HACH – astroTOC HT Process TOC Analyzer

Application—for industrial and municipal wastewater treatment plants

The high temperature oxidation method for process TOC analysis is utilized primarily in chemical and petrochemical industrial wastewater. Other industrial wastewater applications include pharmaceutical, and pulp & paper. Municipal wastewater treatment in some European countries have regulated the use of the high temperature oxidation method and it is anticipated that other countries will follow.

Chemical and petrochemical plants use large amounts of water in the production process. Plants are usually divided into business units that are responsible for the fabrication of a particular plastic or chemical product. The analysis of TOC in process water is performed for two main reasons. Each business unit is charged by the TOC concentration and the volume of wastewater sent to the treatment plant. These TOC measurements at the unit outfall assure each business unit is charged appropriately. Secondly, the TOC measurement alerts the business unit of a spill condition. This alert prompts the business unit to notify the wastewater treatment plant of an incoming high TOC concentration waste stream. The stream is then diverted into a holding tank or pond and later released into the treatment process at a controlled rate avoiding upsetting the biochemistry of the wastewater treatment plant.

Reduced cost of ownership and maintenance

The patented large-volume furnace prevents severe-duty samples from plugging or failing prematurely consequently extending routine maintenance intervals. A platinum catalyst provides an enlarged surface area for the oxidation reaction in the furnace. This increases the life cycle of the catalyst reducing the cost of ownership.

The use of an innovative sample delivery system avoids inherent mechanical breakdown of complicated sample injection mechanisms. Customarily high temperature analyzers use an injection valve mechanism, which is prone to fail due to its narrow passages, small parts and exposed seals. The astroTOC HT has a continuous sample feed by a peristaltic pump providing a robust, easy to maintain sample injection into the furnace. This dramatically reduces maintenance cost.

Grab sample analysis capability

The grab sample feature allows the analysis of a manually collected sample at any time. To perform a grab sample analysis, the analyzer will automatically go off-line, analyze the sample, purge, and go back on-line. This function can be performed unattended since the analyzer software will hold the last analysis result with a time/date stamp

The Hach astroTOC HT Process TOC Analyzer

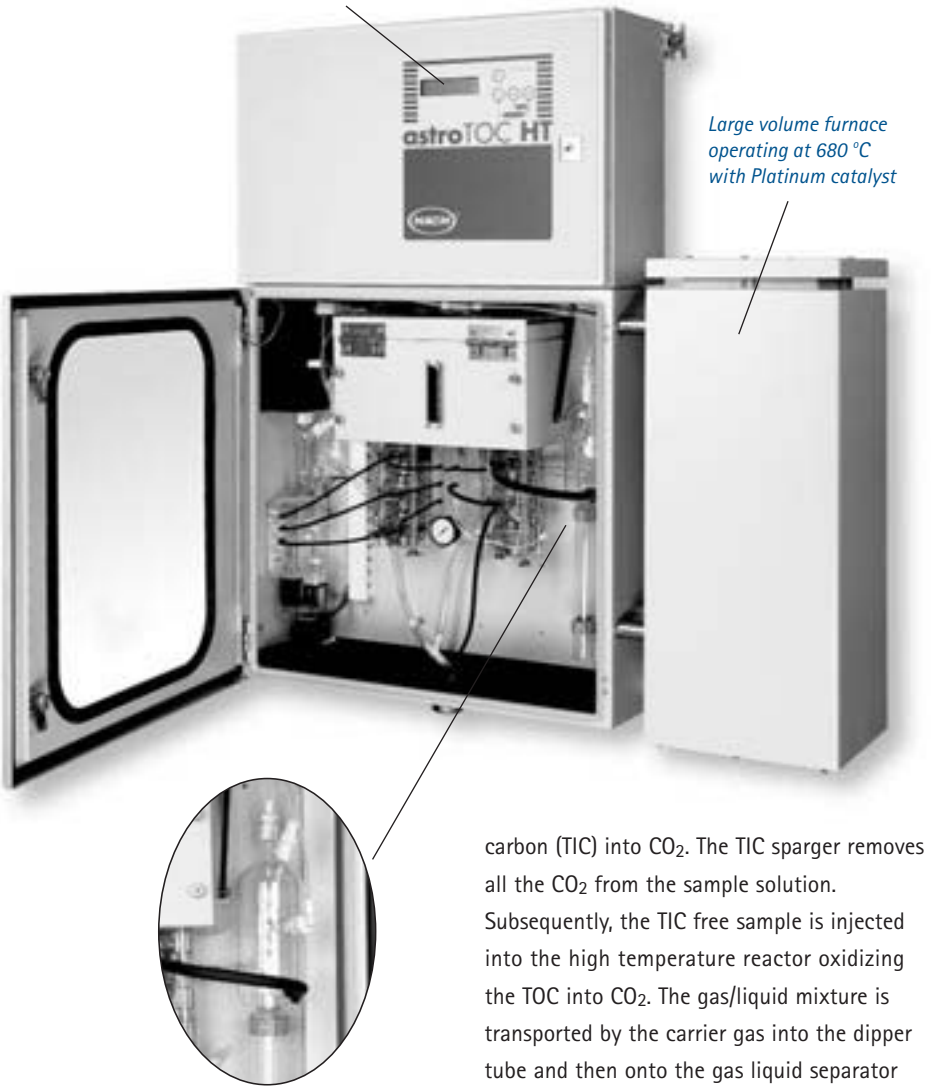
- Large volume furnace extends maintenance intervals and prevents plugging and failing
- Simplified sample delivery system
- Based on the established Astro process TOC analyzer platform
- Utilizes proven, patented high temperature reactor system
- Industrial design withstands the severest conditions

HACH®

Be Right™

Principle of operation

The astroTOC HT TOC analyzer uses a high temperature furnace reactor and a chemically impervious non-dispersive infrared (NDIR) CO_2 detector system assuring full compliance with ISO method 8245, EN method 1484, EPA method 415.1 or Standard Methods 5310 B. The analyzer utilizes a fast-flow sample loop continuously providing a representative sample from the port of entry. Then the sample is mixed with acid converting the total inorganic carbon (TIC) into CO_2. The TIC sparger removes all the CO_2 from the sample solution. Subsequently, the TIC free sample is injected into the high temperature reactor oxidizing the TOC into CO_2. The gas/liquid mixture is transported by the carrier gas into the dipper tube and then onto the gas liquid separator (GLS). From there, the sample gas is separated and diverted into the NDIR detector for direct, interference free CO_2 measurement. The resulting CO_2 concentration is directly proportional to the original TOC concentration found in the sample. The front panel displays the TOC concentration in mg/l.



Integrated sample handling system (dipper tube) designed to cool and absorb the pressure of the sample gas and then separate the gas from the liquid.

Detection Method

ASTM, EN, EPA, ISO and Standard Methods recommend TOC analysis methods utilizing the NDIR detection technique. The NDIR detection technique provides a stable and accurate measurement by detecting CO_2 in the gas phase. The detector performs a CO_2 measurement and compares it against a reference measurement taken at an alternate wavelength. The difference between the two measurements is equal to the concentration of CO_2 present in the cell. All IR systems utilize either a direct path or a wall-bounce path for detection. The NDIR measurement rays in the astroTOC HT follow a direct path going into a concave mirror and then a bundled path back into the receiver. This avoids the inherent draw-backs of the wall-bounce path, which are the loss of sensitivity and/or measurement due to the interference of dust particulates or water droplets on the NDIR cell wall. Therefore, a sample gas pretreatment and filtration are not required, reducing the cost of ownership. The cell body of the astroTOC HT NDIR detection system is made of PVDF (KYNAR) that is impervious to corrosion. Sapphire windows make the optics less susceptible to scratching.

Automatic Calibration, Validation, and Cleaning

The instrument can be set up for automatic zero and span calibration, single-point validation (system check), and analyzer cleaning. Each function can be independently programmed for any time of day and any day of the week. A system validation references the calibration against a known standard assuring an accurate measurement of the sample. Automatic cleaning simplifies analyzer maintenance.

astroTOC HT Analyzer Specifications*

Range

0-25 up to 0-20,000 mg/l TOC

Accuracy

± 5% of reading at ranges less than 1000 mg/l with and without dilution at 25° C (77° F)
± 2% of reading in the range of 2000 to 20,000 mg/l with dilution at 25° C (77° F)

Repeatability

± 5% of reading at ranges less than 1000 mg/l with and without dilution at 25° C (77° F)
± 2% of reading in the range of 2000 to 20,000 mg/l with dilution at 25° C (77° F)

Minimum Detection Limit

< 0.1 mg/l for the range 0-25 mg/l at 25° C (77° F)

Response time

T90 ≤ 8 minutes (includes TIC sparging)

Inlet Pressure

0.15-6 bar (2-87 psig)

Flow Rate

20-200 ml per minute

Sample Temperature Range

2° C to 70° C (36° F to 158° F)

Operating Temperature Range

5° C to 40° C (41° F to 104° F)

Recorder outputs

Two 4-20 mA analog outputs selectable for sample concentration, analyzer system warning or auto range indication

Alarms

Five alarms selectable for sample concentration alarm, analyzer system warning or analyzer system shutdown alarm

Each is equipped with an SPDT relay with contacts rated for 3A resistive load at 250 VAC or 0.5A at 30V

Optional Serial Communication

One multi-function RS232 or RS485 serial port (ModBUS, CSV)

Power

115/230 VAC 50/60 Hz (switch selectable), 1500 VA maximum

Sample Inlet/Outlet Connection

1/4-inch OD tube, compression fitting

Drain Connection

1 1/2-inch OD standard drain pipe

Carrier Gas

1/8-inch OD tube, compression fitting
Clean, CO_2 free air or Nitrogen at 2.8-6.2 bar (40-90 psig)

Compliance/certification

CE certified, listed to UL and CSA safety standards by ETL Standard Methods 5310 B, EPA 415.1

Enclosure

Cold Rolled Steel epoxy powder coated, IP54 / NEMA 12
Optional Stainless Steel IP54 / NEMA 12

Dimensions

Approximately 983 mm (38.7 inches) tall, 973 mm (38.3 inches) wide, 244 mm (9.6 inches) deep

Mounting

Wall mount

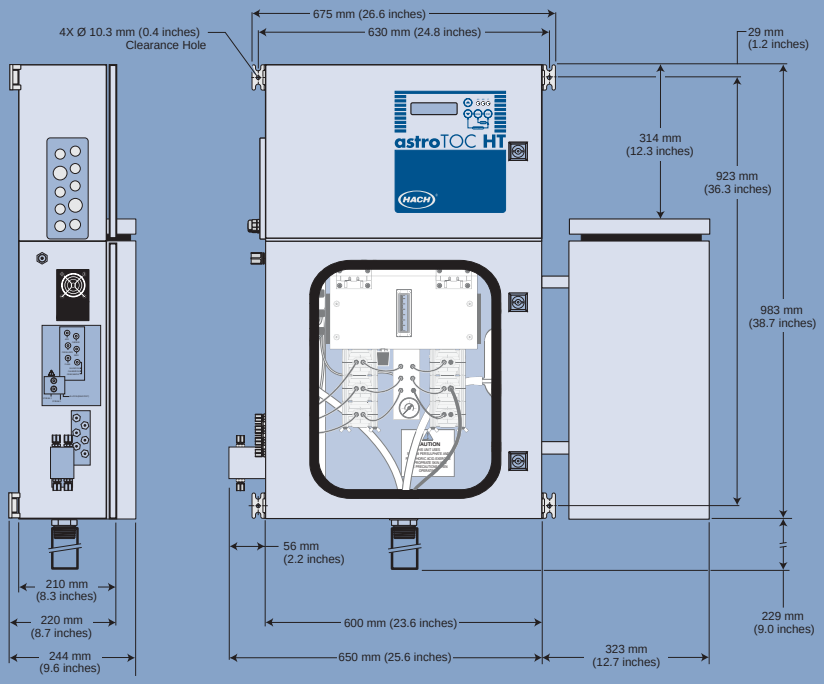
Shipping weight

212 lbs. (97kg)

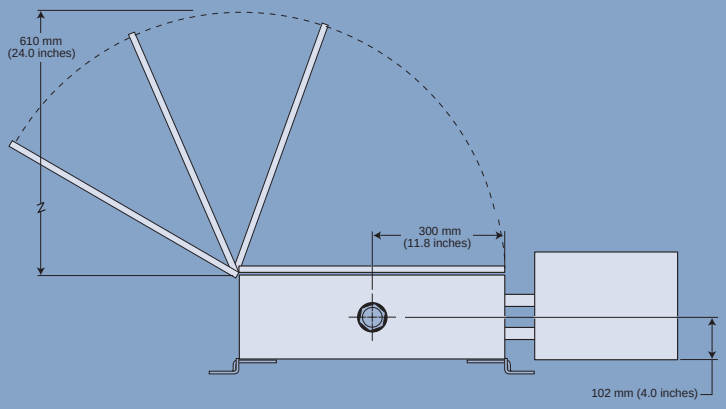
** Subject to change without notice.*

Installation

The Hach astroTOC HT is designed to be wall-mounted with four 3/8-inch screws. Adequate clearance must be provided at the sides and bottom of the enclosure for accuracy, plumbing and electrical connections. The sample inlet connection is 1/4-inch OD tube compression fitting and the drain connection is 1 1/2-inch OD standard drain pipe. Electrical connections are inside the instrument. A punch-out panel for ten conduit fittings is provided. Use oil-tight seals or sealing-type conduit fittings when wiring power, alarms, and relay connections to maintain the IP54/NEMA 12 enclosure rating.



SIDE VIEW **FRONT VIEW**



BOTTOM VIEW

How to Order

Hach astroTOC HT Analyzers are shipped with a start-up kit and a manual. An analyzer and a preference package part number must be selected.

Analyzers

H-4195-5030	HACH astroTOC HT, Cold Rolled Steel, 0 - 25 mg/l Range
H-4195-5040	HACH astroTOC HT, Cold Rolled Steel, 0 - 50 mg/l Range
H-4195-5050	HACH astroTOC HT, Cold Rolled Steel, 0 - 100 mg/l Range, Dilution
H-4195-5060	HACH astroTOC HT, Cold Rolled Steel, 0 - 200 mg/l Range, Dilution
H-4195-5070	HACH astroTOC HT, Cold Rolled Steel, 0 - 500 mg/l Range, Dilution
H-4195-6000	HACH astroTOC HT, Cold Rolled Steel, 0 - 100 mg/l Range
H-4195-6010	HACH astroTOC HT, Cold Rolled Steel, 0 - 200 mg/l Range
H-4195-6020	HACH astroTOC HT, Cold Rolled Steel, 0 - 500 mg/l Range
H-4195-6030	HACH astroTOC HT, Cold Rolled Steel, 0 - 1000 mg/l Range
H-4195-6040	HACH astroTOC HT, Cold Rolled Steel, 0 - 1000 mg/l Range, Dilution
H-4195-6050	HACH astroTOC HT, Cold Rolled Steel, 0 - 2000 mg/l Range, Dilution
H-4195-6060	HACH astroTOC HT, Cold Rolled Steel, 0 - 5000 mg/l Range, Dilution
H-4195-6070	HACH astroTOC HT, Cold Rolled Steel, 0 - 10000 mg/l Range, Dilution
H-4195-6080	HACH astroTOC HT, Cold Rolled Steel, 0 - 20000 mg/l Range, Dilution
H-4195-7030	HACH astroTOC HT, Stainless Steel, 0 - 25 mg/l Range
H-4195-7040	HACH astroTOC HT, Stainless Steel, 0 - 50 mg/l Range
H-4195-7050	HACH astroTOC HT, Stainless Steel, 0 - 100 mg/l Range, Dilution
H-4195-7060	HACH astroTOC HT, Stainless Steel, 0 - 200 mg/l Range, Dilution
H-4195-7070	HACH astroTOC HT, Stainless Steel, 0 - 500 mg/l Range, Dilution
H-4195-8000	HACH astroTOC HT, Stainless Steel, 0 - 100 mg/l Range
H-4195-8010	HACH astroTOC HT, Stainless Steel, 0 - 200 mg/l Range
H-4195-8020	HACH astroTOC HT, Stainless Steel, 0 - 500 mg/l Range
H-4195-8030	HACH astroTOC HT, Stainless Steel, 0 - 1000 mg/l Range
H-4195-8040	HACH astroTOC HT, Stainless Steel, 0 - 1000 mg/l Range, Dilution
H-4195-8050	HACH astroTOC HT, Stainless Steel, 0 - 2000 mg/l Range, Dilution
H-4195-8060	HACH astroTOC HT, Stainless Steel, 0 - 5000 mg/l Range, Dilution
H-4195-8070	HACH astroTOC HT, Stainless Steel, 0 - 10000 mg/l Range, Dilution
H-4195-8080	HACH astroTOC HT, Stainless Steel, 0 - 20000 mg/l Range, Dilution

Preference Packages

4P95-1000-00	astroTOC, Cold Rolled Steel, 115V (no charge)
4P95-1001-00	astroTOC, Cold Rolled Steel, 115V, Level Detection Kit
4P95-1100-00	astroTOC, Cold Rolled Steel, 115V, View Window
4P95-1101-00	astroTOC, Cold Rolled Steel, 115V, View Window / Level Detection Kit
4P95-1300-00	astroTOC, Stainless Steel, 115V, View Window (no charge)
4P95-1301-00	astroTOC, Stainless Steel, 115V, View Window / Level Detection Kit

Accessories

120161	Free-standing Rack Assembly for astroTOC
200201	astroTOC HT, 1 Yr. Spare Parts Kit
200202	astroTOC HT, 2 Yr. Spare Parts Kit
4300-0001	AAS 300 CO_2 Air Purifier with electronic timer for use with Compressed Air, 115 volts
4300-0002	AAS 300 CO_2 Air Purifier with electronic timer for use with Compressed Air, 230 volts
4300-0003	AAS 300 CO_2 Air Purifier with Pneumatic Timer for use with Compressed Air

Typical Proposal Specification

The TOC analyzer shall employ a high temperature large volume furnace reactor coupled with a peristaltic pump based sample injection method. An NDIR CO_2 detection system to measure TOC in less than 8 minutes.

In addition the analyzer shall consist of the following:

- Dual enclosure with analytical/electrical separation
- NEMA 12 / IP 54, epoxy powder-coated cold rolled steel, enclosure
- Complies with ISO Standard 8245, EN 1484, EPA Method 415.1 and Standard Methods 5310 B
- Grab sample and validation utilities for unknown sample or reference standard measurement
- User programmable auto calibration, auto validation, and auto cleaning
- Loss of sample flow & reactor feed detection
- Hinged pump assembly module
- Two 4–20mA parameter mapped analog outputs
- Five volt free function mapped relay outputs
- One optional RS232 or RS485 serial communication output (ModBUS, CSV)
- CE certified, listed to UL & CSA Safety Standards by ETL
- Continuous sample injection method

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