# POLYMETRON 9123

## pH


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# *pH calculated by differential conductivity*

HACH ULTRA™

EXCELLENCE IN PROCESS ANALYTICS

# pH κ

# POLYMETRON 9123

*The* POLYMETRON 9123 *is a part of a range of on-line water chemistry analyzers designed for the power industry. This range includes analyzers for pH, conductivity, silica, sodium, phosphate and oxygen scavengers.*

*On power plants the measurement of pH is crucial for corrosion control in water and steam circuits. The* POLYMETRON 9123 *offers a pH calculation by differential conductivity for low conductivity waters.*

*The* POLYMETRON 9123 *also provides cationic conductivity measurement used for continuous low level contamination monitoring. This is one of the most sensitive and reliable on-line means to detect contaminants such as chlorides, sulfates, nitrates and organic acids.*

## Operation

The conductivity is measured before and after a cationic resin exchanger using high performance sensors. This provides the specific (total) conductivity and the acid (cation) conductivity.

The cation resin converts low conductive mineral ions such as $Na^{+}$, $Ca^{+2}$ and $Mg^{+2}$ to an acid form with a high conductive hydrogen ion $H^{+}$. Because the acid form has 3 to 6 times the conductivity of the corresponding salts, the process is much more sensitive in measuring the impurities of interest.

For the pH calculation an algorithm based on the VGB 450 Le appendix is applied. As long as the water conditioning parameters are within the validity range (see right page) an accurate pH value is provided without the constraints typically associated with conventional glass electrodes in low conductivity applications.


## Interface and communications

The POLYMETRON 9123 display interface is available in 6 languages: English, French, German, Spanish, Italian and Dutch.
Both conductivities can be viewed simultaneously with the pH calculation, relay status and alarms.
A comprehensive set of outputs is available:
2 standard smart galvanic isolated 0/4-20 mA,
4 relays, RS 485, Modbus and Profibus DP.

## Benefits

- Linear response of conductivity with changing concentration gives a higher pH sensitivity than that achieved with the logarithmic response of traditional pH electrodes
- Design follows ASTM 6504 recommendations
- Selectable accurate non linear temperature concentration according to the alkaline reagent (NaOH, ammonia)
- Cartridge with internal plug flow provides longer service intervals and better accuracy
- Upstream flow facilitates evacuation of air after periodical shut off and $CO_2$ during steady state conditions for accurate measurements without interferences

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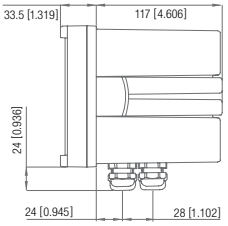
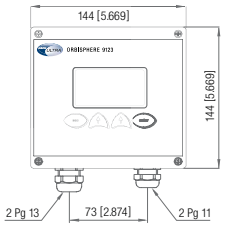
- *All-in-one panel analyzer or single transmitter version available*
- *Provides specific cationic (acid) conductivity and calculated pH*
- *"Dry" pH detection offers reliable and cost effective analysis compared with traditional electrodes*
- *Reduced panel space*


## Transmitter or panel analyzer

A single transmitter (see left picture) can be supplied for easy integration in any power plant sampling panel. This option allows flexibility in the design of the whole measurement loop by adding other mandatory items like flow chambers, probes, cables and external cation exchangers.

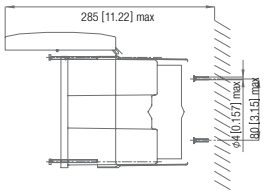



The panel analyzer version is the preferred quick installation and "turn-key" solution that is ready for use in any power plant. It includes all essential items such as: the POLYMETRON 9123 transmitter, the dual flow chamber, the 2 conductivity probes, the cation resin cartridge and a manual flow valve.

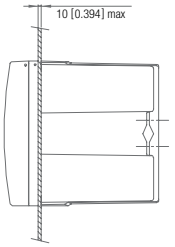



## Auto diagnostic and required conditions for an accurate pH calculation

For a valid pH calculation the following sample specifications should be met:
- pH value should be between 7.5 and 10.5
- Phosphate concentration below 0.5 mg/l
- Use only one alkaline reagent (ammonia or NaOH)
- Below a pH of 8, the concentration of impurities must be small when compared to the alkaline reagent




A self monitoring of the pH calculation validity is continuously performed by the transmitter and delivers a system alarm when the pH calculation is outside the valid limits ($NH_3$: 7<pH<10, NaOH: 7<pH<10.7).
An alarm is also activated when the resin life expectancy has been reached.




## System ordering identification code

| 9 | 1 | 2 | 3 | =A= | X | 0 | Y | 0 |
|---|---|---|---|---|---|---|---|---|

Power supply & Outputs

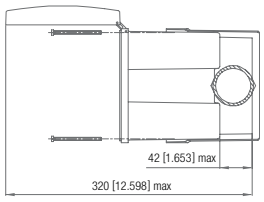
Internal software

## System version

| | |
|---|---|
| 0 | Transmitter alone |
| 1 | Analyzer complete |

## Power supply & outputs

| | |
|---|---|
| 00 | 100-240 VAC |
| 04 | 100-240 VAC + 4 relays board |
| 11 | 100-240 VAC + RS 485 |
| 12 | 100-240 VAC + Profibus DP |
| 15 | 100-240 VAC + 4 relays board + RS 485 |
| 16 | 100-240 VAC + 4 relays board + Profibus DP |
| 20 | Low voltage |
| 24 | Low voltage + 4 relays board |
| 31 | Low voltage + RS 485 |
| 32 | Low voltage + Profibus DP |
| 35 | Low voltage + 4 relays board + RS 485 |
| 36 | Low voltage + 4 relays board + Profibus DP |




## Benefits (following)

- Low resin maintenance required (typical resin life is several months)
- Nuclear grade resin made on a sulfonated styrene-divinylbenzene matrix for superior performance
- Refillable and exchangeable resin cartridge
- Transparent cartridge, quick visualization of resin exhaustion (indicator dye) or flow channeling
- Non-leaching material used for interference free measurements
- Easy visual sample flow check
- 2 standard 0/4-20 mA analog outputs

# Performance Specifications

HU-DS-9123-A4-E.0703

### Temperature measuring range

| | |
|---|---|
| Temperature | 0 to 150°C |

### Measuring range for the two electrodes sensor 8310 (recommended)

| | |
|---|---|
| Cell constant ($cm^{-1}$) | 0.01 |
| Specific conductivity | 0.01µS/cm - 200µS/cm |
| Specific resistivity | 5.00kΩxcm - 100MΩxcm |

### Validity for the pH calculation according to the water conditioning

$NH_3$: 7<pH<10, NaOH: 7<pH<10.7

### Accuracy for conductivity resistivity sensors (at transmitter inputs/outputs)

| | |
|---|---|
| Measurement | Conductivity/resistivity/concentration: ± 1% of reading |
| Analog output | ± 0.1mA |
| Temperature | ± 25°C |

### Outputs

| | |
|---|---|
| Configuration | (Standard with all models) |
| 2 analog outputs | 0 or 4-20mA, freely programmable scale (linear, bilinear, logarithmic)<br>Freely programmable setup for conductivity and calculated pH<br>Galvanic isolation from CPU, outputs and sensor, 16 bit resolution, max load: 900W. true full galvanic insulation, RS485 board galvanic serial link isolated |
| Options | 4 relay outputs (see ordering codification table)<br>- Relay 1.2: low or high set point<br>- Relay 3: low or high set point or system alarm<br>- Relay 4: low or high set point or timer output<br>- Relay output: 250V AC, 3A maximum, 100V DC; 0.5A maximum |

### Enclosure

| | |
|---|---|
| Dimensions | Transmitter: 144 x 144 x 150.5mm (see drawings page 3) (W x H x D)<br>Analyzer: 250 x 570 x 210mm |
| Conforms to EU standards | EN 50081-1 & 50082-2 (EMC) EN-61010-1 (low voltage) |
| Protection | NEMA 4X, IP65 certified |
| Material | Aluminum and polyester–coated metallic housing for the transmitter alone, polyester for the panel |
| Cable glands | 2 x PG13 and 2 x PG11 |
| Connections | 2.5 $mm^2$ terminals with screw terminals for the mains and relays<br>Hydraulic connections for panel version<br>Inlet: Simple fitting for 6mm O.D. tubing or ¼",<br>Drain: Barbed stem for 12 mm (1/2" I.D.) hose |
| Net weight | 7kg (15lbs) for the panel version 9123=A=1000 including resin<br>2kg (4.4lbs) for the transmitter |
| Temperature | Storage: -20 to 70°C (4 to 158°F) Operating: -20 to 60°C (4 to 140°F) |
| Display | 34 x 67.4 mm (1.3 x 2.7in), 4 digits: 12mm x 8mm (0.5 x 0.3in)<br>Central graphic zone, relay status<br>Indication (S1, S2, S3, S4) double indication for measure and temperature |
| Power supply | Universal self-adapting: standard version: 100 to 240VAC, ±10% 50/60Hz, low<br>Voltage version: 13 to 30VAC, 50/60Hz; 18 to 42VDC consumption: 25VA |
| Packaging | The transmitter is shipped in a cardboard box with instruction manual, 4 cable glands, screws for panel mounting, and a quality certificate of conformity to specifications.<br>The analyzer is shipped in a cardboard box with instruction manual, filled resin with the quality certificate and ready for operation |
| QC documentation | Conformity certificate to specifications<br>Detailed test certificate part number: 09123=T=0000 |

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