

Multi-channel Process FT-NIR Analyzer for use in Hazardous Area

Measurement made easy

The HP260X series Process FT-IR analyzers are designed for real-time, online process monitoring and process control of hydrocarbon streams. The analyzers are ideally suited for analyzing gasoline and diesel fuel streams in the refining industry to determine chemical and physical properties for final product blending optimization, as well as wider ranging applications including Crude Distillation Units, Heavy Oil Upgrading Units, Hydrocracking Units and Base Oil Units. Based on FT-IR (Fourier-transform infrared) technology, the HP260X analyzers offer superior reliability, rapidity, and flexibility.

The HP260X analyzers provide exceptionally high stability, sensitivity and photometric accuracy. This results in robust calibration models with excellent transferability & maintainability, reducing development and ownership costs as well as yielding outstanding analytical repeatability.

The HP260X analyzers use optical fibers to direct the near-infrared probe signal between the sampling system and the analyzer. The HP260X series Process FTIR analyzer, is connected to the process stream via optical fibers, which can range in length from 10 – 300m or more. Light is sent between the analyzer and the sampling system(s) via optical fibres. At no time is the analyzer in contact with the sample to analyze.

The HP260X is a multi-channel system and can be configured with from one up to a maximum of eight detectors. The detectors can be at room temperature or thermoelectrically cooled for additional sensitivity.

The HP260X contains hardwired inputs and outputs for control of sample systems and to communicate with the distributed control system (DCS). These aspects are customized on a per project basis.



Features:

Fully automatic operation: All aspects of system operation, such as sampling system control, referencing, sample analysis, data communication, and data archiving, are controlled by ABB's FTSW100 Process Software running on the FTSW controller.

- Certified for hazardous locations: Z-purge and X-purge options are available for hazardous locations
- Up to Eight channels: The HP260X analyzer can monitor up to eight separate process streams with independent cells or probes. A separate extractive or bypass sampling system is required for the sampling point in each stream. More streams can be monitored by stream-switching
- Ethernet connectivity: An Ethernet connection for linking the HP260X analyzer to the plant DCS and / or remote diagnostics PC is provided. An optical fiber data convertor for long-range Ethernet connection is optional
- Integrated touch-screen flat-panel display for HMI with predicted stream property trends and access to historical data log

Specification and Description

Includes:

- Hazardous area enclosure housing the FTIR analyzer, fiber optic interface, I/Os, controller, and integrated touch-screen display interface
- FTIR Fiber-Optic Process Analyzer based on the FTPA2000-260
- Optical Purge Kit
- Dedicated integrated controller with FTSW100 software
- FTSW Custom Configuration module
- Standard Hard Wired I/O and System Alarms
- DCS communication by Modbus RS485 and/or OPC
- Remote access via Ethernet
- Integrated pull box for excess fiber optic cable stowage

Depending on the detailed sampling and sample interface approach used for specific projects, any or all of the following additional items may be required (see price list for selection):

- remote fiber-optic temperature controlled sample cell enclosure, or in-line transmission probes
- fast loop sample conditioning system
- wash/reference or validation fluid system

Each sampling channel on the FTPA2000-HP260X will require specification and selection of

- fibre optics (type, length, encapsulation)
- NIR detector (type, room-temperature or TE-cooled)

Not included:

- Air dryer
- FAT, Installation, Startup, Training, Custom Calibration Modeling or Application support (Please see other price list options to select)
- Neither fiber optic data convertor nor fiber required for Ethernet communications at extended distances
An Ethernet convertor (recommend quantity two for sending and receiving ends) may be ordered separately as option
- RS485 to RS232 convertor for remote DCS / Master side. This second RS485 to RS232 convertor may be ordered separately with the system as option
- Barrier for intrinsically safe connections between the analyzer cabinet and sampling system

Service Options:

- Turn-key Calibration and Modeling on request at extra cost
- Additional application and project support, training and performance audit services available on request
- Startup plan and related services sold separately

Hazardous area classification:

- The FTPA2000-HP260X is certified to meet ATEX Category II Gas
- The fiber optic cables and sample interface (probes / sample cells) are certified to be installed in ATEX Category I for Gas and Dust
- Marking of the equipment:
 - II (1)/2 G Ex e ib mb px [op is Ga] IIC T4 Gb
 - II (1) D [Ex op is Da] IIIC
- The analyzer is designed in accordance with the CSA standards to meet the NFPA 496: Type Z-purge option: Class I, Division 2 Groups B, C, and D, hazardous locations by Canadian Standards Association (for Canada) and the US. Class I Div2 Groups B, C and D T4

Notes:

- An extra disconnecter unit may be required at additional cost to customer. The need for additional unit will depend on the number of wire connections for hard-wired I/Os. To be determined based on final number of hard-wired I/Os
- Analyzer cabinet non-insulated, for shelter installation
- Alarming contacts for purge status provided

Environmental:

- Operating Temperature 0 to 40°C
- Storage Temperature -20 to 50°C
- Humidity range: 5% to 95% non-condensing

Electrical

- Rated line voltage 100-120 VAC or 220-240 VAC
- Line voltage fluctuation: not to exceed 10% of the nominal line voltage
- Rated frequency: 47-63 Hz
- Rated power consumption: 600VA (not including any sample system heaters)

Specification and Description

Mechanical:

	ATEX	Class 1 Division 2
Enclosure	Stainless Steel	Stainless Steel
Overall dimensions	101.6 x 97.2 x 56.3 cm (40" x 38" x 22")	
Additional clearance	Clearances top of cabinet 20 cm (for Regulator tower) Clearances left hand side of cabinet 15 cm (for Purge units, Vortex cooler, electrical connections etc.) Clearance in front 60 cm to open doors	
Mechanical Interface	Wall mount	Wall mount
Weight	Approx. 350kg	Approx. 350kg

Analyzer Utility Requirements

- Detailed instrument air requirements are available on demand or within standard project documentation
- For most configurations, the typical air supply demand will be 65-100 PSIG / 35-40 SCFM. Requirements may change dependent to final configuration and local conditions of installation

FT-NIR Spectrometer Specification and Description

Industrial grade FT-NIR spectrometer with BK7 optics for near IR operation (FTPA2000-260)

- Wavenumber reproducibility $\pm 0.04 \text{ cm}^{-1}$ (based on water vapor line at 7299.86 cm)
- Wavenumber repeatability $\pm 0.001 \text{ cm}^{-1}$
- Peak signal-to-RMS-noise ratio typically 30,000:1 for open beam, 1-min scan time, 4 cm^{-1} resolution
- Noise less than 15 micro absorbance at 32 cm^{-1} resolution and 10 seconds scan time
- Scan times at 4 cm^{-1} resolution: 1.2 s with InGaAs detector
- 100% line repeatability $\pm 0.3\%$ for open beam, 9000 to 4100 cm^{-1} , two consecutive measurements in constant temperature environment after warm-up
- Temperature coefficient of change in 100% line is 1% per °C at 10,000 cm^{-1}
- Maximum beam divergence: 90 milliradians

Storage temperature range	-20°C to 50°C
Operating temperature range	10°C to 30°C
	Spectrometer specifications are met when temperature is maintained within $\pm 5^\circ\text{C}$
Optimal operating range	Room temperature
Humidity range	5% to 95% non-condensing
Pollution degree	2
Altitude	6560 ft. (2000 m) maximum
CSA Installation category	III
Resolution	1 to 128 cm^{-1} in increments of 2x
Spectrometer Spectral Range	3800 to 14000 cm^{-1}
	Spectrometer can cover this range, however the choice of source will determine the effective
Scanning speed	1 cm/s OPD
Controller interface	Ethernet link, 10/100 Mbps
Stabilization time	Approximately 4 hours after power-up (8 hours is preferable)

FTSW100 Industrial Process FT-IR Software

The FTSW100 Software Suite allows full integration of any ABB FTIR/FTNIR analyzer into your environment.

It enables real time process monitoring for closed-loop control and quality assurance applications.

- Local bus for distributed I/O
- Used for controlling sampling system, getting inputs from other sensors and sending results to control system

Features and benefits:

- Complete solution for 24/7 continuous unattended operation
- Validated software for pharmaceutical and other demanding industries
- Integrated support for FTIR acquisition and control
- Compliant with 21 CFR Part 11 environments
- Built-in data management and archiving
- Connectivity to PLC- and DCS-based control systems
- Support for sample conditioning using local sensors and transducers eliminating the need for additional PLCs or DCS programming
- Visual configuration explorer allows complete setup without programming
- Schedule multiple sample preparation and analysis cycles on a time basis or on external events
- Table-based setup of I/Os for result transmission
- Configuration information stored in SQL database with built-in version management and complete log of all changes
- Complete analyzer application configuration stored in one (XML) file for easy archiving and upload

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I/O Format:

- Hard Wired I/O's for sampling system control
- Standard communication is done through serial MODBUS RTU for property and analyzer status communication to plant DCS. MODBUS TCP-IP convertor available at extra cost on request
- Analyzer default digital status flags are:
 - Outlier (per property and/or per stream)
 - Maintenance (Reference failed)
 - Fault (Hardware failure: loss of connection)
 - Off-Line
 - Data-invalid (per stream)
- Digital input (typically volt free contact)
- Digital output (typically dry contact relay)
- Analog input and output (typically 4-20 mA))
- Modbus register address pattern: RTU protocol/ Slave
- Baud rate: default 19,200 baud (configurable from 110 to 115,200 baud)
- Ethernet link, based on Microsoft's COM technology Remote and Local OPC Server support

Remote Access for Maintenance, Diagnostics, Configuration and Calibration Update

- Connection by Dial-Up Modem or Ethernet LAN
- Connection by dial-up modem (optional)

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