Quick Start Guide
D-7010-0061, Rev C
January 2018

Rosemount CT5400 Continuous Gas Analyzer

ROSEMOUNT™

EMERSON™

Safety Information

All authorized users, including installation, operation, and maintenance personnel, must observe the following safety precautions and warnings.

⚠ DANGER!

ELECTRIC SHOCK

The analyzer operates using mains voltage that is dangerous to life. Make sure that the power *ON*/*OFF* switch at the rear of the panel is set to *OFF* and tagged off before removing the top cover.

The analyzer must be earthed.

Death or personal injury may result if this is not observed.

⚠ DANGER!

FAILURE TO LOCK-OUT GAS HANDLING SYSTEM MAY CAUSE DEATH.

Always lock out the gas handling system when shutting down the analyzer. Unauthorized operation of the gas handling system when maintenance is being performed on the analyzer or its associated pipes/hoses may result in highly flammable gas being released, causing fire or explosion.

⚠ DANGER!

FAILURE TO VENT SAMPLE GAS MAY CAUSE DEATH.

The sample gas in the system must be vented to prevent fire or explosion during maintenance and to prevent damage to the analyzer during startup.

The sample gas in the pipes leading to the analyzer must be purged to prevent hazards to personnel during maintenance. Purging the sample gas must be done in accordance with the safe working procedures for the site.

Allow the analyzer and system for returning the sample gas to run for five minutes to allow any sample gas in the system to be returned to the exhaust.

⚠ WARNING!

ELECTRICAL SHOCK HAZARD

Do not operate without covers secure.

Do not open while energized.

Installation requires access to live parts which can cause death or serious injury.

For safety and proper performance, this instrument must be connected to a properly grounded three-wire source of power.

⚠ WARNING!

OPTICAL RADIATION EXPOSURE HAZARD

The analyzer contains lasers. Opening the analyzer and attempting to perform adjustments or procedures other than those specified in this manual may result in hazardous optical radiation exposure.

All lasers used within the analyzer are Class 1. The emitted laser light is invisible (mid-infrared) and the combined laser powers are sufficiently low at the first accessible aperture that the unprotected eye will not be damaged. This class is eye safe under all operating conditions.

It is, however, possible to cause damage to the eye through not following correct procedures. Do not look at the laser with any kind of magnifier or optical measuring device.

The use of control or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

⚠ WARNING!

HAZARDOUS SUBSTANCES

The analyzer may contain hazardous substances. Always handle the analyzer assemblies and components with extreme caution.

Gas handling components within the analyzer will contain particulate matter residue from the sample gases. Over the life of the analyzer, the concentration of particulate matter will become enriched within the gas handling components. When performing repairs and maintenance on the analyzer:

- **Handle used gas handling components with extreme caution.**
- **Avoid direct skin contact with used gas handling components.**
- **Do not smoke, drink, or eat in the work area.**
- **Wear goggles or eye shields.**
- **Wear a suitable face mask to protect against inhalation of particulate matter.**
- **Do not wet fingers, eyes, or any exposed skin.**
- **Pack used gas handling components for disposal in sealed packaging and label them *Contaminated*.**

Dispose of contaminated items as hazardous material according to the applicable local, national, or international health and safety regulations and pollution regulations.

⚠ WARNING!

EXPLOSION HAZARD

Always lock-out tag-out the gas handling system when shutting down the analyzer. Unauthorized operation of the gas handling system when maintenance is being performed on the analyzer or its associated pipes/hoses may result in highly flammable gas being released, causing fire or explosion.

⚠ WARNING!

HEAVY ITEM

Handle the analyzer with caution during unpacking, installing, maintaining, and transporting to prevent crushing of hands, feet, or other body parts.

The analyzer weighs 31 kg (68 lb). Always use suitable lifting/moving equipment when moving the analyzer. Wear suitable protective gloves and protective footwear.

Failure to properly handle the analyzer may cause injury to personnel.

⚠ WARNING!

HAZARDOUS GAS

The product stream that the analyzer is examining may be hazardous even at low concentrations. Therefore, take special care to ensure that the sample gas return port either returns the sample gas to the product stream or discharges the sample gas to a location that will not cause a hazard.

⚠ WARNING!

HIGH PRESSURE GAS AND AIR

The calibration gas supply and compressed air supply operate at a pressure that can cause injury, e.g., damage to eyes and skin punctures from debris blown by the high pressure gas or compressed air.

Always lock out or tag off the calibration gas supply and compressed air supply when shutting down the .

⚠ WARNING!

EXPLOSION HAZARD

The sample gas in the system must be vented to prevent fire or explosion during maintenance and to prevent damage to the analyzer during startup.

The sample gas in the pipes leading to the analyzer must be purged to prevent hazards to personnel during maintenance. Purging the sample gas must be done in accordance with the safe working procedures for the site.

Allow the analyzer and system for returning the sample gas to run for five minutes to allow any sample gas in the system to be returned to the exhaust.

⚠ WARNING!

EXPLOSION

Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type.

⚠ CAUTION!

EQUIPMENT DAMAGE

Always follow the startup procedure. Damage to the may result from a failure to follow this procedure.

Failure to perform pre-system startup checks may cause damage to equipment.

⚠ CAUTION!

EQUIPMENT DAMAGE

Always follow the shutdown procedure. Damage to the analyzer may result from a failure to follow this procedure.

⚠ CAUTION!

EMC

This is a Class A product. In a domestic environment, this product may cause radio interference, in which case you may be required to take adequate measures.

⚠ CAUTION!

EQUIPMENT DAMAGE

Ensure that the local power voltage where the unit is to be installed corresponds to the unit's nominal voltage as given on the name plate label.

⚠ CAUTION!

EQUIPMENT DAMAGE

Do not power up or try to operate the analyzer unless it is physically secure and all electrical and pneumatic connections to the analyzer are in place.

Before commencing the start-up process, it is important to ensure that electrical power, sample gas handling facilities, and any calibration gases that are required are available to the analyzer.

Contents

1 Plan

1.1 Unpacking the analyzer

This procedure may require a minimum of two people to safely remove the equipment from the shipping container.

⚠ WARNING!

HEAVY ITEM
Handle the analyzer with caution during unpacking, installing, maintaining, and transporting to prevent crushing of hands, feet, or other body parts.

The analyzer weighs 31 kg (68 lb). Emerson™ recommends that the analyzer is only moved and lifted by a minimum of two people. Wear suitable protective gloves and protective footwear.

Failure to properly handle the analyzer may cause injury to personnel.

⚠ WARNING!

TRANSPORTATION HAZARD
Use safety-approved lifting equipment. You must ensure safe lifting procedures for the weight and mass of the equipment are followed.

Failure to use proper lifting procedures may cause injury to personnel or damage the analyzer.

Procedure

1. Visually inspect the exterior of the analyzer for signs of damage, corrosion, gas leaks, or signs of previously overheating.
2. Report anything found to the maintenance organization.
3. safety approved and tested lifting equipment to remove the analyzer from the shipping container.
4. Place the analyzer on a solid, level surface and prepare to mount the analyzer.

1.2 Rack mounting the analyzer

This procedure may require two people to safely move and rack mount the Rosemount CT5400.

⚠ WARNING!

HEAVY ITEM
Handle the analyzer with caution during unpacking, installing, maintaining, and transporting to prevent crushing of hands, feet, or other body parts.

The analyzer weighs 31 kg (68 lb). Emerson™ recommends that the analyzer is only moved and lifted by a minimum of two people. Wear suitable protective gloves and protective footwear.

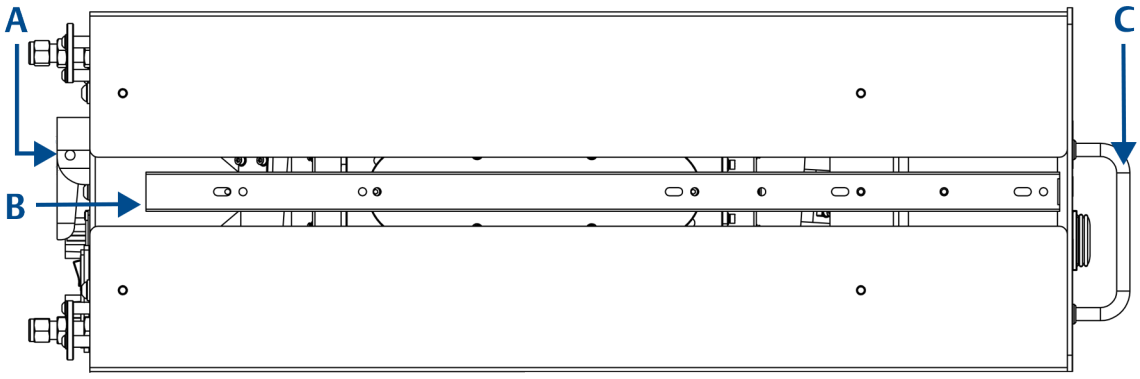
Failure to properly handle the analyzer may cause injury to personnel.

Note
You must supply the rack.

Procedure

1. One person aligns the analyzer's telescoping slide rails on the unit as the other person carefully guides the analyzer into the rack using the front panel and rear handles (see *Figure 1-1*).

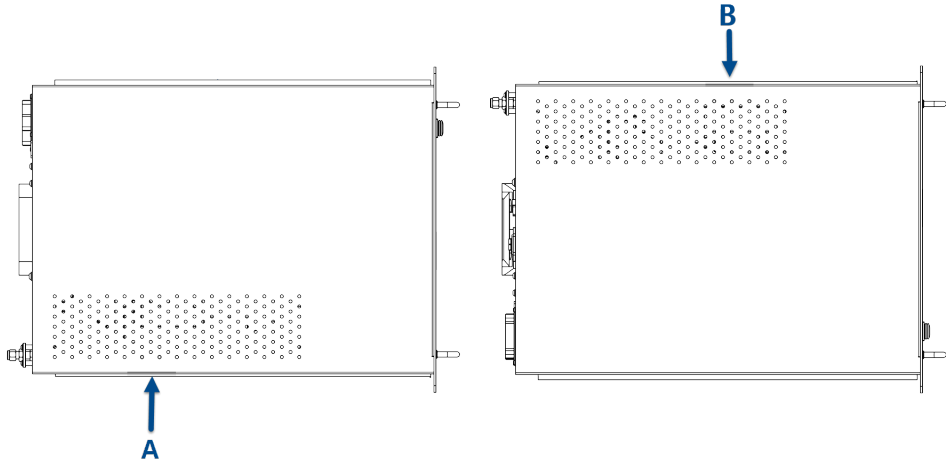
Figure 1-1: Left Side View - Lifting Handles and Telescopic Slide Rails



A. Rear panel handle
B. Telescopic slide for rack mount units
C. Front panel handles

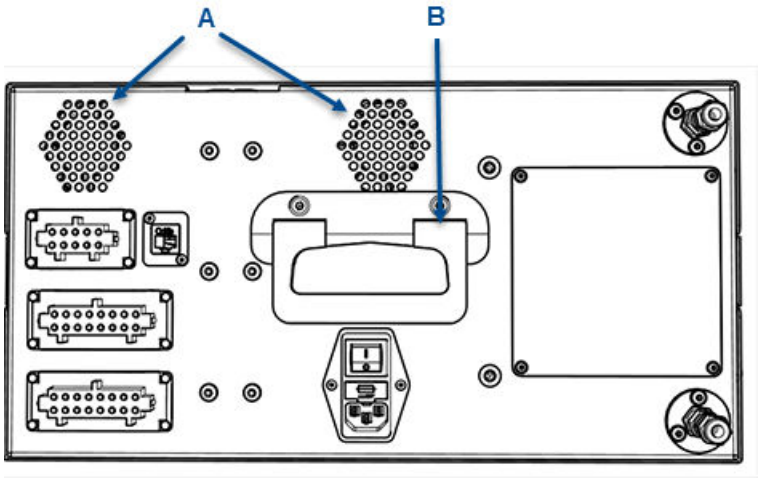
2. Make sure the chassis ventilation holes in the front, top, rear, and bottom are not obstructed.

Figure 1-2: Top and Bottom View - Ventilation



A. Top ventilation holes
B. Bottom ventilation holes

Figure 1-3: Rear View - Ventilation and Handle



A. Rear ventilation holes
B. Rear panel handle

3. Inspect the analyzer and ensure the unit is correctly mounted in the rack and glides easily on the telescoping slide rails.

   The analyzer must slide in and out of the rack to make the power, analog, digital, Ethernet, and gas connections.

1.2.1 Tools required

The CT5400 is shipped as a complete unit and requires minimal tools for installation.

The minimum tools required are:

- 2 (14 mm) spanners (or 2 off adjustable spanners) for gas fittings
- Small flat head screwdriver for wiring electrical contacts
- M5 Hex bit or Alan key

1.3 Detailed system specifications

Table 1-1 gives the physical characteristics of the analyzer. Schematic diagrams of the sensor and mounting points are shown in , . *Table 1-2* gives the general characteristics of the instrument.

Table 1-1: Physical Characteristics

Rosemount CT5400	Value	Units	Comment
External dimensions	482.6 x 673 x 221.5 19 x 26.5 x 8.7	mm in.	Length x Width x Height Nominal dimensions
Weight	31 68.34	kg lb	Approximate weight

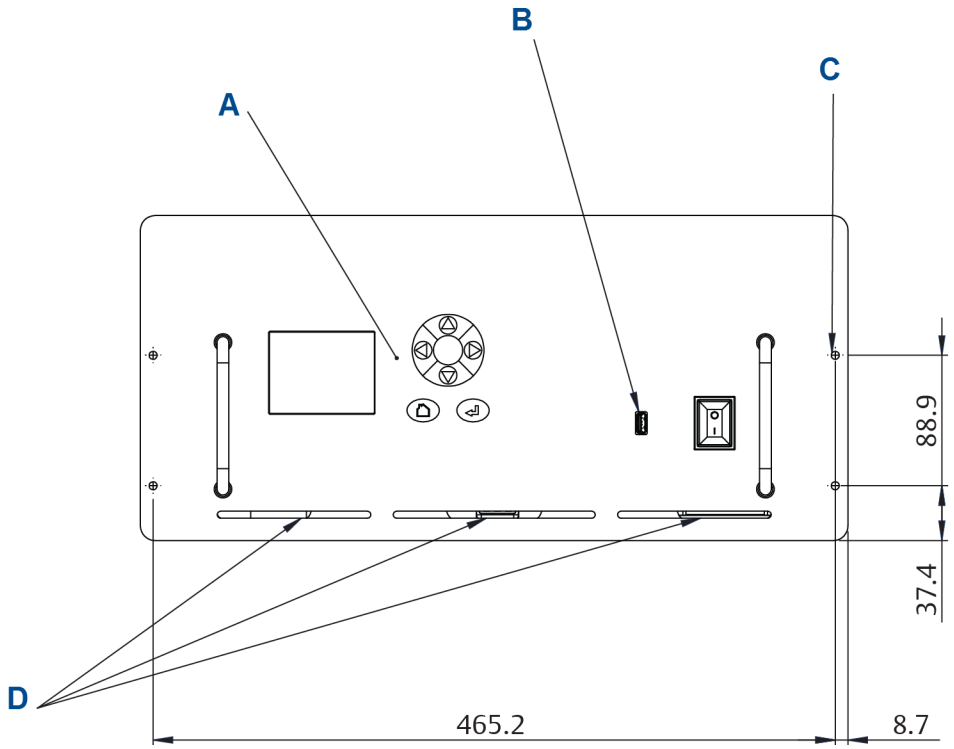
Table 1-2: General Characteristics

Rosemount CT5400	Value	Units	Comment
Supply voltage	240	Vac	50 Hz
Peak power consumption	600	W	Max consumption
Continuous steady-state power consumption	300	W	Once the gas analyzer has stabilized and the analysis cell has reached the temperature set point
Frame and structure material	-	-	Anodized and powder coated aluminum
Housing material	-	-	Powder coated steel
Wetted materials			PFA coated aluminum, 315 stainless steel, FKM and FFKM seals, CaF2 and BaF2 windows, protected gold coated aluminum mirrors
Measurement technique	-	-	Mid IR absorption spectroscopy
Mid IR source	-	-	Quantum Cascade Laser
Laser classification	Class 1		BS EN 60825-1: 2007 safety of laser products. Equipment classification and requirements (identical to IEC 60825-1 2007)

Table 1-2: General Characteristics *(continued)*

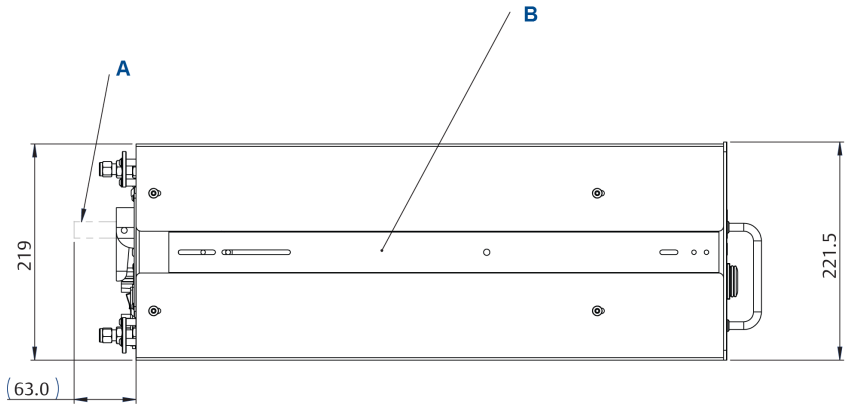
Rosemount CT5400	Value	Units	Comment
Inlet gas port connector	6 1/4	mm in.	Swagelok type, factory-configured, specify on order
Outlet (exhaust) gas port connector	6 1/4	mm in.	Swagelok type, factory-configured, specify on order
Measurement result signals	4 to 20	mA	4 or 8 channel outputs, specify on order
Warm-up time	90	minutes	

Figure 1-4: Dimensions - Front View



A. User interface
B. Data extraction port
C. 4 off Ø system locking holes
D. Ventilation. Do not obstruct.

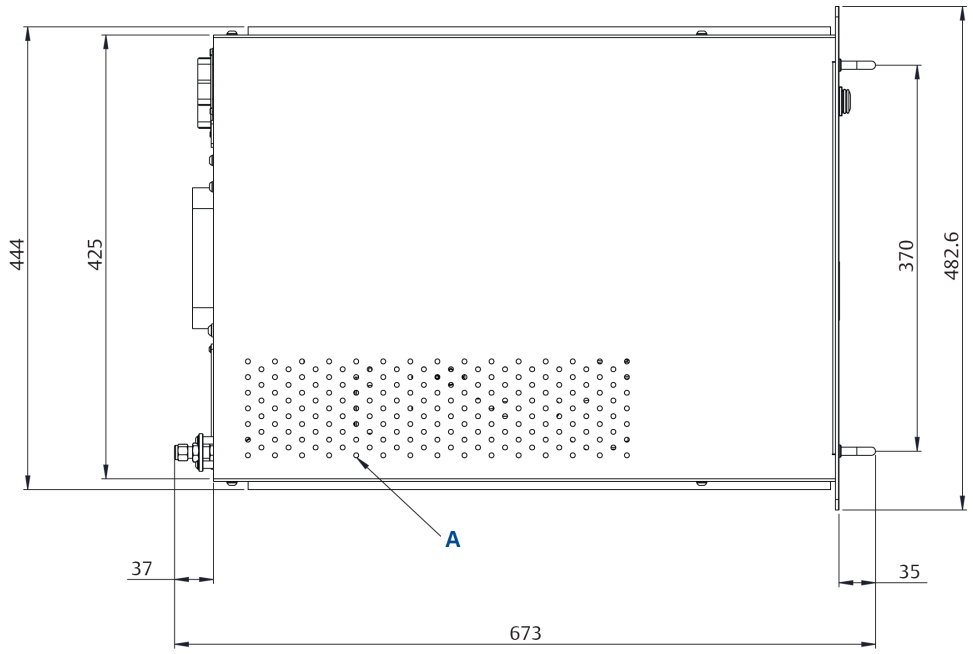
Figure 1-5: Dimensions - Side View



A. Handle swings out 63 mm (2.5 in.)

B. 2 off telescopic slide, 610 mm (24 in.) long, 55 kg (121.3 lb.) max load. 50.8 mm (2 in.) over travel. 9.6 mm (.4 in.) slide thickness. Lock-out. Front disconnect.

Figure 1-6: Dimensions - Top View



A. Ventilation. Do not obstruct.

Table 1-3: Environmental Characteristics

Environmental characteristic	Value	Units	Comment
Operating temperature range	0 to 45 32 to 113	°C °F	Ambient temperature

Table 1-3: Environmental Characteristics *(continued)*

Environmental characteristic	Value	Units	Comment
Sample gas temperature range	50 to 195 122 to 383	°C °F	Factory set, specify on order
Sample gas particulate density	5	mg/m^3	Maximum
Sample gas particulate size	10	µm	Maximum
Sensor humidity range	10 to 95	%	Relative humidity (non-condensing) at 45 °C (113 °F)

Note

The CT5400 Continuous Gas Analyzer is suitable for indoor use only

2 Install

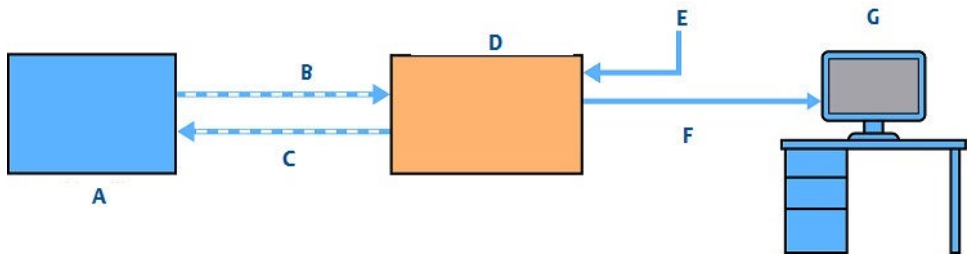
2.1 System overview

A complete Rosemount CT5400 system consists of a gas handling system, the analyzer, and the associated interconnecting wiring and gas piping.

Measurement data from the analyzer can be displayed in the process control center. You must provide the gas handling system and interconnecting wiring and gas piping; Emerson supplies the CT5400.

In *Figure 2-1*, the items supplied by Emerson are colored orange; the items supplied by you are colored blue. *Table 2-1* lists the main items of the system.

Figure 2-1: Complete Rosemount CT5400 Gas Analysis System



A. Gas handling system
B. Sample supply line
C. Sample return (exhaust) line
D. Rosemount CT5400 Gas Analyzer
E. Electrical power
F. Measurement data
G. Control center

The analyzer contains an optical system with multiple lasers and a series of optical components that provide an optical path, a heated multi-pass analysis cell, and sample and outlet ports that can be connected to a gas handling system, and control and analysis electronics. The number of lasers installed depends upon customer requirements. The complete system operates from a 240 Vac 50 Hz supply.

Gas concentrations are measured using mid-infrared optical absorption spectroscopy. The light sources are quantum cascade lasers (QCLs), which are operated to produce wavelength sweeps that cover the absorption lines of the gases. The light from each laser is routed through an optical path to the analysis cell, which provides measurement of low concentrations of the subject gases. An external sample handling system conditions the sample gas and draws it through the analysis cell. The light exits the multi-pass analysis cell and is directed to a receiver in the analyzer. The variation in the intensity of light in the vicinity of the absorption lines is measured, and the concentration is determined using a comprehensive spectral fitting routine.

There is no sample conditioning provided within the analyzer; the sampled gas must be brought within the parameters shown in *Section 1.3* before entering the analyzer. Detailed characteristics of the analyzer are also given in *Section 1.3*.

Table 2-1: Main Items of the Rosemount CT5400 System

Item	Name or description	Supplied by	Part number	Quantity	Notes
1	Rosemount CT5400	Emerson	CT5400	1	
2	Rosemount CT5400 software package, version 5.x.x	Emerson	N/A	1	Software is embedded in . Version described in manual
3	Gas handling system	Customer	Customer choice	1	
4	Heated gas sample line hose	Customer	Customer choice	1	
5	Exhaust line hose (for sample gas)	Customer	Customer choice	1	
6	Reference gas cylinders (instrument gas) for calibration purposes	Customer	Customer choice	Dependent upon number of gases being measured	
7	Pressure regulator	Customer	Customer choice	1 per gas cylinder	Required for calibration
8	Pneumatic T-piece	Customer	Customer choice	2	Required for calibration
9	Excess flow line	Customer	Customer choice	1	Required for calibration
10	240 Vac power cable	Customer	Customer	1	
11	Cable from analyzer to control center	Customer	Customer choice	1	1
12	482.6 mm (19 in.) rack system	Customer	Customer choice	1	Holds the CT5400

2.2 Gas inputs and outputs

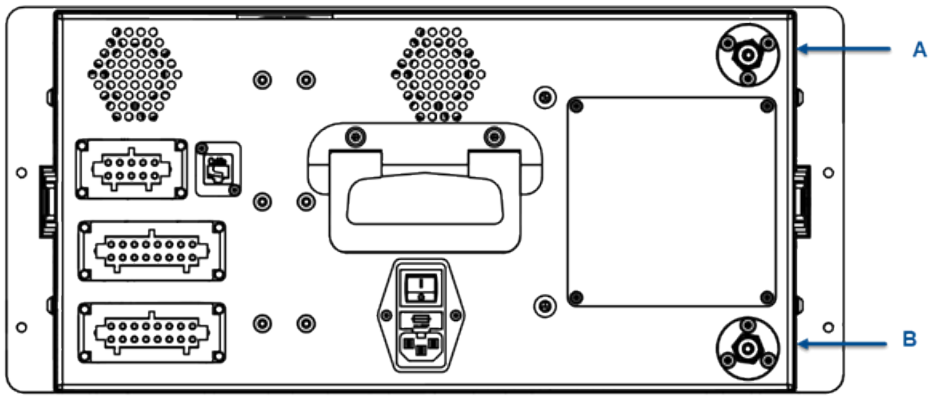
The analyzer has one gas input and one gas output, both of which are located on the rear panel of the instrument (*Figure 2-2*).

Procedure

1. The gas sample that is to be measured for impurities enters the instrument through the sample gas input port .

2. Once the gas sample has been examined for impurities, it is expelled from the instrument through the sample gas return port (B).

Figure 2-2: Gas Inlet and Outlet Connectors



A. Sample gas input port
B. Sample gas return port

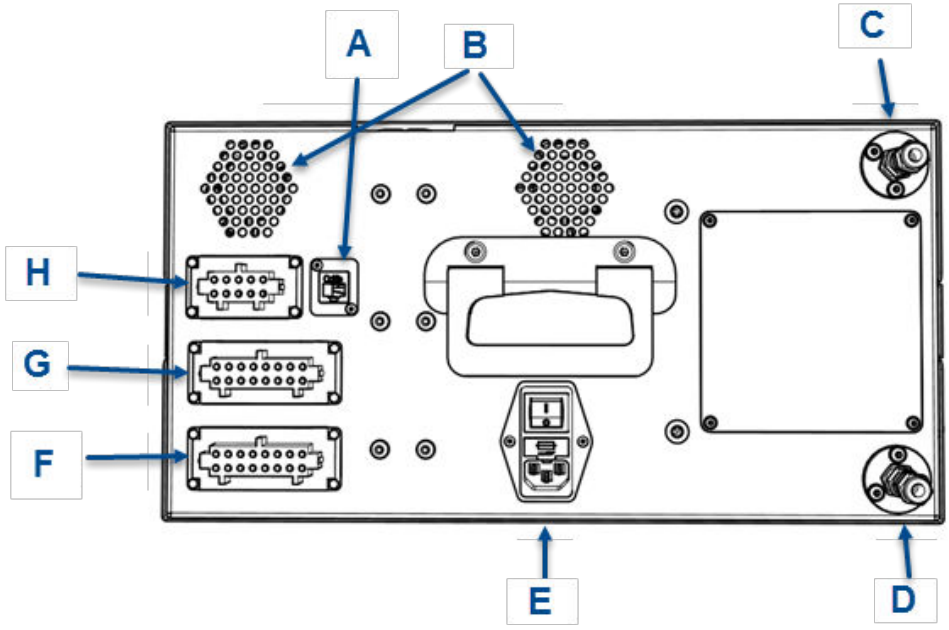
3. The sample supply line must be heated all the way to the sample gas input port on the analyzer to prevent condensation forming at any point in the sample supply line.

⚠ WARNING!

HAZARDOUS GAS
The product stream that the analyzer is examining may be hazardous even at low concentrations. Therefore, take special care to ensure that the sample gas return port either returns the sample gas to the product stream or discharges the sample gas to a location that will not cause a hazard.

2.3 Connecting the electrical/electronic inputs and outputs

Figure 2-3: Electrical / Electronic Connectors



A. Ethernet connector
B. Ventilation holes
C. Sample supply (stainless steel tubing)
D. Sample return (stainless steel tubing)
E. Main power supply
F. Analog outputs (4-20 mA)
G. Digital outputs
H. Status output (10 way connector)

Electrical/electronic signal connections to the analyzer are made through electrical connectors located on the rear panel of the instrument, as shown in *Figure 2-3*.

Table 2-2: Status outputs, 10 way socket (H)

Pins	Function
1-6	Status output 1 (check function), optional
2-7	Status output 2 (maintenance required), optional
3-8	Status output 3 (out of specification), optional
4-9	Status output 4 (failed), optional

Table 2-3: Digital outputs, 16 way socket (G)

Pins	Function
1-9	Reading valid channel 0, set in config file
2-10	Reading valid channel 1, set in config file
3-11	Reading valid channel 2, set in config file
4-12	Reading valid channel 3, set in config file
5-13	Reading valid channel 4, set in config file
6-14	Reading valid channel 5, set in config file
7-15	Reading valid channel 6, set in config file
8-16	Reading valid channel 7, set in config file

Table 2-4: Analog outputs, 16 way socket (F)

Pins	Function
1-9	Analog channel 0, set in config file
2-10	Analog channel 1, set in config file
3-11	Analog channel 2, set in config file
4-12	Analog channel 3, set in config file
5-13	Analog channel 4, set in config file
6-14	Analog channel 5, set in config file
7-15	Analog channel 6, set in config file
8-16	Analog channel 7, set in config file

⚠ CAUTION!

EQUIPMENT DAMAGE

Make sure that the mains supply cable used is of a suitable rating for the unit power requirements. Failure to do so may result in damage to property.

The Ethernet connector (*Figure 2-3*, A) provides an Ethernet output from the instrument that may be used for downloading data for failure diagnosis purposes.

The results of the gas analysis are output from the instrument through the 4-20 mA analog outputs (*Figure 2-3*, F) and sent to your process control center.

The status outputs (H) provide fault indications to your process control center. Each digital output is connected to a normally closed relay, located inside the analyzer, which will open in response to the detection of a specific fault. The possible causes of a fault indication are:

1. The sample gas concentration is outside of specification, i.e., the sample gas concentration has exceeded the measurement range of the instrument.
2. The analyzer is out of specification or has developed a fault.

⚠ WARNING!

HIGH VOLTAGE
Voltages up to 250 Vac, 50 Hz may be present on the digital output terminals.

External circuits should be installed in accordance with national wiring regulations.

Failure to obey the wiring regulations may result in serious injury to personnel.

⚠ WARNING!

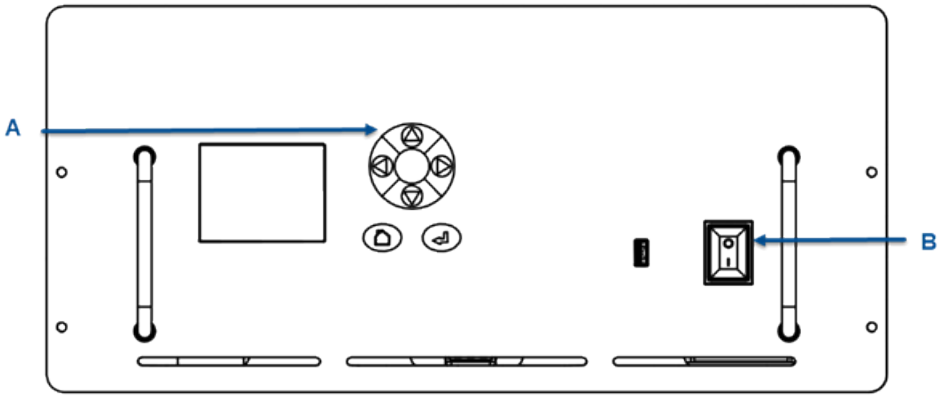
ELECTRIC SHOCK
The analyzer passed electromagnetic compatibility (EMC) tests based on all electrical cables and harnesses attached to the instrument having a length of 3 m (9.8 ft.) Attaching cables and wiring harnesses longer than 3 m (9.8 ft.) may cause injury to personnel.

3 Navigating the CT5400 Controls

3.1 Front panel controls and indicators

There are two controls located on the front panel ():

Figure 3-1: Front panel



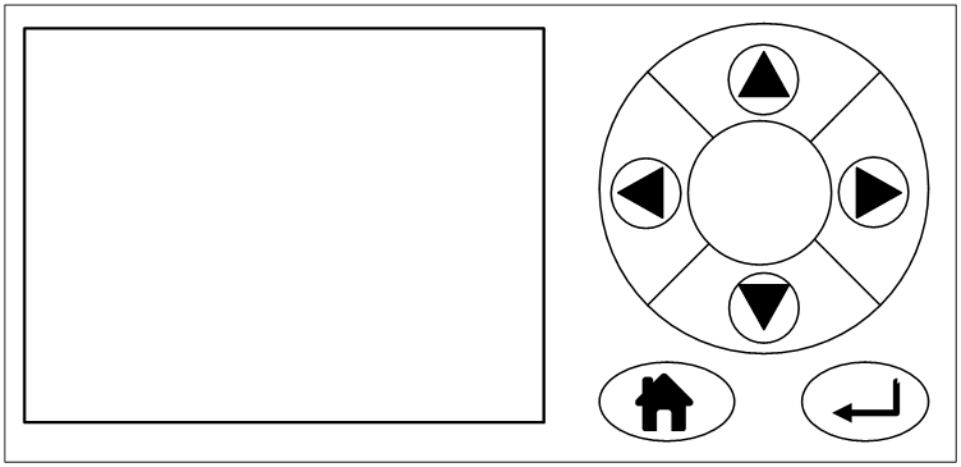
A. Display controller
B. Illuminated On/Off switch

The front panel **On/Off** switch (*Figure 3-1*, B) controls the application of electrical power to the electronic circuits inside the instrument. On the switch, **I** identifies the On position and **O** identifies the Off position. The switch includes an indicator that illuminates red when the switch is set to On.

Note that setting the front panel **On/Off** switch to Off does *not* remove all electrical power from the instrument. Part of the power distribution circuit will remain live. To remove all electrical power from the instrument, set the **On/Off** switch on the rear panel (refer to *Section 3.2*) to *Off*.

Operation of the analyzer is controlled primarily through the display controller (*Figure 3-2*).

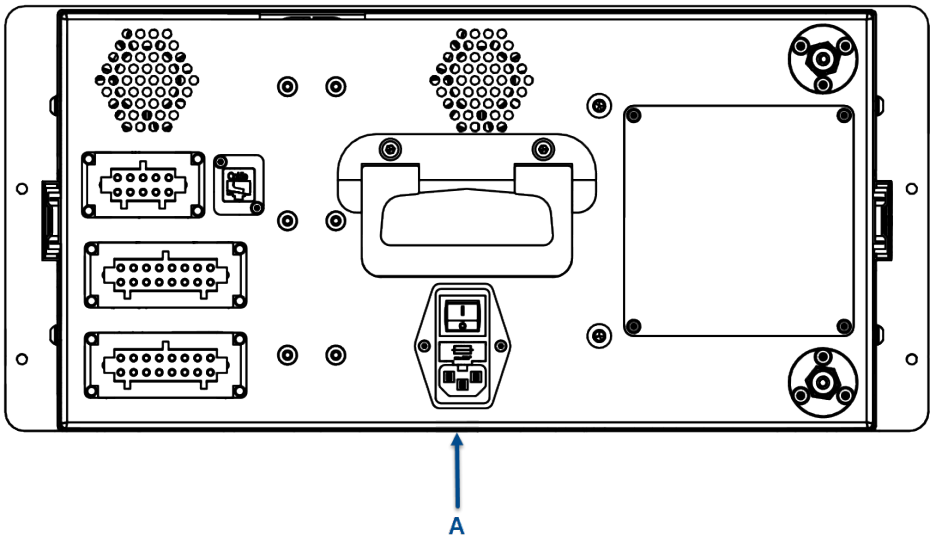
Figure 3-2: Display controller



3.2 Rear panel controls

There is only one control on the rear panel , a fused socket (A) that incorporates an On/Off switch. The function of the rear panel On/Off switch is to control the application of electrical power to the complete instrument.

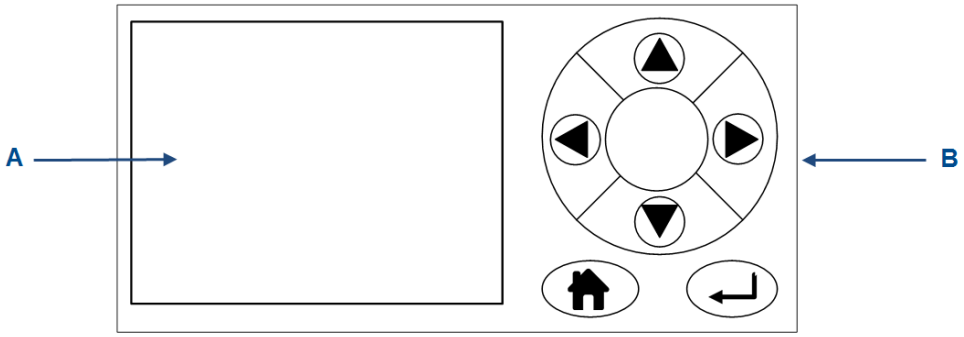
Figure 3-3: Rear Panel



A. On/Off switch - fused socket

3.3 Display controller

Figure 3-4: Front Panel Display Controller



A. LCD display
B. Navigation buttons

The LCD display (A) can be used to display:

1. Gas concentration measurements obtained
2. Operating temperature and pressure
3. Help screens
4. Step-by-step calibration
5. Diagnostics

The navigation buttons (B) are configured to perform different functions according to which software screen is shown on the LCD display.

Table 3-1: Display Controller Navigation Button Functions

Button	Description
	Normally used to scroll up. Referred to as *UP*.
	Normally used to scroll down. Referred to as *DOWN*.
	Normally used to select. Also accesses the *Main Menu* from the *Home* screen. Referred to as *RIGHT*.
	Used to go back to the previous screen. No function from the *Home* screen. Referred to as *LEFT*.
	Used to access the context sensitive *Help* pages. Referred to as *HOME*.
	Generally used to select an alternative function. Also allows you to toggle between gas and physical measurements from the *Home* screen. Referred to as *ENTER*.

The analyzer employs *Intelligent Device Management* which enables self-monitoring and diagnostics. This ensures that operators are made aware of malfunctions so they can take appropriate action. *Table 3-2* defines the symbols that may be displayed.

Table 3-2: Diagnostic symbols

♥	System running
◇	Maintenance required: still valid output signal
△?	Out of specification: signal out of the specified range
▽	Indicates the analyzer is performing a calibration or validation or that the software has been deliberately stopped.
⊗	Failure: non-valid output signal

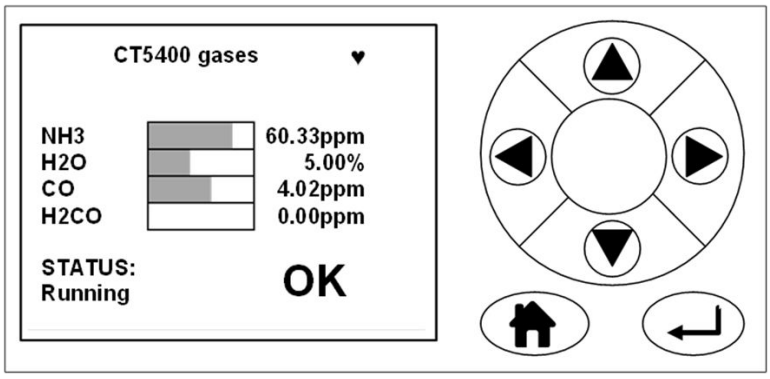
3.4 Gas Sensor Main screen

When the analyzer is switched on, at the end of the startup procedure, the *Gas Sensor Main* screen (*Figure 3-5*) appears. The *Gas Sensor Main* screen is the screen that is normally displayed.

NOTICE

The gas concentrations shown in the following screenshots may be different from those shown in your particular analyzer. The screenshots indicate the functionality of the software, which is the same regardless of the gases or gas concentrations being measured.

Figure 3-5: Gas Sensor Main screen



The *Gas Sensor Main* screen displays the gas concentration measurements obtained by the analyzer. In the example shown in , the gases are being measured, and for each gas, the concentration detected is in parts per million (ppm).

At the end of the startup procedure, the gas measurements initially appear as *0.00* until the first readings are taken. After a few seconds, the initial gas concentrations are displayed.

The *Gas Sensor Main* screen also shows the status of the analyzer. In the example shown in , the instrument is *Running* and *OK* (i.e., no faults have been identified).

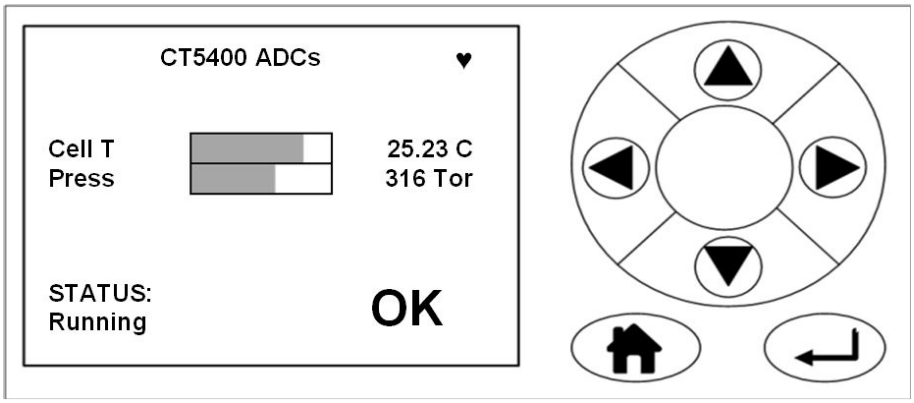
is a link to the Help system. Press to go to *Help* screen (described in *Section 3.6*).

On the *Gas Sensor Main* screen, has no function when the analyzer is operating correctly. If, however, the software detects a fault, an error message is displayed. Press to get further information on the error.

3.5 Pressure and Temperature screen

The *Pressure and Temperature* screen (*Figure 3-6*) shows pressure and temperature measurements taken inside the analyzer.

Figure 3-6: Pressure and Temperature Screen



The *Cell* reading is the temperature, in °C, of the analysis cell.

The *Press* reading is the pressure, in Torr, inside the analysis cell.

NOTICE

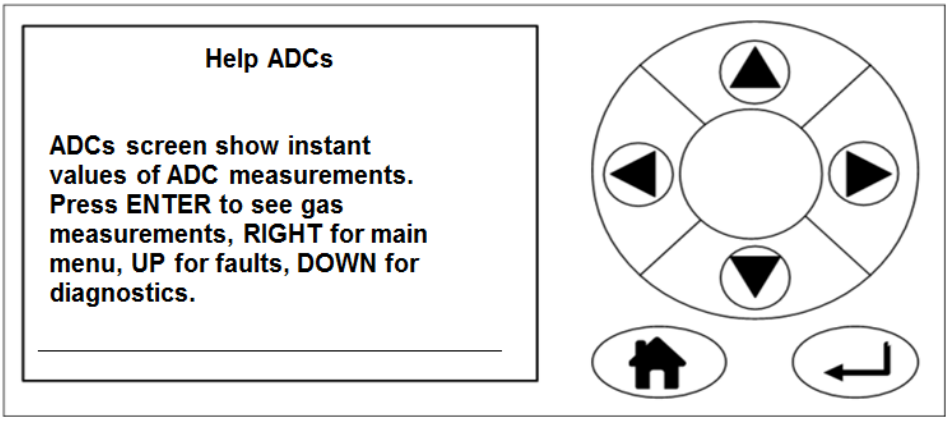
A Torr is a non-SI unit of pressure defined as 1/760 of standard atmospheric pressure and is equal to the fluid pressure of 1 mm of mercury.

3.6 Help system

The analyzer software includes a context-sensitive help system. Press , which is available on most of the software screens, to open the Help system.

The help system contains a number of different *Help* screens, each conveying a different message. As the help system is context-sensitive, the help screen that appears is the one that is most appropriate to the software function engaged when was pressed. *Figure 3-7* shows an example of a help screen.

Figure 3-7: Example of a Help Screen

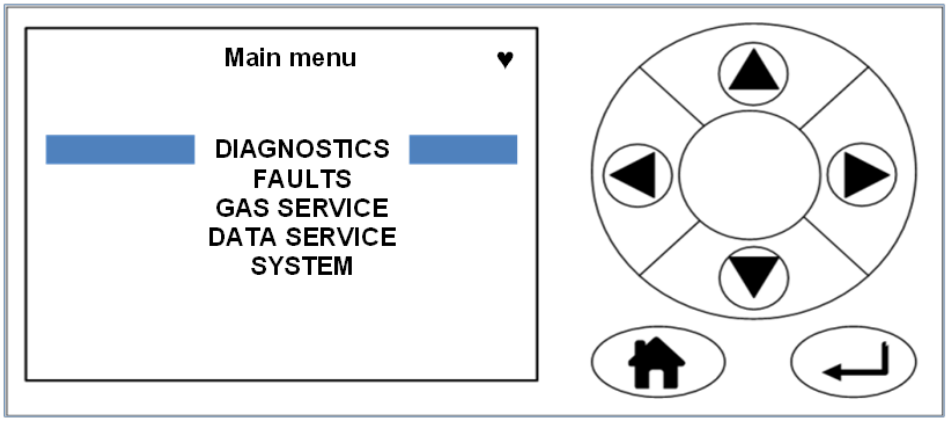


3.7 Main menu

To access the *Main menu* (*Figure 3-8*), press on either the *Gas Sensor Main* screen (*Figure 3-5*) or the *Pressure and Temperature* screen (*Figure 3-6*). The *Main menu* options are:

- DIAGNOSTICS: Displays various parameters used in the internal calculations and compares desired and actual parameters, for example, the analysis cell pressure and temperature. The diagnostics routines and screens are used to perform fault diagnosis.
- FAULTS: Takes you to a screen that lists any faults affecting the analyzer. This option is used as part of the failure diagnosis procedures.
- GAS SERVICE: Allows you to check the sensor readings against a known gas source (verification) or, if necessary, to calibrate the analyzer against that known gas source (calibration).
- DATA SERVICE: Takes you to a screen that allows data to be downloaded from the instrument. The downloaded data is used to diagnose faults.
- SYSTEM: Takes you to a screen that allows you to shut down the analyzer or access system information, such as software versions or IP addresses. The main motherboard IP address can also be changed from this menu. Some of these options are not available on older analyzers.

Figure 3-8: Main menu



3.8 BACK button

On most of the software screens, ◀ is configured as a *BACK* button. Press ◀ to return to the previous screen.

4 Startup procedure

4.1 Introduction

⚠ CAUTION!

EQUIPMENT DAMAGE

Always follow the startup procedure. Damage to the Rosemount™ CT5400 may result from a failure to follow this procedure.

The Rosemount CT5400 normally operates continuously. It should only be necessary to start up the instrument under the following circumstances.

- When the Rosemount CT5400 is first switched on following installation.
- Following repair or maintenance.
- When it has been switched off as part of a plant shutdown or maintenance.

4.2 Preparation for use

The analyzer must be installed and fully commissioned prior to startup.

⚠ CAUTION!

EQUIPMENT DAMAGE

Do not power up or try to operate the analyzer unless it is physically secure and all electrical and pneumatic connections to the analyzer are in place.

Before commencing the start-up process, it is important to ensure that electrical power, sample gas handling facilities, and any calibration gases that are required are available to the analyzer.

⚠ WARNING!

BURNS
Do not touch any part of the analyzer. Assume all parts of the analyzer are hot unless it has been switched off and allowed to cool down. Some parts of the analyzer may be heated to 190 °C (374 °F). Always wear proper protective equipment when handling the analyzer.

- **Switch off the analyzer and allow it to cool for at least two hours before fitting, removing, or performing any maintenance.**
- **The analysis cell is insulated against heat loss. Allow the analyzer to cool for at least twelve hours before performing any maintenance on, or in the vicinity of, the analysis cell.**

Failure to allow sufficient cooling may cause serious burn injury to personnel. If burns occur, seek immediate medical treatment.

4.3 Startup procedure

NOTICE

The gases shown in the screenshots and the measurements thereof may be different from those shown in your particular analyzer. They indicate the functionality of the software, which is the same regardless of the gases being measured.

NOTICE

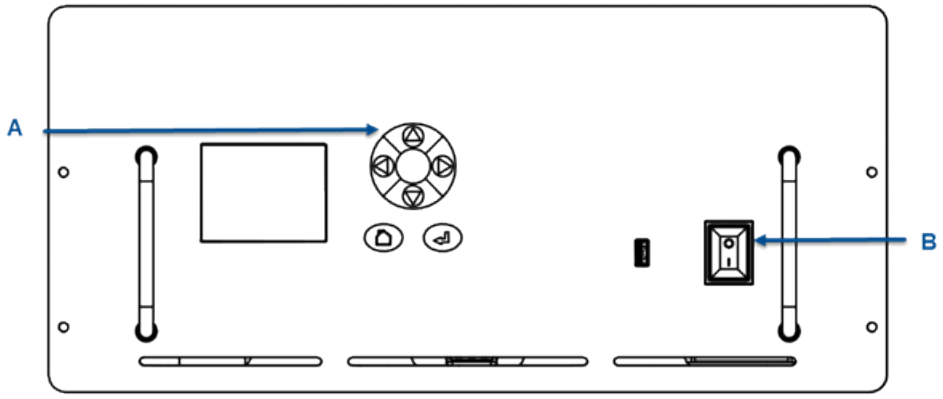
To stop the startup procedure at any time, set the main circuit breaker to *OFF*.

To start up the analyzer, perform the following steps:

Procedure

1. Visually inspect the exterior of the analyzer for signs of damage, corrosion, gas leaks, or overheating. Report anything found to the maintenance organization.
2. Make sure that the analyzer has been correctly installed (see *Chapter 2*).
3. Make sure that the rack lid is fitted to the analyzer. If it is not, report it to the maintenance organization and do not proceed further until the rack lid has been fitted.
4. Make sure that the *On/Off* switch at the rear of the analyzer is set to *I* (ON).
5. On the front panel (*Figure 4-1*) of the analyzer, set the *On/Off* switch (B) to *I* (ON). Check that the switch illuminates.

Figure 4-1: Front panel

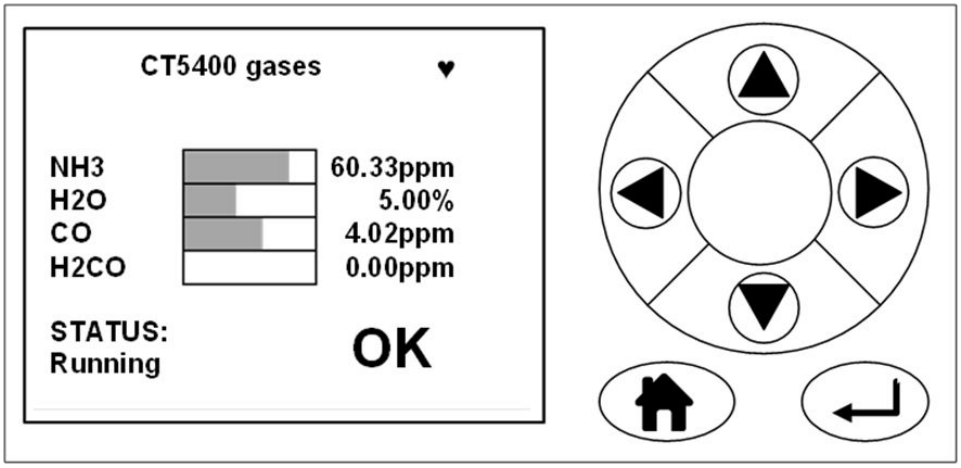


A. Display controller
B. Illuminated On/Off switch

The startup sequence commences automatically under software control.

After a few seconds, the *Gas Sensor Main* screen (*Figure 4-2*) appears on the display controller. If it does not, report the fault to the maintenance organization.

Figure 4-2: Gas Sensor Main screen



6. Start up the system for returning the sample gas.
7. Start up the gas handling system that conditions the sample gas before it is fed into the analyzer. Allow the analyzer to warm up in accordance with *Table 1-2* before the sample gas supply is turned on.

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