90<15sec at 10 l/h)
- Valve and connector for calibration according to ISO 7027
- Pressure tight sample system avoids outgasing of sample

Turbidity
0-100 FNU/NTU

AMI Turbiwell

Contact-free turbidity measurement; approved alternative method to US EPA 180.1/ISO 7027

- Heated optics prevent measurement errors and condensation
- Applicable for flocculation control (coagulant dosing)
- Automatic measurement chamber flushing; trouble-free operation without manual intervention
- Fast and easy verification with primary and secondary standard
- Optional deltaT flow meter; optional sample degasser to avoid the formation of interfering bubbles in the sample

Turbidity (EPA)
0-100 FNU/NTU
Turbidity (ISO)
0-200 FNU/NTU

Portable Instruments

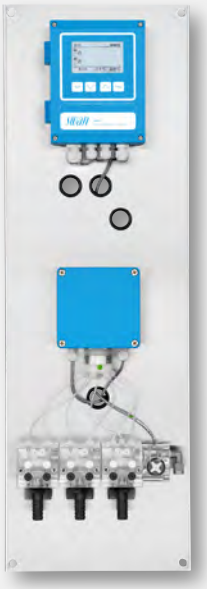
AMI Inspector

Portable quality assurance (verification) of existing online measurements. Available for conductivity, hydrogen, oxygen and pH measurements

- USB data logger interface for lifelong data storage at a selectable interval
- Rechargeable battery for more than 24 hours of stand-alone operation
- Recertification by Swan possible

Conductivity
0.055-1000 µS/cm
Hydrogen
0.1-800 ppm
0-50 % Saturation
Dissolved Oxygen
0-20 ppm
0-200 % Saturation
pH Range
pH 1-12

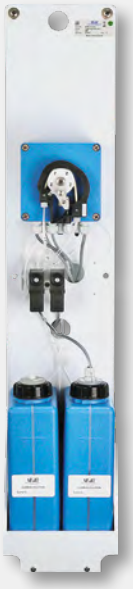
Options



AMI Sample Sequencer

Complete system for the automatic, continuous multiplexing of up to six sample streams to one process analyzer

- Complete system including control unit, back pressure regulator and needle-valve for each stream, and flow measurement
- Signal outputs for indication of active sample stream and flow alarm
- Optional module to use conjointly with these monitoring systems:
  - AMI Sodium P
  - AMI Sodium A
  - AMI Silica
  - AMI Silitrace



Cleaning Module

Reliable accurate measurements ensured by counteracting bio-growth inside the flow cell and photometer

- Automatic cleaning with addition of one or two cleaning solutions (e.g. 2.5% hypochlorite solution and/or diluted sulfuric acid 2.5%)
- Individual programmable cleaning interval
- Automatic reagent level monitoring
- Optional module to use conjointly with these monitoring systems:
  - AMI Codes-II

Swan AMI Monitor Concept

Swan instruments are delivered as fully functional, ready-to-use instruments. This ensures easy system integration as well as user-friendly operation and maintainability.

Highest standards in development and production assure the instrument quality expected by our customers.

SWISS MADE

Full System Integration

- Complete panel-mounted systems with fluidics connections preconfigured for quick start up
- Various communication possibilities with Profibus, Modbus, HART-Protocol, USB-interface and analog output
- Simple process engineering with regulation functions (P, PI, PID or PD), relay or analog output

Easy Maintenance

- Uniform menu navigation for easy operation and maintenance – one platform for all instruments
- Clearly arranged setup of instruments, good accessibility of all components for efficient operation and maintenance
- Self-explanatory maintenance procedures can be easily performed by the operating company

Highest Quality Assurance

- Every analyzer is wet bench tested and factory calibrated prior to delivery
- Automatic instrument alarms and self-diagnostic such as reagent level and sensor functions for validated results
- Integrated sample flow control for measurement check available for all analyzers

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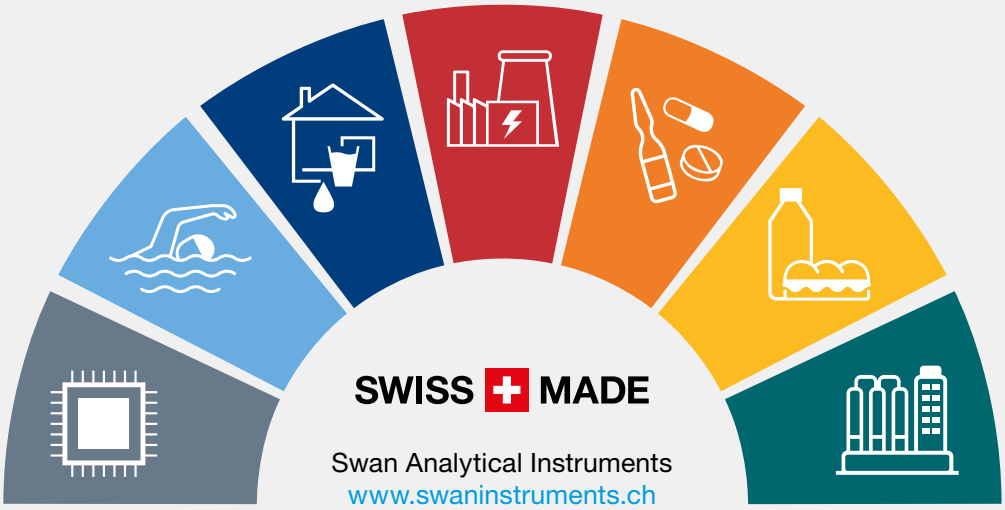
ANALYTICAL INSTRUMENTS

- Swan Headquarters
- Swan Subsidiaries
- Distributors



Swan Analytical Instruments
www.swaninstruments.ch