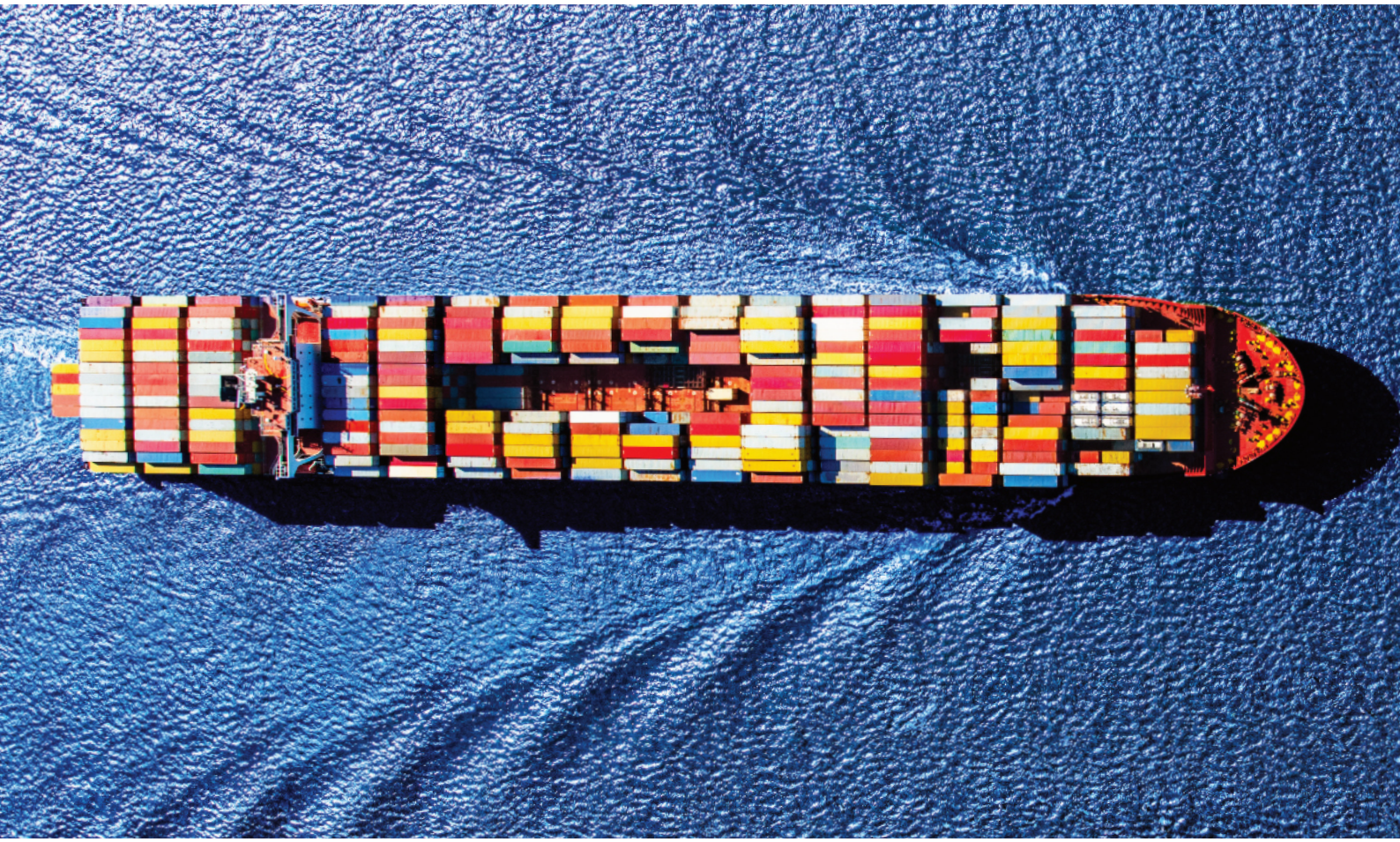
HALOGEN
SYSTEMS



Simple, Reliable, Low Maintenance TRO Measurement

DNV·GL KR KOREAN REGISTER IECEx IEC

HALOGEN SYSTEMS

MORE THAN 2,000 SENSORS DELIVERED FOR BALLAST WATER MANAGEMENT SYSTEMS

TRO Sensors are now a critical part of the Maritime Industry. Malfunctions in the TRO sensor can bring your shipping efforts to a halt. To help prevent any service interruptions, installing a simple, reliable, low maintenance TRO sensor will reap benefits in your Ballast Water Management System.

The Halogen Systems TRO sensor measures chlorine (TRO) without chemical reagents. It is far less expensive to install and has much lower maintenance requirements. Plus it measures TRO from 0.03 to 20 ppm in all types of water, regardless of the flow-rate, salinity or turbidity.

MODELS

Application	In Pipe	Side Stream	Hot Tap
Non Hazardous	 Sensor for Flange or pipe install **SWN-P+**	 Sensor with side stream chamber **SWN-P+CHM**	 Sensor with Hot Tap Valve for direct pipe insertion **SWN-P+HT2-HTV-01**
Hazardous Zone1 Group IIC IECEx marking string: Ex db ib IIC T5 Gb	 IECEx sensor Flange or pipe install **EX-P-STD2**	 IECEx sensor Side stream chamber **EX-P-STD-CHM**	 IECEx with Hot Tap Valve for direct pipe insertion **EX-P-HT4-HTV-1**
Optional Display Units			
Non Hazardous only Display/Transmitter	 2) 4-20 mA Outputs; 24 VDC Input Modbus RTU Output **D01**		 4) 4-20 mA Outputs; 24 VDC Input Modbus RTU Output **D01-4**

TRO MEASUREMENT

Simple, Reliable & Low Maintenance

ADVANTAGES FOR SHIPOWNERS & OPERATORS

Installation Benefits

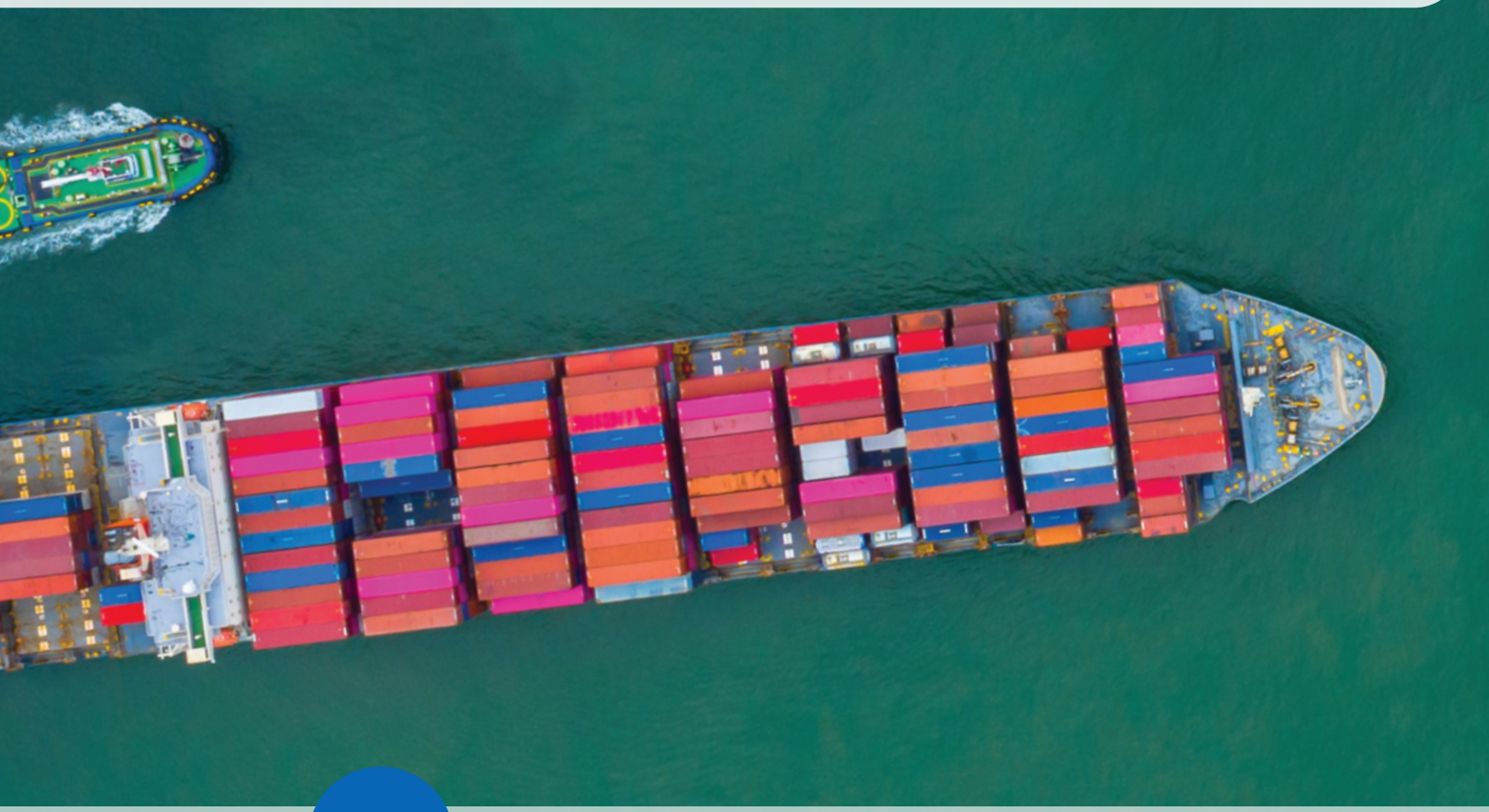
Locating the sensor in the ballast pipe makes things simple and lowers costs *(see Figure 1)*

- No Sampling Pumps
- No Additional Automatic Valves
- No Sampling Lines
- No Waste Lines
- No Skid Mounting

Operational Benefits

Halogen System's sensors are designed for simplicity, longevity and easy maintenance *(see Table 1)*

- No reagents to stock or replace
- Eliminates many Preventative Maintenance labor operations
- No scheduled maintenance for 24 months
- Long interval between calibration checks



ABOUT US

Halogen Systems, Inc. (HSI) develops and manufacturers innovative sensors for water treatment. Halogen sensors are rugged, robust and accurate and are covered by more than eleven patents worldwide. Halogen Systems is based near Reno, Nevada, USA and has been making sensors since 2013.

HSI FEATURES & BENEFITS: FIGURES & TABLES

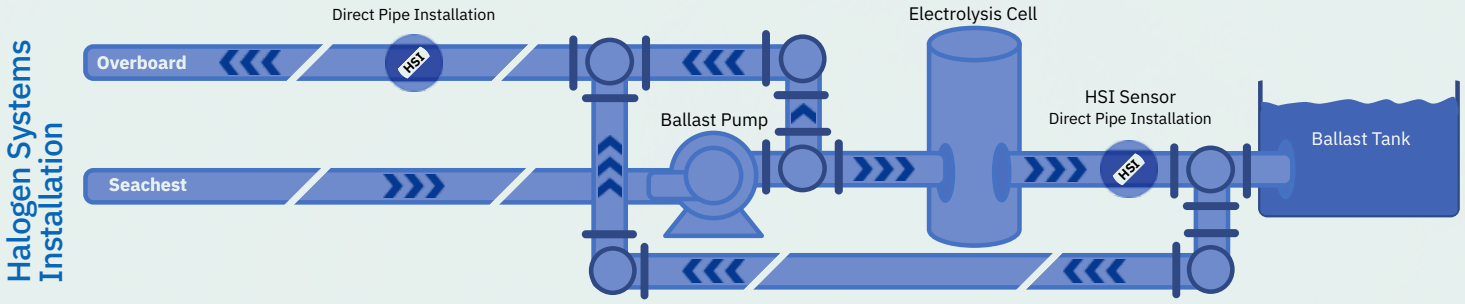
TABLE 1: COST AND LABOR SAVINGS FOR DPI SENSORS

	HSI	DPD
No Reagents	Yes	No
No Waste Stream	Yes	No
Unaffected by very turbid water	Yes	No
No Sampling Lines or Pump	Yes	No
Calibration or service (Months)	6 to 12	1
Time to Measurement PLC (secs)	45	180
Maintenance (Months)	24	1

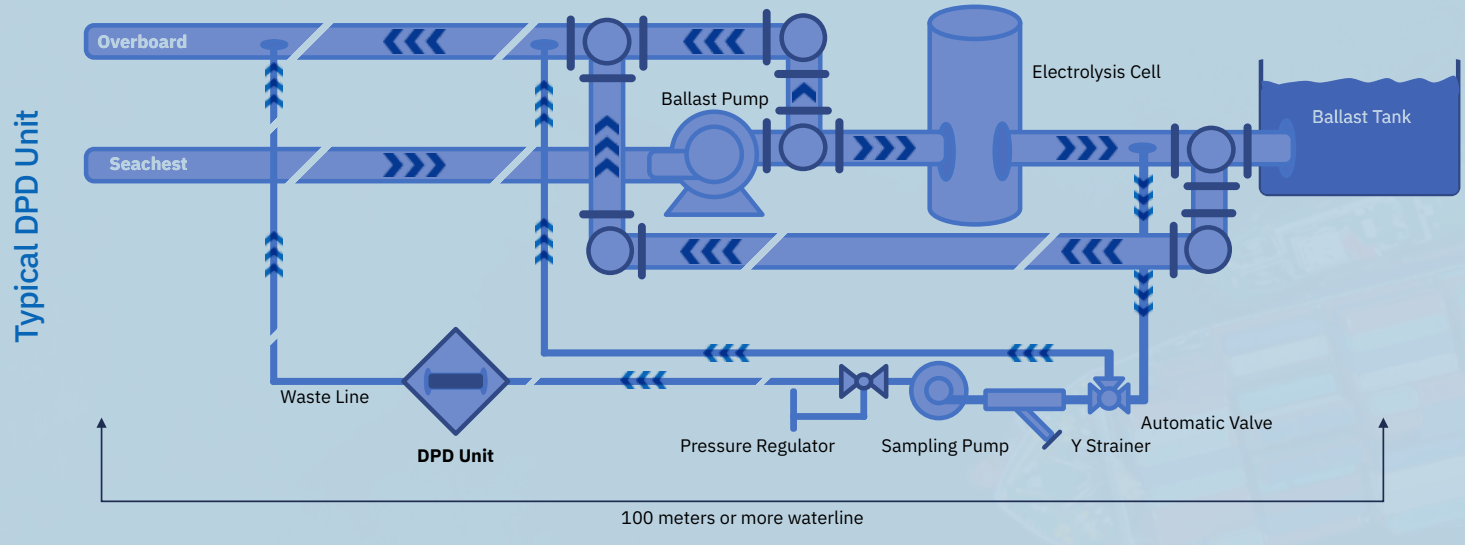
TABLE 2: HSI SENSOR RANGE AND ACCURACY

Measurement Specifications	Range
Chlorine (TRO)	.03 to 20 ppm (Accuracy of ±15% or 0.06 ppm, whichever is greater)
Chlorine Limit of Detection (LOD)	0.0 to 0.25
Oxidation Reduction Potential (ORP)	-1100 to 1100 mV
Conductivity/ Salinity	200 to 50,000 µS
pH	5 to 12
Temperature	0 to 100° C
Cycle time (depends on selected measurements)	45-55 seconds
Communication	Modbus RTU

FIGURE 1: SYSTEM COMPLEXITY COMPARISON



HSI's patented design allows for a Direct Pipe Insertion (DPI) or Hot Tap installation into the ballast piping, eliminating the need for the extra components required by online DPD systems like the one below.

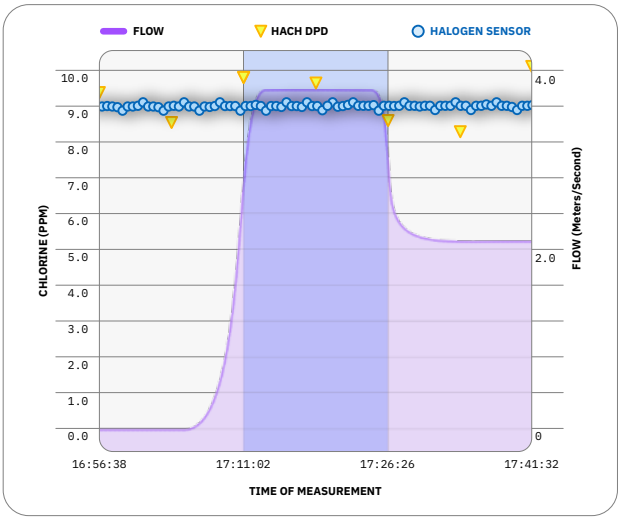


HI RES TRO™

HSI's patented **HiResTRO™** system is unaffected by flow changes ranging from 0 to 4 meters per second. Our magnetically coupled pump motor boasts a 20,000-hour life expectancy. No other company offers a direct pipe inserted TRO sensor that accurately measures TRO while experiencing a varying flow rate.

- All wear parts are engineered for a long lifetime.
- HSI's sensor achieves its accuracy by generating a high-velocity flow across the internal electrodes, resulting in higher resolution from an increased Signal to Noise ratio (S:N).

FIGURE 2: MONITORING AT VARIABLE FLOWRATES



DRYGLAS™

The unique **DryGLAS™** pH cartridge quickly stabilizes after dry out, making our pH sensor the only one on the market that can survive both high and negative pressures within a ballast pipe.

HALO SAL™

HSI's sensors integrate salinity using our **HaloSal™** technology. The sensor automatically compensates for signal changes based on the conductivity of water, whether seawater or freshwater. No other TRO sensor on the market can compensate for changes in salinity.

RAPID RESPONSE ORP™

Traditional ORP probes suffer damage if left dry. HSI's superior **Rapid Response ORP™** sensor will never get poisoned or be damaged if allowed to dry out.

SENSICLĒNE™

HSI's **SensiCLENE™** keeps sensor electrodes clean during operation. Our patented technology cleans biofouling off the interior surfaces within minutes of startup. Polymetric beads remove salt and organic buildup from the electrodes, allowing the sensor to maintain peak operating performance over extended periods.

- No filters to clean
- Accuracy is not affected by turbidity in muddy ports

TRO SENSOR FEATURES

The Technology

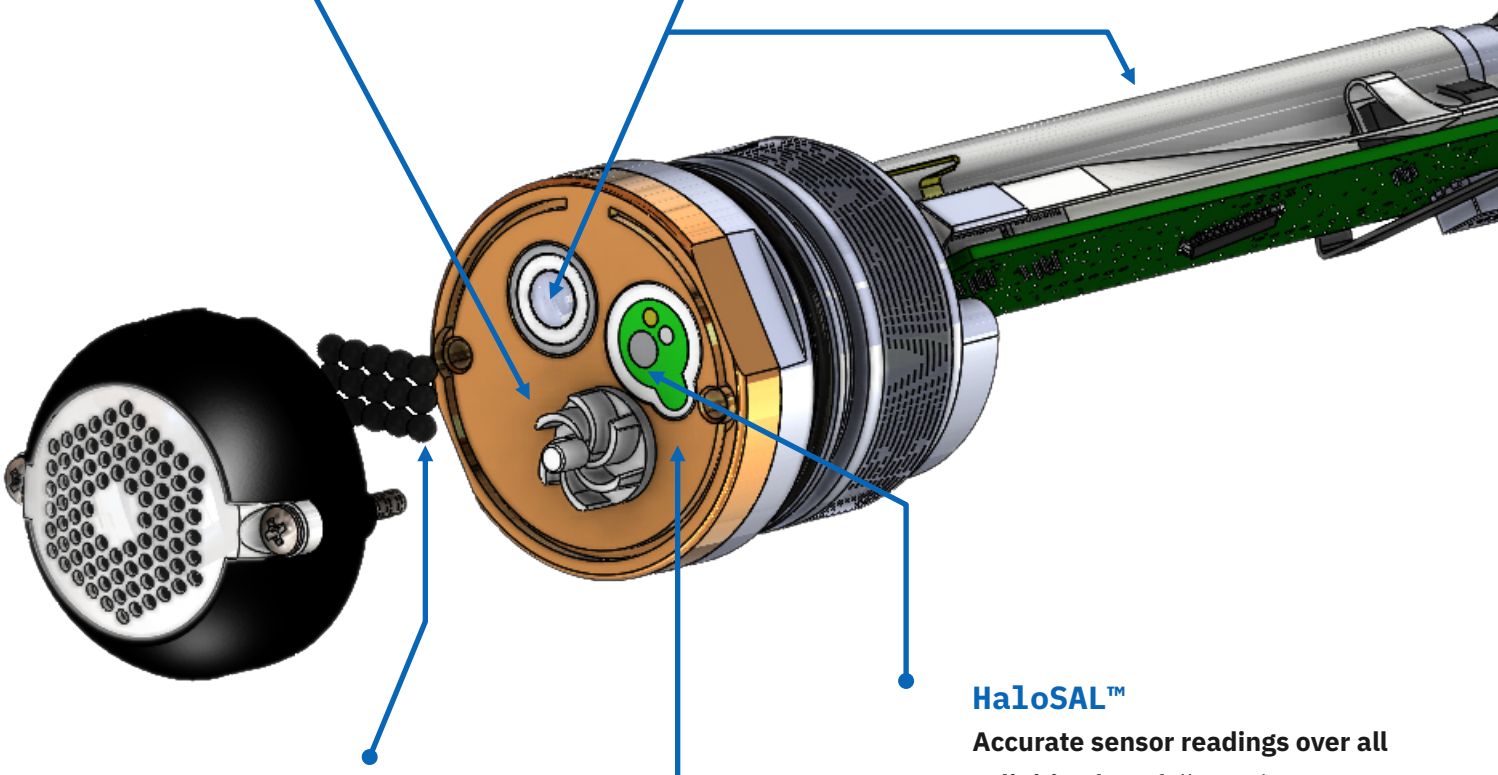
SIMPLE, RELIABLE OPERATION FROM A ROBUST MARINE DEVICE WITH THESE UNIQUE FEATURES:

HiRes™ TRO

HSI's *patented impeller system* **eliminates the need for extra components** by enabling Direct Pipe Insertion of the sensor into a ballast pipe.

DryGLAS™

Ensures **robust, reliable operation** if the ballast pipe is emptied. The sensor stabilizes with minutes after extended time dry out.



HaloSAL™

Accurate sensor readings over all salinities from fully marine seawater to freshwater (0.2 PSU salinity). Measures salinity and TRO with three electrodes.

SensiCLĒNE™

Halogen's **patented low-maintenance system** uses cleaning beads within the sensor shroud that circulate with the the water flow, cleaning the electrodes continuously.

Rapid Response ORP™

For BWMS that use ORP, traditional ORP probes suffer damage if left dry. HSI's® superior ORP sensor will never get poisoned or be damaged if allowed to dry out.

HALOGEN SYSTEMS, INC.

919 Incline Way, Unit 11

Incline Village, NV 89451 USA

+01 (775) 832-0495

info@halogensys.com

www.halogensys.com