



# The new MP5-A: a dramatic improvement in accuracy.

W H I T E   P A P E R   ·   S E N S O R   A C C U R A C Y

Stable calibration across wide ranges of pH, conductivity, and temperature — eliminating the frequent recalibrations that waste labor and compromise measurement reliability.

<b>AUTHOR</b>	Michael Silveri Founder, Halogen Systems, Inc.
<b>PRODUCT</b>	Halogen MP5-A
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## E X E C U T I V E   S U M M A R Y

# One calibration. Months of accuracy.

Chlorine sensor specifications are routinely tested under tightly controlled laboratory conditions that bear little resemblance to real-world treatment plants. The MP5-A was calibrated once at a single condition and then subjected to wide variations in pH, conductivity, and temperature. Accuracy remained within  $\pm 4\%$  across all variables — a level of stability that enables six months or more between calibrations.

## $\pm 4\%$

Maximum deviation from reference across full pH range (6.5–8.5), temperature (10–35°C), and conductivity (156–10,000  $\mu\text{S}$ )

## 6+ months

Stable calibration without recalibration, even as water chemistry conditions change seasonally

## 0.01 ppm

Limit of detection (LOD) per ISO 15839 — three times better than competing amperometric sensors

## Zero flow req.

Accurate measurement at any flow rate from 0 to 120+ gpm, enabling tank immersion and pipe insertion

## B A C K G R O U N D

### The real-world accuracy problem

Chlorine sensor specifications often have no relationship to the real world. The conditions under which published specifications were measured are frequently not disclosed. Furthermore, variables like pH and temperature are held constant during specification testing — something that almost never happens in an operating treatment plant.

Frequent calibrations waste labor resources and increase a sensor's total operating cost. These costs are often opaque to operators and management. A sensor with a wider accurate operating range saves plant resources and delivers a more consistent product to consumers.

The MP5-A is the latest version of Halogen's multiparameter sensor for drinking water applications. For this evaluation, nine MP5-A sensors were calibrated at a single condition — pH 8.0, chlorine level of 1.25 ppm, conductivity of 2,700  $\mu$ S, and temperature of 20°C — and then each variable was independently varied across its full range.

P H A C C U R A C Y

## Accurate across the full pH range

Competing sensors are typically specified at narrow pH ranges. For example, Hach's CL10 specifies free chlorine accuracy as  $\pm 3\%$  of the DPD reference at constant pH below 7.2 ( $\pm 0.2$  pH unit), widening to  $\pm 10\%$  at pH below 8.5 ( $\pm 0.5$  pH unit from calibration). Importantly, Hach calibrates separately at each pH range.

The MP5-A was calibrated once at pH 8.0 and then tested across the full range from pH 6.5 to 8.5. Accuracy remained within  $\pm 4\%$  of the DPD reference throughout — across a much wider pH range than Hach or any other chlorine sensor, with a single calibration point.

T E M P E R A T U R E A C C U R A C Y

## Stable from 10°C to 35°C

Hach does not specify temperature performance for the CL10. The MP5-A maintains  $\pm 4\%$  accuracy across a temperature range of 10°C to 35°C — the full range encountered in municipal drinking water treatment.

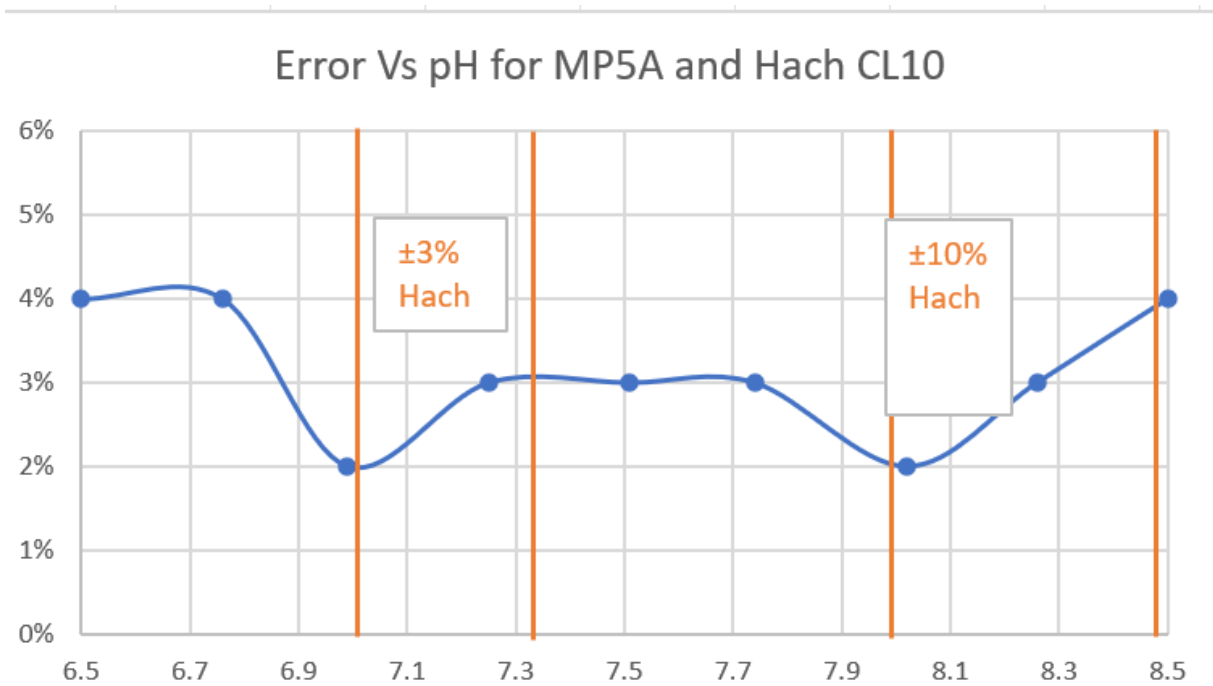


Figure 1. Chlorine measurement error as temperature varies from 10°C to 35°C. Nine MP5-A sensors calibrated once at 20°C maintain accuracy within  $\pm 4\%$  across the full range.

C O N D U C T I V I T Y A C C U R A C Y

## 156 to 10,000 $\mu\text{S}$ — no recalibration needed

Hach does not mention conductivity changes in its specifications. The MP5-A was tested across conductivity ranging from 156 to 10,000  $\mu\text{S}$ . The chlorine reading varied by only  $\pm 4\%$  — meaning seasonal or source-water conductivity swings do not require recalibration.

## WHAT THIS MEANS

As your water chemistry variables change — pH, temperature, conductivity — the MP5-A calibration holds. No recalibration due to changing conditions. This also means the MP5 can be factory calibrated and will often be accurate when installed without initial calibration.

## Superior detection at low residual levels

The MP5-A has dramatically improved performance at low chlorine levels. Testing per ISO 15839 for limit of detection (LOD) and limit of quantitation (LOQ) shows the MP5-A outperforms competing sensors:

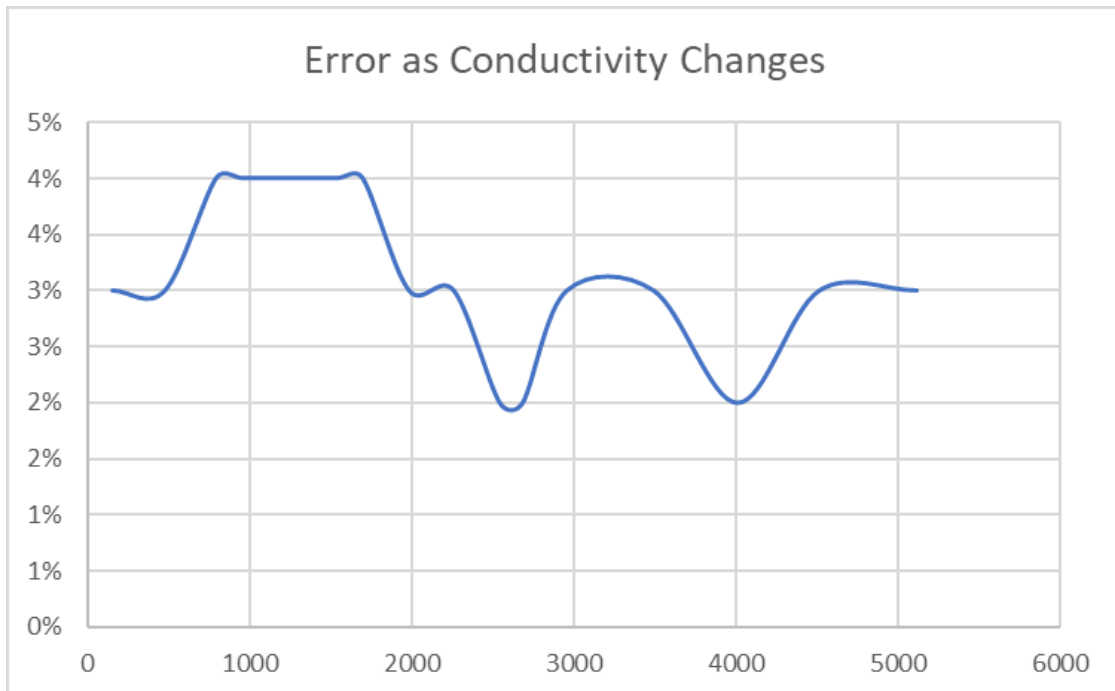
METRIC	HACH CL10	HALOGEN MP5-A	ADVANTAGE
Limit of Detection (LOD)	0.03 ppm	<b>0.01 ppm</b>	3× better
Limit of Quantitation (LOQ)	0.09 ppm	<b>0.04 ppm</b>	2.25× better

Method: ISO 15839:2003 — Water Quality Online Sensors/Analysing Equipment Specifications

In addition, the MP5 can operate at zero ppm chlorine for hours and, when chlorine is reintroduced, will accurately read very low levels. No membrane sensor can do this. Membrane sensors also require minimum flow to measure accurately — the MP5 does not, making it ideal for immersion applications in tanks and reservoirs.

## Accurate at any flow rate — even zero

The MP5-A's stable calibration under changing variables extends to flow variation. This makes direct pipe insertion practical, enabling distribution system monitoring that gives utilities insight into water quality after it leaves the treatment plant. Dead-end monitoring can indicate the need for flushing and provide better water quality data for consumers.



*Figure 2. Chlorine signal stability as flow varies from 0 to 60 gpm to 120 gpm. Virtually no change in measurement signal regardless of flow rate.*

There are thousands of tanks and wells with no chlorine monitoring because a practical solution did not previously exist. According to one utility, the cost of collecting grab samples requires more than 2,080 hours per year for just five locations.

## Unattended operation for six months or more

The MP5's self-cleaning system keeps sensor electrodes polished during operation, requiring very little maintenance. Halogen offers a rechargeable battery and low-power option that enables unattended operation for more than six months. An IoT cellular option enables 24/7 monitoring at remote locations.

Many distribution system locations — tanks, wells, booster stations, dead-end mains — can now be continuously monitored where utilities were previously blind. This gives the utility greater insight into conditions at the consumer's tap, and makes 24/7 monitoring practical at a reasonable cost.

### THE BOTTOM LINE

The MP5-A delivers  $\pm 4\%$  accuracy across the full range of real-world conditions — pH, temperature, conductivity, and flow — with a single calibration that holds for six months or more. No other chlorine sensor can match this combination of accuracy, stability, and operational simplicity.

### R E F E R E N C E S

## References

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### A B O U T   T H E   A U T H O R

#### Michael Silveri

Michael Silveri is the founder of Halogen Systems, Inc. and inventor of the company's amperometric sensor technology. With over two decades of experience in electrochemical water quality measurement, he has led the development of reagent-free chlorine analyzers deployed across municipal water treatment plants, building water systems, and industrial applications worldwide.