

SULFUR ANALYSIS SERIES

MODEL

800TS

ONLINE TOTAL SULFUR

Continuous online total sulfur measurement for conditioned light-hydrocarbon liquids, combining quantitative injection, high-temperature catalytic combustion, membrane drying and ultraviolet fluorescence detection.

**0-100 ppm**

STANDARD RANGE

+/- 1% FS

REPEATABILITY

<= 5 min

SAME-STREAM ANALYSIS

Up to 6

SEQUENTIAL STREAMS

HIGH-TEMPERATURE CATALYTIC COMBUSTION + UV FLUORESCENCE

Built for continuous sulfur control

A controlled measurement chain from representative liquid sample to plant-ready result.

Purpose-built for online total sulfur measurement

The Model 800TS is a fully automatic online analyzer for total sulfur in qualified liquid samples. A six-port valve quantifies the sample before high-temperature catalytic combustion, membrane drying and UV fluorescence detection. The pretreatment system can be configured to analyze up to six sample flow paths.

TS

TOTAL SULFUR

Sulfur-containing compounds are converted to SO₂ before detection, producing a total sulfur result rather than a species-specific H₂S measurement.

AUTO

AUTOMATIC ONLINE OPERATION

The manual describes unattended automatic analysis with scheduled tasks, real-time status monitoring and alarm handling.

1-6

MULTI-STREAM OPTION

The pretreatment architecture supports up to six configured sample paths measured sequentially through the base analyzer.

STANDARD DOCUMENTED SAMPLE ENVELOPE

The operating manual defines the standard scope as liquid samples that can be completely decomposed and burned under controlled combustion conditions. Examples cited include gasoline, diesel and naphtha.

- Gasoline

- Diesel

- Naphtha

- Other qualified liquids

- Low-viscosity samples

- Controlled-combustion suitable

Application qualification should confirm the actual matrix, sulfur range, pressure, temperature, viscosity, sample conditioning and reference basis.

APPLICATION REVIEW REQUIRED

The manual excludes corrosive chemicals, acids, explosive samples, high-viscosity samples, and matrices containing fluoride, phosphorus compounds or heavy metals.

OUTSIDE STANDARD SCOPE

Applications outside the documented liquid-sample scope require engineering review and approved project documentation before quotation or supply.

Where the measurement adds value

Process control

Track sulfur changes earlier than intermittent laboratory checks.

Product quality

Support blending, transfer and final-product sulfur control.

Treatment performance

Verify desulfurization or process-treatment performance.

Operational visibility

Combine result, status, alarms and plant communications.

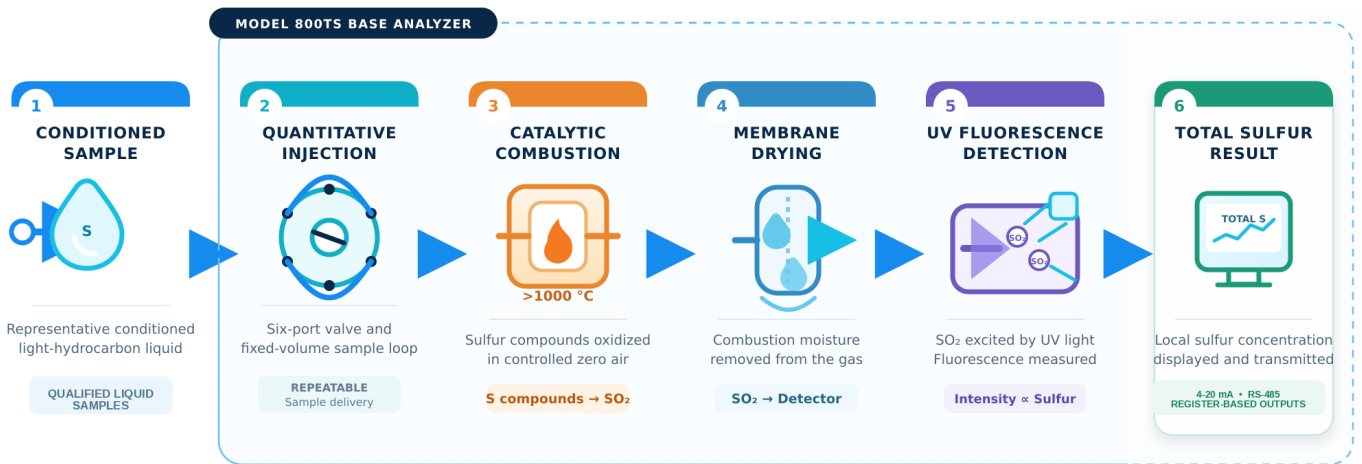
Complete total sulfur measurement process

The full analyzer measurement chain from conditioned sample through reported result.

DIAGRAM D01

HOW THE MODEL 800TS MEASURES TOTAL SULFUR

Quantitative injection • catalytic combustion • membrane drying • ultraviolet fluorescence detection



PUBLISHED PERFORMANCE AT A GLANCE

DETECTION LIMIT
100 ppb

REPEATABILITY
 $\pm 1\%$ of full scale

ANALYSIS TIME
 ≤ 5 min same sample stream

PUBLISHED RANGE
0-100 ppm other ranges by review

Standard documented configuration: conditioned light-hydrocarbon liquids. Final sample handling and application suitability require confirmed project configuration.

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What this diagram clarifies

01 Sample is quantified

A six-port valve and fixed-volume loop provide repeatable sample delivery into the reaction system.

02 Sulfur becomes SO_2

High-temperature catalytic combustion converts sulfur compounds into sulfur dioxide for a common measurement basis.

03 Signal becomes result

A membrane dryer removes combustion moisture before UV fluorescence detection and concentration reporting.

Engineering note: the diagram distinguishes the base analyzer from project-dependent sample conditioning and keeps the documented application scope centered on qualified liquid hydrocarbon samples.

UV fluorescence detection principle

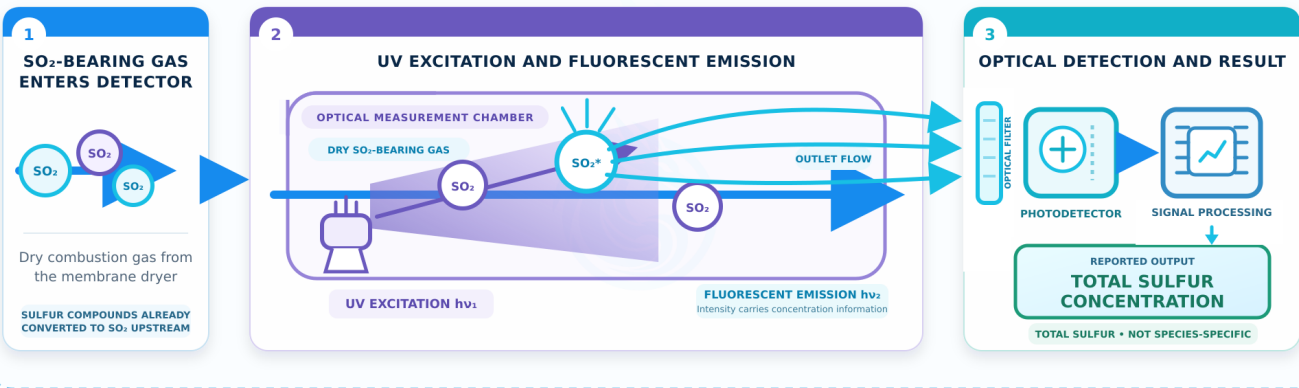
Optical detection of SO₂ after upstream conversion of sulfur compounds.

DIAGRAM D02

UV FLUORESCENCE DETECTION PRINCIPLE

SO₂ conversion upstream • UV excitation • fluorescent emission • photodetection • concentration result

MODEL 800TS UV FLUORESCENCE DETECTION SYSTEM



THE UV FLUORESCENCE SIGNAL CHAIN

EXCITATION



FLUORESCENT EMISSION



QUANTITATIVE RELATIONSHIP

$$\text{Intensity} \propto \text{SO}_2 \text{ concentration}$$

REPORTED RESULT

Total sulfur concentration

● Conceptual optical schematic. The detector quantifies SO₂ after upstream conversion; it does not identify individual sulfur species.

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Measurement principle

After catalytic combustion and membrane drying, SO₂-bearing gas enters the optical detector. Ultraviolet excitation raises SO₂ to an excited state; the molecule then returns to its ground state and emits fluorescence. The photodetector measures fluorescence intensity, which is proportional to the SO₂ concentration and therefore to the total sulfur converted upstream.

UV FLUORESCENCE SIGNAL CHAIN

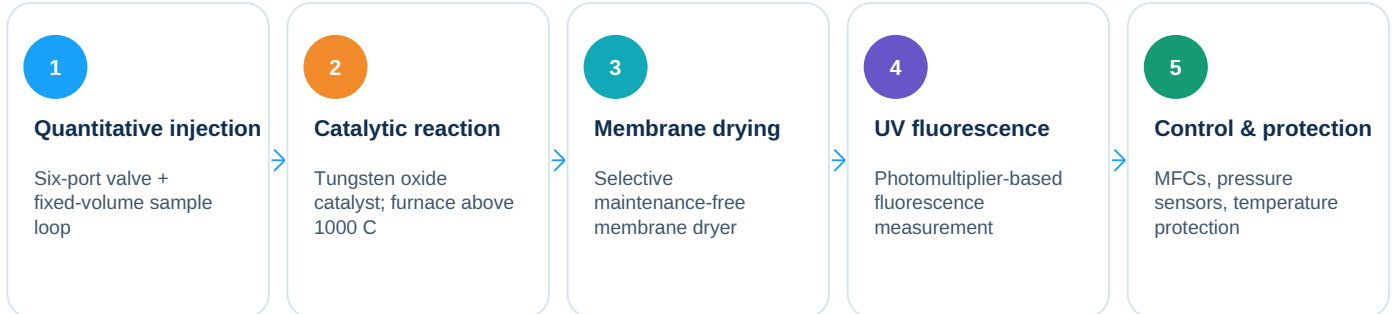


Intensity proportional to SO₂ concentration

The detector is a total-sulfur measurement stage after conversion; it is not a species-specific sulfur detector.

Inside the measurement chain

Core modules, operating setpoints and automatic protection described in the current manual.



FACTORY / NORMAL OPERATING VALUES

Furnace temperature	1020 C factory setting
Detector temperature	50 C factory setting
Sample injection heating	300 C factory setting
Auxiliary gas flow	300 mL/min
Carrier gas flow	300 mL/min
Detector outlet total flow	>= 550 mL/min
Carrier / auxiliary gas pressure	0.2-0.3 MPa
Valve-drive gas pressure	0.4-0.6 MPa typical
Combustion chamber temperature	Maintain <= 60 C during operation

AUTOMATIC PROTECTION

P GAS PRESSURE

Carrier / auxiliary gas outside the set range stops analysis.

T FURNACE SAFETY

Control faults stop analysis and cut furnace power.

OK CHAMBER TEMP.

Over-temperature stops furnace heating immediately.

ENGINEERING DETAIL THAT MATTERS

The manual describes high-precision mass-flow control, pressure sensing, temperature regulation and automatic shut-off logic as part of the measurement system - not as optional software extras. This is important for repeatability because sulfur conversion, drying and optical detection all depend on stable gas flow and temperature conditions.

Published performance & validation

Manual-controlled operating specifications plus published validation data from the existing Model 800TS brochure.

100 ppb

LEGACY PUBLISHED LIMIT
not listed in manual V1.0.0

0-100 ppm

MANUAL STANDARD RANGE
w/w; other ranges by review

+/- 1% FS

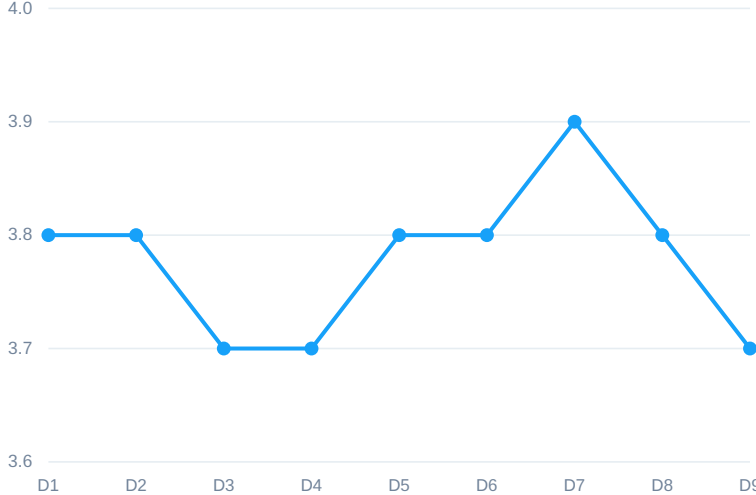
MANUAL REPEATABILITY
full-scale basis

<= 5 min

MANUAL ANALYSIS TIME
same sample flow path

9-DAY LOW-PPM STABILITY

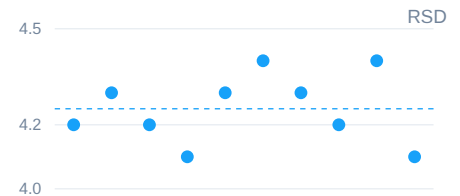
Daily average concentration (ppm)



LOW-PPM REPEATABILITY

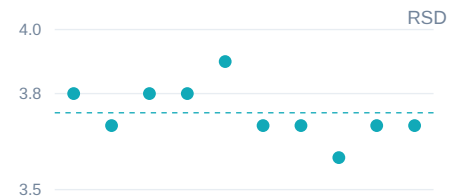
Gasoline dataset

2.54%



Diesel dataset

2.25%



PUBLISHED LINEARITY RESULT

$r = 0.99969$

The prior brochure also reports gasoline and diesel precision below 5 ppm with RSD under 3%, and a 9-day stability dataset with daily averages between 3.7 and 3.9 ppm.

Validation plots on this page reproduce the published dataset from the previous Model 800TS brochure. Operating and project specifications are governed by the current manual and approved project documentation.

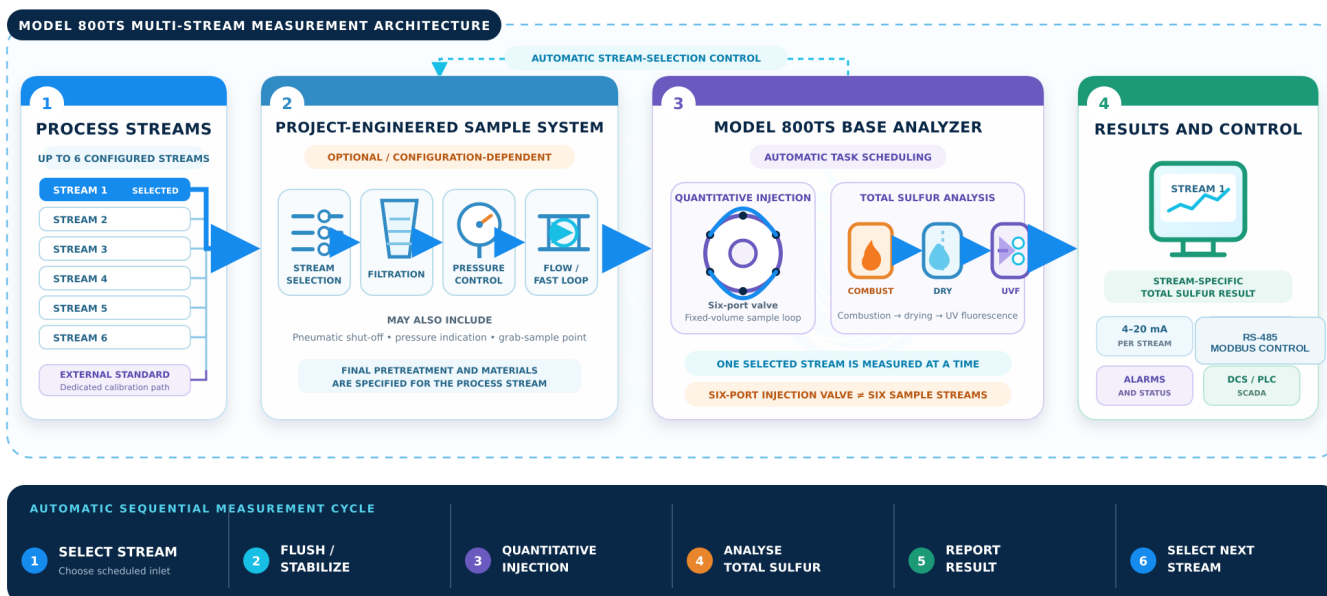
Multi-stream & sample-handling architecture

Up to six configured process streams with project-engineered pretreatment and sequential automatic analysis.

DIAGRAM D03

MULTI-STREAM AND SAMPLE-HANDLING ARCHITECTURE

Up to six process streams • project-engineered pretreatment • quantitative injection • sequential automatic analysis



● Multi-stream operation is sequential, not simultaneous. The stream-selection manifold is separate from the internal six-port injection valve.

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One analyzer, multiple process points

The pretreatment system can select up to six process streams. Each selected stream is conditioned, flushed and stabilized before entering the base analyzer. The internal six-port injection valve then quantifies the selected sample for analysis.

IMPORTANT ARCHITECTURE DISTINCTION

Multi-stream operation is sequential, not simultaneous. The external stream-selection manifold is separate from the analyzer's internal six-port quantitative injection valve.

Installation boundary, utilities & plant integration

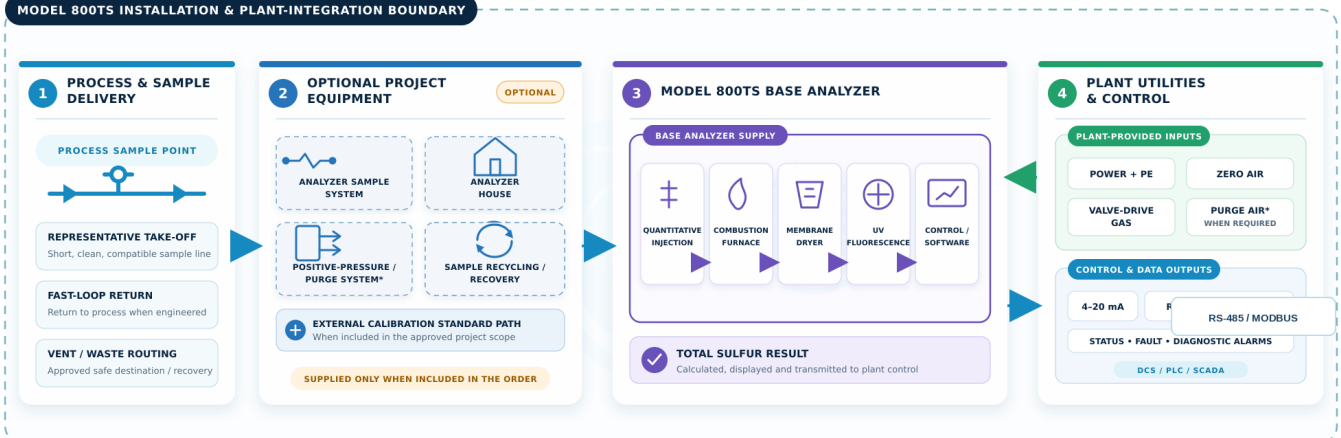
A clearer definition of what belongs to the process, project options, base analyzer and plant control system.

DIAGRAM D04

INSTALLATION BOUNDARY, UTILITIES & PLANT INTEGRATION

Process sample • engineered options • Model 800TS base analyzer • plant utilities • DCS / PLC / SCADA

MODEL 800TS INSTALLATION & PLANT-INTEGRATION BOUNDARY



SITE INTERFACES AT A GLANCE

ELECTRICAL

220 VAC ±10%
50/60 Hz + protective earth

ZERO AIR

0.2-0.3 MPa
Normal supply • ≥1.5 L/min

VALVE-DRIVE GAS

≥0.4 MPa
Pneumatic actuation supply

ANALOG OUTPUT

4-20 mA
Per configured stream

DIGITAL / STATUS

RS-485 / MODBUS
Alarms and diagnostics

PROJECT VALUES TO BE CONFIRMED

Final utility loads, hazardous-area protection, sample suitability, sample-system materials, vent / return arrangement and installation scope are governed by approved project documentation. *Positive-pressure / purge arrangements apply only where specified for the installation.

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Project boundary must be explicit

The Model 800TS is a base analyzer within a wider measurement system. Representative sample take-off, sample conditioning, purge arrangements, recovery or vent routing and installation hardware can be project-specific. Utilities and control interfaces also need to be confirmed before release for manufacture.

220 VAC ±10%
50/60 Hz | 1500 W

Zero air
0.2-0.3 MPa | ≥1.5 L/min

Valve-drive gas
≥0.4 MPa

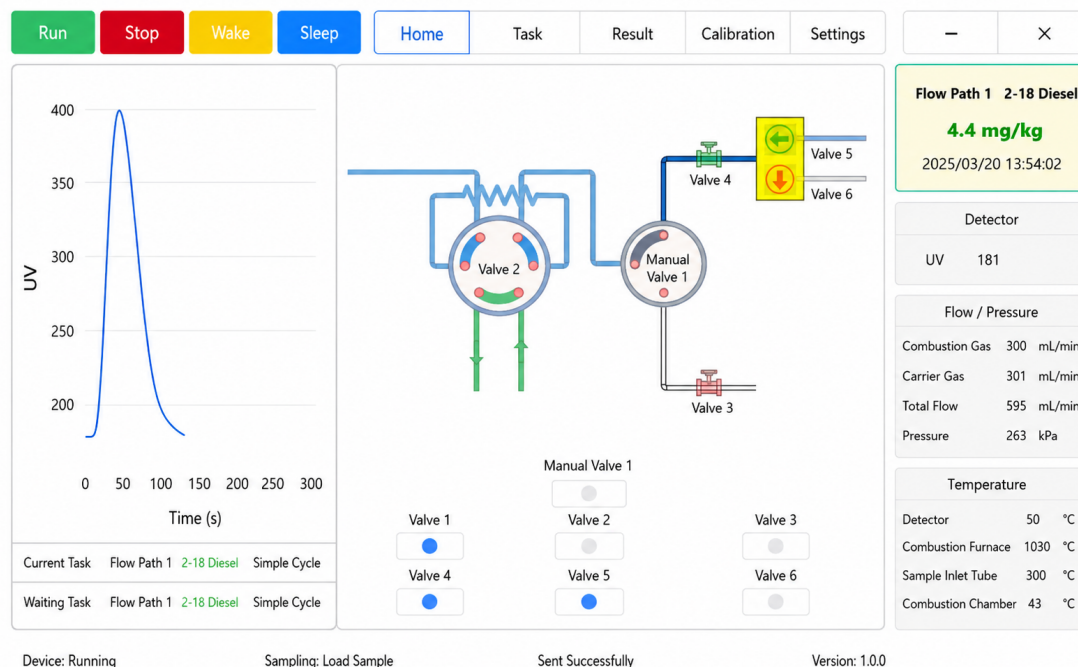
4-20 mA
per configured flow path

RS-485
Modbus register interface

Hazardous-area protection, final utility loads, sample-system materials, sample suitability and installation scope must be confirmed in approved project documentation.

Real-time operation with plant-ready outputs

Operator visibility into concentration, injection status, gas flow, pressure, temperature and alarms.



LIVE

REAL-TIME MONITORING

The client software displays the sample result, UV detector signal, auxiliary and carrier gas flow, total outlet flow, pressure and key temperatures. The status bar also reports device and sampling state.

TASK

TASK AUTOMATION

Documented task modes include Single Loop, Weekly Schedule, Daily Schedule and Simple Loop. The workstation supports automatic sequential operation once conditions and tasks are configured.

I/O

PLANT COMMUNICATIONS

4-20 mA DC results can be provided for configured flow paths. The manual also defines an RS-485 register interface for real-time results, sensor data, alarms and control parameters.

ALM

DIAGNOSTICS & AUTHORITY

Alarm states include gas, total flow, pressure and temperature conditions. Software authority is divided into operator and manager levels, with separate password capability.

English interface graphic shown for brochure clarity; functional interpretation is based on the operating manual interface.

Designed for controlled long-term operation

External-standard calibration, positive-pressure protection and documented maintenance procedures.

Calibration workflow

- 1

Prepare standards
 Load approved standard samples into the pretreatment-system standard path.
- 2

Run standard analyses
 Analyze at least two standard concentrations for curve generation.
- 3

Generate curve
 Create the calibration curve in the client software; two segments can be used for a wider span.
- 4

Send parameters
 Transmit the calibration parameters to the server software.
- 5

Correct drift
 Measure a known standard and apply the calculated correction factor when required.

SAFETY / PURGE SYSTEM

For hazardous-area use, the manual describes a positive-pressure purge system. Before analyzer power is

200-600 Pa

ENCLOSURE PURGE PRESSURE
manual operating window

5 min

INITIAL PURGE DURATION
before host power

The combustion system operates above 1000 C. Power must be isolated before internal access, and hot components require sufficient cooling time before maintenance.

Maintenance structure documented in the manual

Daily inspection

Routine visual and operating checks.

Leakage test

Standard, sample and gas pipeline leak checks.

Troubleshooting

Fault table for pressure, flow, heating and communications.

Service procedures

Combustion-tube replacement, pretreatment and purge-system appendices.

Only trained or authorized personnel should adjust protected parameters, maintain or repair the analyzer.

Model 800TS technical data

Primary values reconciled to Operating Instruction Manual V1.0.0, revised May 8, 2025.

Category	Parameter	Specification
MEASUREMENT	Detector	High-sensitivity UV fluorescence detector
MEASUREMENT	Standard range	0-100 ppm (w/w); other ranges by manufacturer review
MEASUREMENT	Repeatability	+/- 1% of full range
MEASUREMENT	Analysis time	<= 5 minutes for the same sample flow path
MEASUREMENT	Calibration	External standard; multi-point or single-point
MULTI-STREAM	Configured flow paths	Up to 6; sequential automatic measurement
MULTI-STREAM	Concentration relationship	For multiple paths, highest concentration should not exceed 5x the lowest
MECHANICAL	Dimensions (L x W x H)	705 x 386 x 1155 mm
MECHANICAL	Weight	Approx. 100 kg
ENVIRONMENT	Ambient temperature	0-40 C
ENVIRONMENT	Purge / blowing-air temperature	15-30 C
UTILITIES	AC power	220 VAC +/-10%, 50-60 Hz, 1500 W
UTILITIES	Instrument air blowing	200 L/min minimum
UTILITIES	Carrier + auxiliary gas	Clean air, 0.2-0.3 MPa, >=1.5 L/min
UTILITIES	Valve-drive gas	Nitrogen or air, >=0.4 MPa; typical operating pressure 0.4-0.6 MPa
UTILITIES	Standard sample gas	0.1-0.2 MPa, nitrogen or clean air
INSTALLATION	Sample pipeline	316L stainless steel, clean and free of oil, moisture and impurities
INTERFACES	Analog output	4-20 mA DC
INTERFACES	Digital communication	RS-485 register interface; manual references MODBUS control
SAFETY	Hazardous-area use	Positive-pressure purge configuration described for Zone 2; final protection by approved project documentation

REFERENCE METHOD / COMPLIANCE NOTE

The current operating manual does not state ASTM or ISO compliance claims. Any project-specific reference method, certification requirement or standard alignment should therefore be confirmed in approved technical documentation before quotation or acceptance testing.



MODEL 800TS

ONLINE TOTAL SULFUR ANALYZER

Quantitative injection. Catalytic combustion. UV fluorescence.

Engineered for continuous total sulfur visibility in qualified liquid-hydrocarbon applications - from representative sample delivery through plant-ready result, alarms and

APPLICATION ENGINEERING

Discuss your measurement requirement.

Share the sample, expected sulfur range, process pressure and temperature, stream count, installation environment, utilities, hazardous-area requirements, required outputs and reference method. Blue Dragon Technology can review the application and define the appropriate system boundary.

bluedragontechnology.com

info@bluedragontechnology.com

Technical documentation

Application review | configuration | support

Brochure v2.1 | Technical data reconciled primarily to Model 800TS Operating Instruction Manual V1.0.0, revised May 8, 2025. Final application suitability, hazardous-area protection, sample handling, utilities and supplied configuration are governed by approved project documentation.

ANALYTICAL INSTRUMENTATION FOR CRITICAL INDUSTRIAL MEASUREMENTS

Blue Dragon Technology | PT Blue Dragon Consulting