

Rosemount™ CT5100(Ex)

Continuous Gas Analyzer



Preface

Published by Emerson.

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Rosemount CT5100(Ex) preliminary information

This section details important user information for the Rosemount CT5100(Ex) Continuous Gas Analyzer.

This article is in accordance with IEC 60079-0: 2011 Clause 30.

This article must not be changed amended or removed.

Important

Users must read, understand, and comply with the following information before proceeding.

All users, installers, operators, and maintainers must be familiar with operating the analyzer. To install, start up, operate, maintain, and service the analyzer in a safe manner, it is MANDATORY to read all additional documents shipped with the analyzer. The following information are also available and/or referenced in Rosemount CT5100(Ex) [Reference Manual](#).

Save all instructions for future use. Contact your local service center or sales office when missing documents.

Authorized personnel

In-depth specialist knowledge is an absolute requirement for working with and on the analyzer. Personnel installing, operating, servicing, and maintaining the analyzer must be instructed, trained, qualified, and authorized personnel of the operating company for hazardous areas and the manufacturer. It is the responsibility of the operating company to:

- Train staff
- Observe safety regulations
- Follow the safety instructions and procedures in the product manual

Operators must:

- Have been trained
- Have read and understand all relevant sections of the product manual before commencing work
- Know the safety mechanisms and regulations

⚠ WARNING

To avoid explosions, loss of life, personal injury, and damage to this equipment and on-site property, do not install, operate, maintain, or service this analyzer before reading and understanding this reference manual and receiving appropriate training.

Safety Precautions

Operators, maintenance personnel, and authorized users must observe the following safety precautions and warnings.

Safety precautions are in accordance with IEC 60079-0: 2011 Clause 30. The precautions in this manual MUST NOT be changed amended or removed. All authorized users, installation, operation and maintenance personnel, must observe the following safety precautions and warnings.

⚠ DANGER

ELECTRIC SHOCK

In accordance with IEC 60079-0: 2011 Clause 30.

The analyzer operates using mains voltage, which may cause death or serious injury to personnel. Confirm that the circuit breakers are set to *Off* and locked out and tagged out off before removing the top cover or opening the front cover. The analyzer must be earthed.

Death, personal injury, and/or damage to persons and/or property may result if this is not observed.

⚠ DANGER

EXPLOSION HAZARD

In accordance with IEC 60079-0: 2011 Clause 30.

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

The sample gas in the pipes leading to the analyzer must be purged for a minimum of 2 minutes 30 seconds at a minimum flow rate of 280 L/m at 1.5 ± 0.5 bar to prevent hazards to personnel during maintenance.

Purge the sample gas in accordance with the safe working procedures for this site.

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

Failure to observe this precaution will cause death, personal injury, and/or damage to persons.

⚠ DANGER

FLAMMABLE SUBSTANCES

Some parts of the analyzer may reach temperatures of 320 °F (160 °C) and may present an ignition source. Exercise care when using oil, paint, cleaning rags, or other flammable substances near the analyzer. A fire may result if this precaution is not observed. The interior of a analyzer is always hot unless it has been switched off and allowed to cool down.

⚠ WARNING

TRANSPORTATION HAZARD

Handle the analyzer with caution during unpacking, installation, maintenance, and transport to prevent crushing of hands, feet, or other body parts.

The analyzer weighs 121 lb (55 kg) and should always be lifted and moved using suitable lifting/moving equipment. Wear suitable protective gloves and protective footwear. When preparing the analyzer for transport by air, road, or rail, safeguard the analyzer against movement or break-away during transport by securely strapping it in place.

⚠ WARNING

FIRE AND EXPLOSION

In accordance with IEC 60079-0: 2011 Clause 30.

Do not open the analyzer's electrical compartment unless the atmosphere in the area is known to be below the ignitable concentration of combustible gases or materials, or unless all equipment within the protected enclosure is de-energized in accordance with NFPA 496 and ISO60079-1/2 and 28.

Failure to observe this warning could cause an explosion or potentially hazardous situation, which if not avoided, may cause death, personal injury, and/or damage to persons and/or property.

⚠ WARNING

FIRE, BURN, AND OPTICAL RADIATION EXPOSURE HAZARD

In accordance with IEC 60079-0: 2011 Clause 30.

Operators and service personnel do not have access to the laser/electrics or upper cell compartments for general maintenance or service.

Electrical shock, thermal burns, or loss of vision may occur.

Failure to observe this warning could cause an explosion or potentially hazardous situation, which if not avoided, may cause death, personal injury, and/or damage to persons and/or property.

⚠ WARNING

COMBUSTIBLE GASES

In accordance with IEC 60079-0: 2011 Clause 30.

The protective gas supply valve must be kept open unless the atmosphere in the area is known to be below the ignitable concentration of combustible gases or materials, or unless all equipment within the protected enclosure is de-energized in accordance with NFPA 496.

Failure to observe this warning could cause an explosion or potentially hazardous situation, which if not avoided, may cause death, personal injury, and/or damage to persons and/or property.

⚠ WARNING

EXPLOSION HAZARD

In accordance with IEC 60079-0: 2011 Clause 30.

Always lock out the gas handling system when shutting down the analyzer. Unauthorized performance on the analyzer or its associated pipes/hoses may result in highly flammable gas being released, causing fire or explosion. Failure to lock out gas handling system may cause death.

⚠ WARNING

BURNS

Some parts of the analyzer may be heated to 320 °F (160 °C). To prevent burns, do not touch any of the hot parts. All parts of a analyzer are always hot unless it has been switched off and allowed to cool down.

Before fitting, removing, or performing any maintenance on the analyzer, ensure that it has been switched off and allowed to cool for at least two hours. Before performing any maintenance on, or in the vicinity of, the analysis cell, allow the analyzer to cool for at least 12 hours as the analysis cell is insulated against heat loss.

When handling the analyzer, always wear suitable protective gloves.

Personal injury and/or damage to property may result if these precautions are not observed. These precautions are particularly important when working at heights. If you receive a burn, seek medical treatment immediately.

⚠ WARNING

LASER

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.

⚠ WARNING

HAZARDOUS SUBSTANCES

The analyzer may contain hazardous substances. Always handle the analyzer assemblies and components with extreme caution. Wear personal protective equipment (PPE) when handling the equipment.

Gas handling components within the analyzer 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.

Failure to observe this warning could cause a potentially hazardous situation, which if not avoided, may cause death, personal injury, and/or damage to persons and/or property.

⚠ WARNING

OPTICAL RADIATION EXPOSURE HAZARD

In accordance with IEC 60079-0: 2011 Clause 30.

There are three types of laser that may be included in the Rosemount CT5100(Ex) : Quantum Cascade Lasers (QCLs), Interband Cascade Lasers (ICLs), and diode lasers. The lasers within the analyzer are Class 1. The characteristics of the lasers contained within the analyzer are given in the table below.

Parameter	QCL	ICL	Diode	Comment
Operation mode	Pulsed	Pulsed	Pulsed	N/A
Lasers per system	1 - 6	1 - 6	1 - 6	Maximum of 6 lasers per system
Wavelength	4 - 10 μm	2 - 5 μm	Approximately 760 nm	N/A
Power	< 5 mW	< 5 mW	< 5 mW	Combined power of QCL at first accessible aperture: < 9.62 mW
Pulse duration	< 1 μs	< 1 μs	< 5 μs	N/A
Pulse repetition frequency	< 100 kHz	< 100 kHz	< 100 kHz	N/A
Duty cycle	< 5 %	< 5 %	< 25 %	N/A

The combined power of the QCL, ICL, and diode lasers at the first accessible aperture is < 9.62 mW.

The analyzer has warning labels in appropriate positions according to USA 21 CFR 1040.10. The location of laser safety labels on the analyzer is specified in [Safety and system labels and annotation](#).

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

⚠ WARNING

HAZARDOUS GAS

In accordance with IEC 60079-0: 2011 Clause 30.

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 or punctures from debris blown by the high pressure gas or compressed air. Always lock off or tag out the calibration gas supply and compressed air supply when shutting down the analyzer.

⚠ WARNING

HEAVY ITEM

In accordance with IEC 60079-0: 2011 Clause 30.

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

Ensure the wall the analyzer is mounted on is solid, stable, and of suitable material to hold the weight of the analyzer.

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

The analyzer weighs 121 lb (55 kg).

Emerson recommends that a minimum of two people move and lift the analyzer.

Wear suitable protective gloves and protective footwear.

⚠ WARNING

EXPLOSION HAZARD / ELECTRIC SHOCK HAZARD

In accordance with IEC 60079-0: 2011 Clause 30.

Only trained, qualified personnel may install and connect power and signal cables. The installation/connection must be in accordance with all legislative requirements and applicable standards.

Failure to follow may cause warranty invalidation, property damage, and/or personal injury or death.

Only qualified personnel, familiar with potential risks, should install the analyzer.

Analyzers providing screw terminals for electrical connections may require working near live parts. Failure to observe this warning and or follow safety instruction could cause an explosion or potentially hazardous situation, which if not avoided, could result in death or serious injury.

⚠ WARNING

HIGH PRESSURE HAZARD

In accordance with IEC 60079-0: 2011 Clause 30.

The maximum inlet purge gas pressure at the inlet valve must not exceed 690 kPa (6.9 bar). Higher pressure may damage the analyzer enclosure in case of failure of the inlet valve.

Failure to observe this warning could cause a potentially hazardous situation which if not avoided, could result in death or serious injury.

⚠ WARNING

EXPLOSIONS HAZARD DUE TO ELECTROSTATIC DISCHARGE

In accordance with IEC 60079-0: 2011 Clause 30.

In the event of a sudden discharge from electrostatically charged devices or individuals, there is a risk of an explosion. Take suitable measures to ensure that no electrostatic discharge can build up in the explosions risk area.

Clean the device surface by gently wiping it with a damp or antistatic cloth only.

Failure to observe this warning and or follow safety instruction could cause an explosion or potentially hazardous situation, which if not avoided, could result in death or serious injury.

⚠ WARNING

EXPLOSION HAZARD

In accordance with IEC 60079-0: 2011 Clause 30.

After opening the enclosure, do not restore power until the enclosure has been purged for a minimum of 2 minutes 30 seconds at a minimum flow rate of 280 L/m at 1.5 ± 0.5 bar.

Failure to observe this warning could cause an explosion or potentially hazardous situation, which if not avoided, may cause death, personal injury, and/or damage to persons and/or property.

⚠ WARNING

POSSIBLE EXPLOSION HAZARD

In accordance with IEC 60079-0: 2011 Clause 30.

DO NOT operate the analyzer with doors or covers open.

Refer to local regulations as this may require a competent hot work supervisor to issue a hot work permit.

Failure to observe this warning and or follow safety instruction could cause an explosion or potentially hazardous situation, which if not avoided, could result in death or serious injury.

⚠ WARNING

HAZARD BY WRONG INPUT VOLTAGE

In accordance with IEC 60079-0: 2011 Clause 30.

Applying a rated voltage other than specified on the analyzer's nameplate label may cause an explosion, injury, or damage to the installation.

Pressurized analyzers for hazardous locations DO NOT provide wide range power supplies.

This type of analyzer is always setup for a specific rated input voltage; see nameplate label.

Ensure the voltage at site of installation meets the rated analyzer input voltage.

Failure to observe this warning could cause an explosion or potentially hazardous situation, which if not avoided, may cause death, personal injury, and/or damage to persons and/or property.

⚠ WARNING

EXPLOSION HAZARD

In accordance with IEC 60079-0: 2011 Clause 30.

When the analyzer is out of order or if the pressurization unit shuts off due to a failure, all inputs and outputs connected to external equipment MUST be shut off.

This will ensure that no hazardous voltages are present within the analyzer enclosure when not pressurized.

Failure to observe this warning could cause an explosion or potentially hazardous situation, which if not avoided, may cause death, personal injury, and/or damage to persons and/or property.

⚠ WARNING

EXPLOSION HAZARD

In accordance with IEC 60079-0: 2011 Clause 30.

Only properly trained personnel who understand the contents of all applicable manuals and related instructions should start up the analyzer.

Failure to observe this warning could cause an explosion or potentially hazardous situation, which if not avoided, may cause death, personal injury, and/or damage to persons and/or property.

⚠ WARNING

EXPLOSION HAZARD

In accordance with IEC 60079-0: 2011 Clause 30.

During the pre-purge phase, all inputs and outputs connected to external equipment **MUST** be shut off.

This will ensure that no hazardous voltages are present within the analyzer enclosure when not pressurized.

The internal backup battery is still connected and associated circuitry remains powered.

Failure to observe this warning could cause an explosion or potentially hazardous situation, which if not avoided, may cause death, personal injury, and/or damage to persons and/or property.

⚠ WARNING

EXPLOSION HAZARD

In accordance with IEC 60079-0: 2011 Clause 30.

Do not open while an explosive atmosphere may be present.

Failure to observe this warning could cause an explosion or potentially hazardous situation, which if not avoided, may cause death, personal injury, and/or damage to persons and/or property.

⚠ WARNING

EXPLOSION HAZARD

In accordance with IEC 60079-0: 2011 Clause 30.

Do not keep operating the analyzer if the enclosure shows permanent deformations after performing the overpressure test.

Failure to observe this warning could cause an explosion or potentially hazardous situation, which if not avoided, may cause death, personal injury, and/or damage to persons and/or property.

⚠ WARNING

EXPLOSION HAZARD

In accordance with IEC 60079-0: 2011 Clause 30.

Use only replacement parts and components authorized by Emerson.

All replacement parts and components must be certified and approved for use in hazardous areas.

Failure to comply will void certification and may cause an explosion or potentially hazardous situation, which if not avoided, may cause death, personal injury, and/or damage to persons and/or property.

⚠ WARNING

EXPLOSION HAZARD BY BATTERY

In accordance with IEC 60079-0: 2011 Clause 30.

The analyzer contains a battery for data backup purposes.

Under normal operating conditions, there is no need to replace the battery during the analyzer life time. Battery replacement **MUST** only be conducted by Rosemount Customer Care personnel. It is **NOT** a customer serviceable item.

Failure to observe this warning could cause an explosion or potentially hazardous situation, which if not avoided, may cause death, personal injury, and/or damage to persons and/or property.

⚠ WARNING

LOOSE ITEMS

Do not place any loose items on top of the system or inside the compartments when doors / covers are open.

Confirm that all loose items, tools, and equipment are removed from compartments before closing doors and covers.

Failure to observe this warning could cause a potentially hazardous situation, which if not avoided, could result in death or serious injury.

⚠ WARNING

MAINTENANCE/MODIFICATIONS

In accordance with IEC 60079-0: 2011 Clause 30.

On completion of any maintenance and or modifications verify:

- All tools and equipment are removed.

- No contamination (water/dust) is in the compartments.

- Analyzer is wiped clean.

- Vents are clear and not obstructed.

- Verify that system is in a safe state for operation.

Failure to observe this warning could cause a potentially hazardous situation, which if not avoided, could result in death or serious injury.

⚠ WARNING

TRANSPORTATION HAZARD

Use safety approved lifting equipment. Ensure that the equipment is tested, meets the lifting ratings for the weight of the equipment, and is in good operational condition.

Failure to verify equipment meets the lifting ratings and is in good operational condition may cause injury to personnel or damage the analyzer.

⚠ WARNING

PHYSICAL ACCESS

Unauthorized personnel may potentially cause significant damage to and/or misconfiguration of end users' equipment. This could be intentional or unintentional and needs to be protected against.

Physical security is an important part of any security program and fundamental to protecting your system. Restrict physical access by unauthorized personnel to protect end users' assets. This is true for all systems used within the facility.

⚠ 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 starting up the analyzer, ensure that electrical power, sample gas handling facilities, and any calibration gases that are required are available to the analyzer.

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

⚠ CAUTION

EQUIPMENT DAMAGE

Always follow the start-up procedure. Damage to the analyzer may result from a failure to follow this procedure.

⚠ CAUTION

EQUIPMENT DAMAGE

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

⚠ CAUTION

UNSERVICEABLE EQUIPMENT

If the pressure and temperature screen does not display measurements similar to those shown in [Gas sensor main screen](#) and [Pressure and temperature screen](#). Refer to Troubleshooting and System Diagnostic section of Rosemount CT5100(Ex) [Reference Manual](#).

⚠ CAUTION

EMC

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

⚠ CAUTION

EMC

As a general principle, if any optical component other than the cell assembly, the laser modules, and the detectors is unserviceable, the analyzer must be repaired by Emerson. This is because the repair, replacement, and alignment of the optical components requires the use of special optical test/calibration equipment and procedures.

Some faults can only be repaired by Emerson. Where an item is unserviceable, and no replacement procedure is given in this manual, then the fault must be repaired by Emerson.

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1 Introduction

1.1 Safety precautions and conditions for safe use

⚠ WARNING

Before installing or performing any maintenance on the analyzer, read and understand the safety information given in the preliminary information of this manual.

The analyzer described in this guide has been quality control tested and left the manufacturer in pristine condition. To achieve the correct and safe operation of this product, it must be transported, installed, operated, and maintained as described by the manufacturer.

All lasers used within the analyzer are Class 1. The emitted laser light is invisible (mid-infrared) and the pulse duration so short that the unprotected eye will not be damaged.

The nature of the laser beam path and beam width further ensures that it should be impossible to cause any eye damage. The analyzer has warning labels at appropriate positions in accordance with USA 21 CFR 1040.10.

Conditions for safe use (Europe)

- The maximum sample gas temperature that the analyzer can operate with is 320 °F (160 °C).
- The purge controller keypad mounted on the front of the equipment shall not be exposed to direct UV light sources or direct sunlight. Example methods of protection include, but are not limited to, indoor applications away from UV sources and outdoor locations under shading. As part of regular inspections, if damage to or deterioration of the membrane keypad is detected, take the unit out of service for repair or replacement.
- The purge controller bypass function shall only be enabled during setup or maintenance and only when the area is known to be non-hazardous.
- The equipment shall be installed in an area of not more than pollution degree 2 as defined in IEC 60664-1.
- The cable glands used in the equipment are only suitable for use in areas with a low risk of mechanical damage and must be suitably protected.
- The purge controller automatically monitors the internal pressure of the enclosure and will output any fault conditions onto contact K2. It is the end user's responsibility to connect this contact to a suitable facility such as an alarm or an automatic shutdown system.
- For correct operation, the on-site pressurizing air supply must be capable of providing at least 25 L/min for leakage compensation.
- When using the analyzer variant fitted with the Elmess gas cell heater certified as BVS 14ATEXE155U and IECEx BVS 14.0106U, the equipment top compartment should be cooled with a source of compressed air at a minimum flow rate of 280 L/min.

- The Elmess gas cell heater, certified as BVS 14ATEXE155U and IECEx BVS 14.0106U, may only be used in combination with the ESI Technology gas cell pressure transducer, certified as TRAC12ATEX0060X and IECEx TRC 12.0025X.

Conditions for safe use (North America)

- The maximum sample gas temperature that the analyzer can operate with is 176 °F (80 °C).
- The purge controller keypad mounted on the front of the equipment shall not be exposed to direct UV light sources or direct sunlight. Example methods of protection include, but are not limited to, indoor applications away from UV sources and outdoor locations under shading. As part of regular inspections, if damage to or deterioration of the membrane keypad is detected, take the unit out of service for repair or replacement.
- The purge controller bypass function shall only be enabled during setup or maintenance and only when the area is known to be non-hazardous.
- The cable glands used in the equipment are only suitable for use in areas with a low risk of mechanical damage and must be suitably protected.
- The purge controller provided with this equipment provides alarm signals at various contacts as described in the equipment instructions. The alarms relate to low-flow and loss of purged air supply, and must be connected to the end-user's remote, monitored alarm system.
- For correct operation, the on-site pressurizing air supply must be capable of providing at least 25 L/min for leakage compensation.
- This assessment does not cover reliable function, performance, or other properties of the equipment not related to safety.
- The equipment is to be installed using wire no larger than the protective earth wire.
- Equipment is only to be installed by manufacturer trained personnel.
- If at any time there is a conflict between the system safety provisions and any relevant local (national or regional) requirements, the local requirements always take precedence.
- Equipment is not to be used with flammable liquids.
- The relief valve sealing cap must be fitted to maintain IP66 when the unit is in a non-operational state.
- Equipment is subject to acceptance of the local inspection authorities having jurisdiction.
- The equipment is intended for use only with air of instrument quality; all piping up to and including the shut-off valve adjacent to the equipment must be protected against mechanical damage.
- The protective gas supply to the equipment must be marked with the warning as detailed in NFPA496 Clause 4.12.5.
- When installing conduit for power and data connections, the end-user must select suitably certified conduit.

General safety notice/residual risk

Installation, operation, and maintenance of the analyzer must be in accordance with these instructions.

When operated as intended and all applicable safety instructions are observed, an element of risk will remain, including, but not limited to, the following:

- Explosion protection measures may become ineffective on the occurrence of one failure (for Category 3 analyzers).
- The emission of gases hazardous to health may be possible when all gas connections have been correctly made.
- To avoid exposure to the dangers of residual risks, take particular care when installing, operating, maintaining, and servicing the analyzer.

1.2 Qualified personnel

In-depth specialist knowledge is an absolute requirement for working with and on the analyzer. Personnel installing, operating, servicing, and maintaining the analyzer must be instructed, trained, qualified, and authorized personnel of the operating company for hazardous areas and the manufacturer.

It is the operating company's responsibility to:

- Train staff
- Observe safety regulations
- Follow the safety instructions and procedures in the product manual

Operators must:

- Be trained
- Read and understand all relevant sections of the product manual before commencing work
- Know the safety mechanisms and regulations

⚠ WARNING

To avoid explosions, loss of life, personal injury, and damage to this equipment and on-site property, do not install, operate, maintain, or service this analyzer before reading and understanding this reference manual and receiving appropriate training.

1.3 Glossary and abbreviations

Abbreviation	Description
©	Copyright
%	Percent
<	Less than

Abbreviation	Description
°	Degree
AC	Alternating current
Barg	Pressure, in units of bars, above or below atmospheric pressure
BS	British Standard
C	Celsius
CDA	Compressed dry air
CE	European Conformity
CH ₄	Methane
CO ₂	Carbon dioxide
DC	Direct current
Deg	Degree (temperature)
e.g.	For example
EC	European Community
EMC	Electromagnetic compatibility
EU	European Union
Hrs	Hours
Hz	Hertz
H ₂ O	Water
ICL	Interband Cascade Laser
IEC	International Electro-technical Commission
in.	Inches
IP	Ingress protection
IPxx	Ingress protection (xx are numbers that define the protection level)
IS	Intrinsically safe
ISO	International Organization for Standardization
k	Thousand
kg	Kilogram
kHz	Kilo hertz
L	Liter
lb	Pound
LCD	Liquid crystal display
LED	Light emitting diode
L/min	Liters per minute
m	Meter

Abbreviation	Description
m ³	Cubic meter
mA	Milliamp
Max	Maximum
mBar	milli-Bar
mbps	Megabits per second
mg	Milligram
mg/m ³	Milligram/cubic meter
Mid IR	Mid Infrared
min	Minute
mm	Millimeter
NEC®	National Electrical Code
NFPA	National Fire Protection Association
nm	Nanometer
No.	Number
PC	Personal computer
PM	Preventative maintenance
ppm	Parts per million
psi	Pounds per square inch
QCL	Quantum Cascade Laser
TDL	Tunable Diode Laser
Torr	Unit of pressure defined as exactly 1/760 of a standard atmosphere
USA	United States of America
USB	Universal serial bus
V	Volt
Vac	Volt alternating current
Vdc	Volt direct current
W	Watt
WEEE	Waste electrical and electronic equipment
μm	Micro-meter

2 Description

2.1 Equipment purpose and role

The types of molecules that are measured depend on the system configuration.

Figure 2-1: Rosemount CT5100(Ex) Continuous Gas Analyzer



The analyzer can be configured to detect and measure up to different gases, depending on the combination of laser modules fitted.

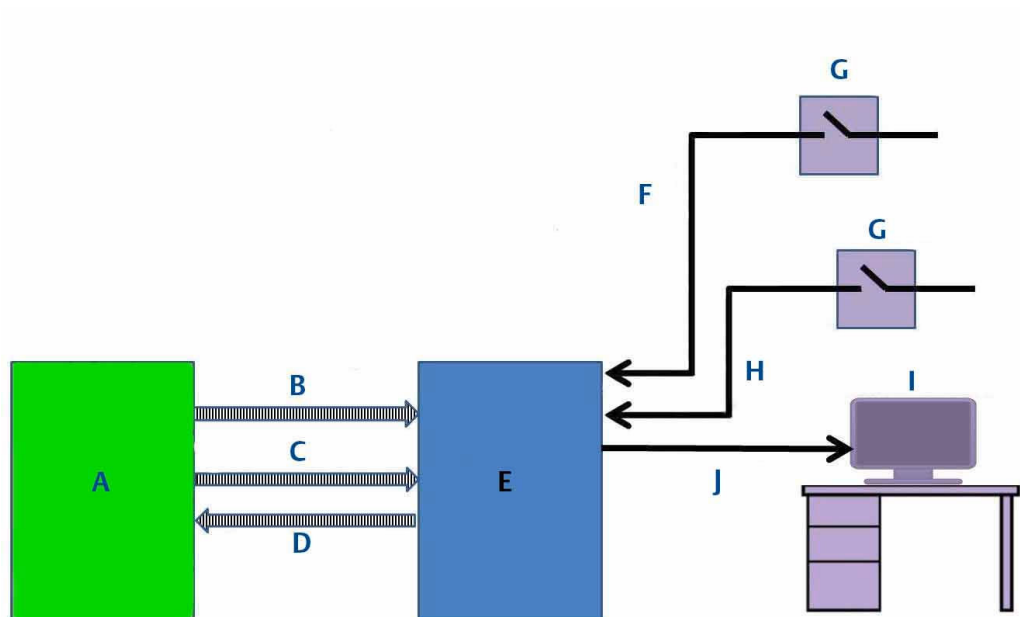
2.2 System overview

A complete Rosemount CT5100(Ex) system consists of the analyzer, and the associated interconnecting wiring and gas piping.

The Rosemount CT5100(Ex) is supplied by Emerson. The gas handling system may be provided by either you or Emerson, depending upon the specific installation. The circuit breakers used to control the application of electrical power to the analyzer, the interconnecting wires, and gas piping are provided by you.

In [Figure 2-2](#), the items supplied by Emerson are colored blue; the items supplied by you are colored purple. The green gas handling system may be provided by Emerson or you.

Figure 2-2: Complete Rosemount CT5100(Ex) Installation



- A. Gas handling system
- B. Instrument air
- C. Sample supply line
- D. Sample return (exhaust) line
- E. Rosemount CT5100(Ex)
- F. Electrical power
- G. Two pole main isolator
- H. Purge power
- I. Control center
- J. Measurement data

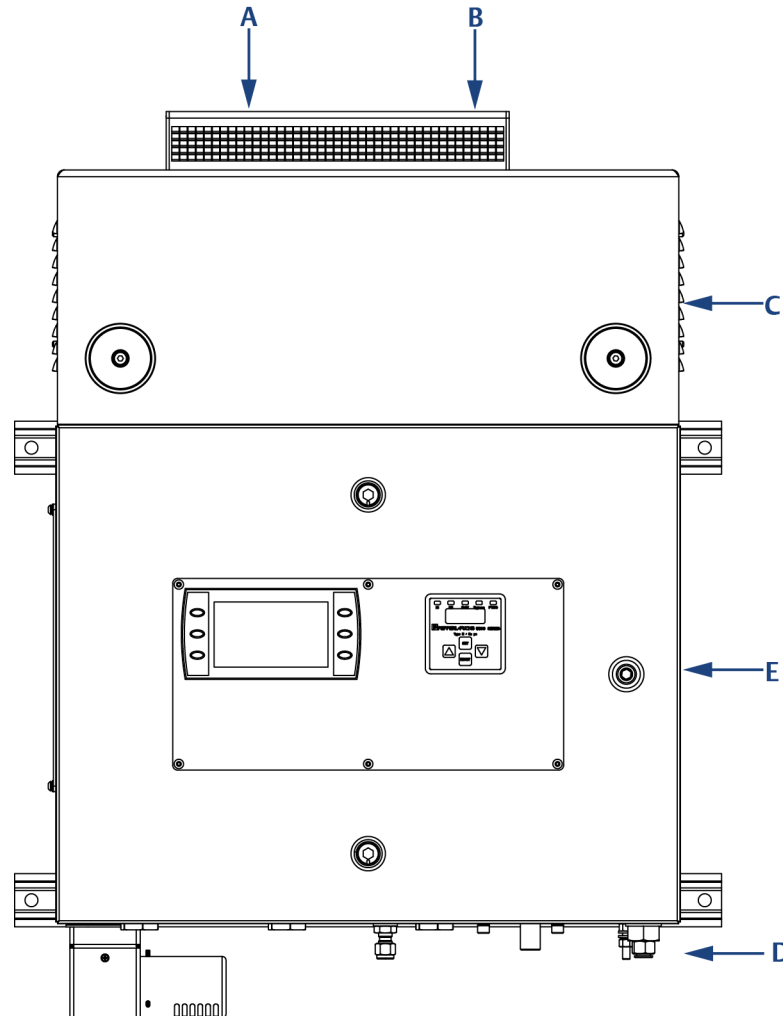
There is no sample conditioning provided within the analyzer; the sampled gas requirements for the analyzer to operate are defined in the Environmental Characteristics

(Table 3-3). Detailed characteristics of the analyzer are given in Rosemount CT5100(Ex) Reference Manual.

2.3 Gas flow through analyzer

The analyzer has two gas inputs and one gas output. See Figure 2-3.

Figure 2-3: Gas Inlet and Outlet Connectors



- A. Sample gas return port
- B. Sample gas input port
- C. Top cover of Rosemount CT5100(Ex) (cell compartment)
- D. Purge air supply
- E. Laser/electrical compartment

Procedure

1. The gas sample that is to be measured for impurities enters the analyzer through the sample gas input port located on top of the analyzer (see [Figure 2-3](#), Items A and B).
2. Once the gas sample has been examined for impurities, it is expelled from the analyzer through the sample gas return port (A).
3. A compressed air supply enters the analyzer through a port (D) on the underside of the unit.

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

AIR SUPPLY

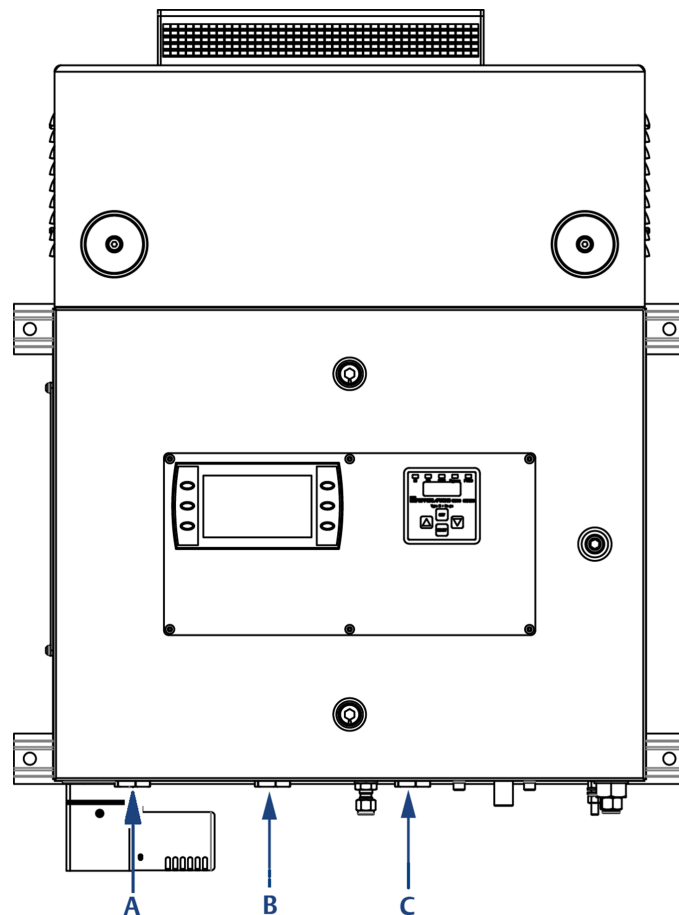
The air supply must be clean, filtered, and free from moisture.

2.4 Connecting the electrical/electronic inputs and outputs

⚠ CAUTION

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

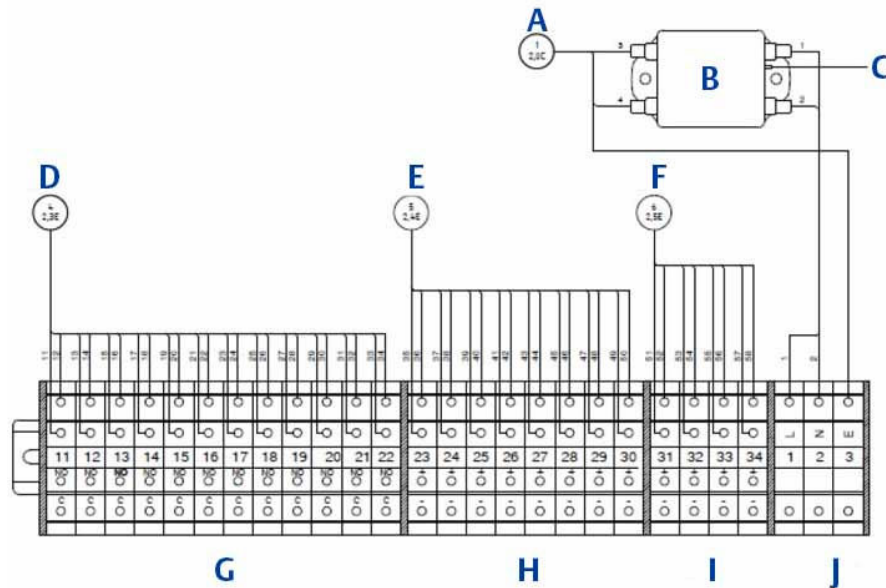
Figure 2-4: Electrical/Electronic Connectors



- A. Purge power and alarm entry point
- B. Power entry point
- C. Analog/digital entry point

Electrical/electronic signal connections to the analyzer are made through three electrical entry points located on the underside of the analyzer, as shown in Figure 2-4. Use the wiring diagram to make the electrical connections as shown in Engineering drawings and Figure 2-5.

Figure 2-5: Signal Cable Outputs



- A. To mains input fuses
- B. Mains input filter
- C. To enclosure earth stud
- D. To digital modules
- E. To analog modules
- F. To status relays
- G. Digital output terminals
- H. Analog output terminals
- I. Status output terminals
- J. Mains input terminals

Note

Purge solenoid fitted can be either for 5500-MAN-EX01 for ATEX/IEC applications or 5500-MAN-CD01 for North American applications.

Note

Maximum number of user terminals shown. These may be reduced depending on number and type of analog/digital outputs required.

Two sources of electrical power are applied to the analyzer through power entry points (see Figure 2-4 Items A and B).

1. A purge electrical supply that is used to power the overpressure facility in the electrical compartment of the analyzer entry point (A).
2. An instrumentation electrical supply that is used to power all other functions of the analyzer entry point (C).

Both power supplies are 110 to 230 Vac, 50/60 Hz \pm 10%. AC to DC power converters inside the analyzer automatically adjust in response to the input voltage level and ensure that the correct DC voltage is available inside the unit. The analyzer is electrically protected by an internal 5 A, 250 VA fast acting fuse on the instrumentation electrical supply line and an internal 2 A, 250 VA fuse on the purge electrical supply line.

The wiring diagram (Figure 2-6) for the purge electrical supply is in accordance with the latest Pepperl+Fuchs 5500 Series Installation Manual Purge and Pressurization System documentation (www.Pepperl-fuchs.com). It is recommended that these instructions are verified from the Pepperl+Fuchs website to ensure the latest wiring instructions for the purge controller have been followed during installation. The complete wiring diagram used during the manufacture of the Rosemount CT5100(Ex) is included for reference in [Engineering drawings](#).

Figure 2-6: Pepperl +Fuchs Wiring Diagram (External Mount)

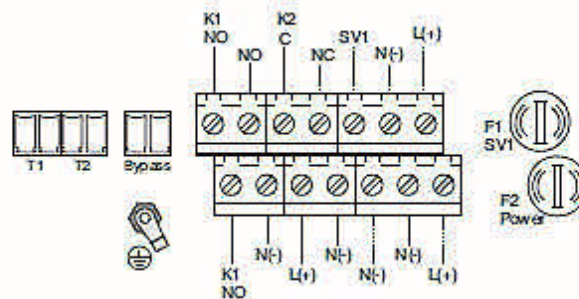


Figure 2-7: Pepperl +Fuchs Wiring Diagram (Internal Mount)

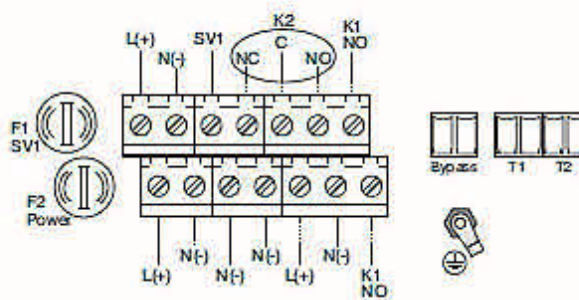
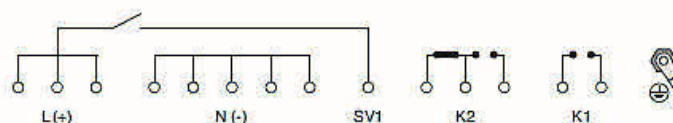


Figure 2-8: Pepperl +Fuchs Wiring Diagram (Terminal Block Connections)



General wiring instructions for the Pepperl+Fuchs 5500 series purge control power connection are as follows:

- All applicable local and national wiring codes **MUST** be followed when wiring the system. Also see IEC60079-14.
- The power supply to this device shall have a separate customer installed external disconnect. If placed in the hazardous area, it shall be rated for the area it is being installed in. Placing the disconnect into the purged enclosure is not an option as power needs to be applied to the control unit before the purge cycle is complete.
- PE ground wire to be same size as largest wire used to bring power into the enclosure. Terminate using ring lug properly crimped at grounding stud in bottom of enclosure.
- All wire shall be copper only, rated 176 °F (80 °C) minimum.
- The minimum wire strand in a stranded wire shall have a diameter of 0.004-in. (0.1 mm) or greater.
- Wire strip length into fixed terminal block is 0.315 in. (8 mm).
- Terminal torque is 0.5 Nm to 0.6 Nm.
- There shall be only one wire per terminal.
- It is recommended to leave a bit of extra wire loop in housing to allow for any re-termination.

3 Specifications

3.1 Detailed system specifications

Table 3-1 gives the physical characteristics for the analyzer while Table 3-2 gives the general characteristics. Schematic diagrams of the analyzer are shown in Figure 3-1, Figure 3-2, and Figure 3-3.

Table 3-1: Physical Characteristics

Rosemount CT5100(Ex)	Value	Comment
External dimensions	22.68 x 11.7 x 30.94 in. 575 x 298 x 786 mm	Length x width x height Nominal dimensions
Weight	121 lb 55 kg	Approximate weight

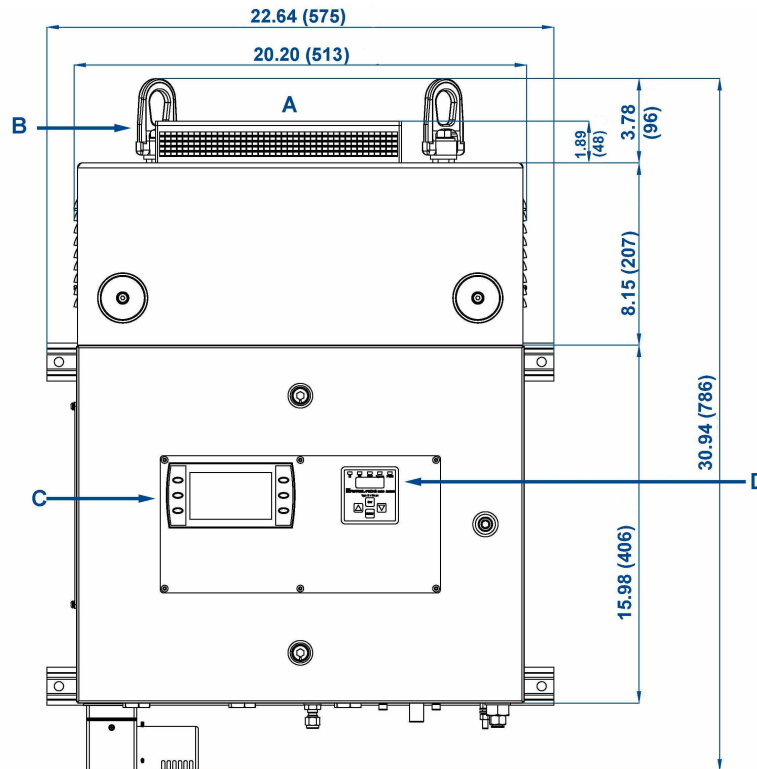
Table 3-2: General Characteristics

Rosemount CT5100(Ex)	Value	Units	Comment
Instrumentation supply voltage	110 or 230	Vac	50/60 HZ ±10%
Purge supply voltage	110 or 230	Vac	50/60 Hz ±10%
Peak power consumption	500	W	Max consumption per gas analyzer
Continuous steady-state power consumption	300	W	Once the gas analyzer has stabilized and the analysis cell has reached the temperature set point
Electrical compartment enclosure	N/A	N/A	Stainless steel
Optical compartment enclosure	N/A	N/A	Stainless steel
Measurement technique	N/A	N/A	Mid IR absorption spectroscopy
Operating conditions			
Mid IR source	N/A	N/A	Quantum Cascade Laser
Near IR source	N/A	N/A	Interband Cascade Laser Diode Laser
Laser classification	Class 1	N/A	BS EN 60825-1: 2007 safety of laser products. Equipment classification and requirements (identical to IEC 60825-1 2007)
Inlet gas port connector	¼ 6	in. mm	Swagelok® type, factory-configured, specify on order
Outlet (exhaust) gas port connector	¼ 6	in. mm	Swagelok type, factory-configured, specify on order
Purge connector	⅜ 10	in. mm	Purge inlet (certified system only)
Purge air pressure	2	Barg	N/A

Table 3-2: General Characteristics (continued)

Rosemount CT5100(Ex)	Value	Units	Comment
Measurement result signals	4 to 20	mA	4 or 8 channel outputs, specify on order
Communication	10/100	Mbps	Ethernet
Warm-up time	90	minutes	N/A

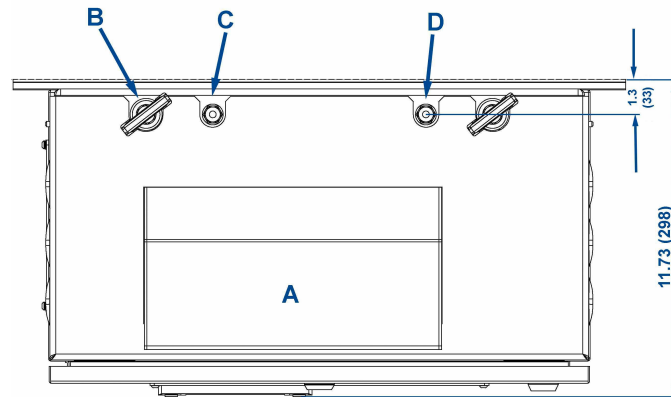
Figure 3-1: Rosemount CT5100(Ex) Dimensions - Front View



- A. Ventilation
- B. Lifting eyelet
- C. User interface
- D. Purge control panel

Dimensions are in inches (mm)

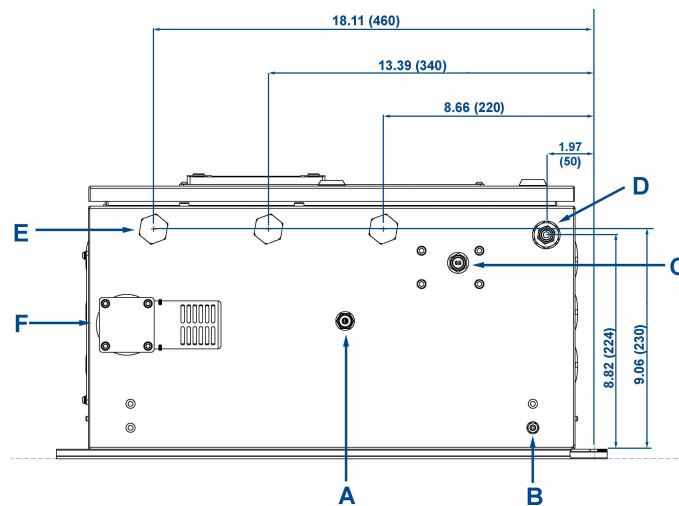
Figure 3-2: Rosemount CT5100(Ex) Dimensions - Top View



- A. Ventilation
- B. Lifting eyelet
- C. Sample return
- D. Sample inlet

Dimensions are in inches (mm)

Figure 3-3: Rosemount CT5100(Ex) Dimensions - Bottom View



- A. Atmospheric pressure refer plug
- B. Earth point
- C. Purge pressure set
- D. Air supply
- E. Cable glands
- F. Purge vent

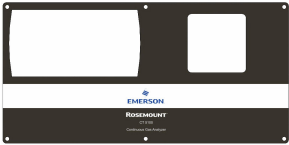


Dimensions are in inches (mm)

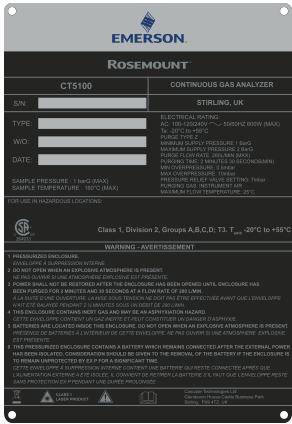
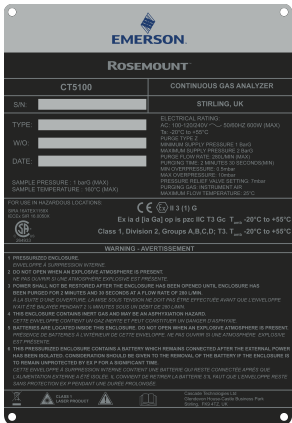



Table 3-3: Environmental Characteristics


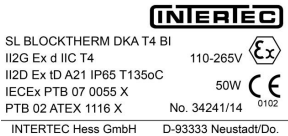


Environmental characteristic	Value	Units	Comment
Operating temperature range	-4 to 131 -20 to 55	°F °C	Ambient temperature
Sample gas temperature range (Condition for safe use Europe)	122 to 329 50 to 160	°F °C	Factory set, specify on order
Sample gas temperature range (Condition for safe use North America)	122 to 176 50 to 80	°F °C	Factory set, specify on order
Sample gas particulate density	5	mg/m ³	Maximum
Sample gas particulate size	10	µm	Maximum
IP code	66	N/A	IP to IEC 60529
Sensor humidity range	10 to 95	%	Relative humidity (non-condensing) at 113 °F (45 °C)

3.2 Safety and system labels and annotation

The labels and annotation applied to the analyzer are specified in the table below.

Label type	Example	Location
Identification label (including serial number and model number)		Front panel
Fuse identification label		1. Back plate 2. Top right inside of door
IECEX and ATEX ratings label		Enclosure side panel

Label type	Example	Location
North America/Canada ratings label		Enclosure side panel
Universal ratings label		Enclosure side panel
Laser radiation CAUTION label		Baseplate
Laser module identification label		On each laser module housing
Intrinsically safe label		<ol style="list-style-type: none"> HMI Intrinsically safe sensor barrier

Label type	Example	Location																																																																																				
Terminal label (typical layout)	<table border="1"> <thead> <tr> <th colspan="2">USER CONNECTIONS</th> </tr> <tr> <th>TERMINAL</th> <th>FUNCTION</th> </tr> </thead> <tbody> <tr><td>1</td><td>SENSOR SYSTEM SUPPLY (L)</td></tr> <tr><td>2</td><td>SENSOR SYSTEM SUPPLY (N)</td></tr> <tr><td>3</td><td>EARTH</td></tr> <tr><td>4</td><td>PURGE FAILURE ALARM CONTACTS</td></tr> <tr><td>5</td><td>PURGE SYSTEM SUPPLY (L)</td></tr> <tr><td>6</td><td>PURGE SYSTEM SUPPLY (N)</td></tr> <tr><td>7</td><td>EARTH</td></tr> <tr><td>8</td><td>PURGE SOLENOID (L)</td></tr> <tr><td>9</td><td>PURGE SOLENOID (N)</td></tr> <tr><td>10</td><td>EARTH</td></tr> <tr><td>11</td><td>DIGITAL OUTPUT 1</td></tr> <tr><td>12</td><td>DIGITAL OUTPUT 2</td></tr> <tr><td>13</td><td>DIGITAL OUTPUT 3</td></tr> <tr><td>14</td><td>DIGITAL OUTPUT 4</td></tr> <tr><td>15</td><td>DIGITAL OUTPUT 5</td></tr> <tr><td>16</td><td>DIGITAL OUTPUT 6</td></tr> <tr><td>17</td><td>DIGITAL OUTPUT 7</td></tr> <tr><td>18</td><td>DIGITAL OUTPUT 8</td></tr> <tr><td>19</td><td>DIGITAL OUTPUT 9</td></tr> <tr><td>20</td><td>DIGITAL OUTPUT 10</td></tr> <tr><td>21</td><td>DIGITAL OUTPUT 11</td></tr> <tr><td>22</td><td>DIGITAL OUTPUT 12</td></tr> <tr><td>23</td><td>ANALOGUE OUTPUT 1</td></tr> <tr><td>24</td><td>ANALOGUE OUTPUT 2</td></tr> <tr><td>25</td><td>ANALOGUE OUTPUT 3</td></tr> <tr><td>26</td><td>ANALOGUE OUTPUT 4</td></tr> <tr><td>27</td><td>ANALOGUE OUTPUT 5</td></tr> <tr><td>28</td><td>ANALOGUE OUTPUT 6</td></tr> <tr><td>29</td><td>ANALOGUE OUTPUT 7</td></tr> <tr><td>30</td><td>ANALOGUE OUTPUT 8</td></tr> <tr><td>31</td><td>STATUS OUTPUT 1 (Check Function)</td></tr> <tr><td>32</td><td>STATUS OUTPUT 2 (Maintenance Required)</td></tr> <tr><td>33</td><td>STATUS OUTPUT 3 Out Of Specification</td></tr> <tr><td>34</td><td>STATUS OUTPUT 4 (Failed)</td></tr> <tr><td>01</td><td>ANALOGUE OR DIGITAL OUTPUT</td></tr> <tr><td>02</td><td>ANALOGUE OR DIGITAL OUTPUT</td></tr> <tr><td>03</td><td>ANALOGUE OR DIGITAL OUTPUT</td></tr> <tr><td>04</td><td>ANALOGUE OR DIGITAL OUTPUT</td></tr> <tr><td>05</td><td>ANALOGUE OR DIGITAL OUTPUT</td></tr> <tr><td>06</td><td>ANALOGUE OR DIGITAL OUTPUT</td></tr> </tbody> </table>	USER CONNECTIONS		TERMINAL	FUNCTION	1	SENSOR SYSTEM SUPPLY (L)	2	SENSOR SYSTEM SUPPLY (N)	3	EARTH	4	PURGE FAILURE ALARM CONTACTS	5	PURGE SYSTEM SUPPLY (L)	6	PURGE SYSTEM SUPPLY (N)	7	EARTH	8	PURGE SOLENOID (L)	9	PURGE SOLENOID (N)	10	EARTH	11	DIGITAL OUTPUT 1	12	DIGITAL OUTPUT 2	13	DIGITAL OUTPUT 3	14	DIGITAL OUTPUT 4	15	DIGITAL OUTPUT 5	16	DIGITAL OUTPUT 6	17	DIGITAL OUTPUT 7	18	DIGITAL OUTPUT 8	19	DIGITAL OUTPUT 9	20	DIGITAL OUTPUT 10	21	DIGITAL OUTPUT 11	22	DIGITAL OUTPUT 12	23	ANALOGUE OUTPUT 1	24	ANALOGUE OUTPUT 2	25	ANALOGUE OUTPUT 3	26	ANALOGUE OUTPUT 4	27	ANALOGUE OUTPUT 5	28	ANALOGUE OUTPUT 6	29	ANALOGUE OUTPUT 7	30	ANALOGUE OUTPUT 8	31	STATUS OUTPUT 1 (Check Function)	32	STATUS OUTPUT 2 (Maintenance Required)	33	STATUS OUTPUT 3 Out Of Specification	34	STATUS OUTPUT 4 (Failed)	01	ANALOGUE OR DIGITAL OUTPUT	02	ANALOGUE OR DIGITAL OUTPUT	03	ANALOGUE OR DIGITAL OUTPUT	04	ANALOGUE OR DIGITAL OUTPUT	05	ANALOGUE OR DIGITAL OUTPUT	06	ANALOGUE OR DIGITAL OUTPUT	Top left inside of door
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AC power supply danger label		<ol style="list-style-type: none"> 1. On outside of electrical compartment door 2. On manifold block of air overpressure system 																																																																																				

4 Install

4.1 Site selection

The Rosemount CT5100(Ex) has a T3 temperature classification. The user must ensure that no combustible gas concentrations will be present, whether on a continual or occasional basis, which have an ignition temperature below the T3 rating of the analyzer.

⚠ DANGER

FIRE AND EXPLOSION

The analyzer's electrical compartment must not be opened unless the atmosphere in the area is known to be below the ignitable concentration of combustible gases or materials, or unless all equipment within the protected enclosure is de-energized in accordance with NFPA496.

Death, personal injury, and/or damage to persons and/or property may result if this is not observed.

⚠ DANGER

ELECTRIC SHOCK

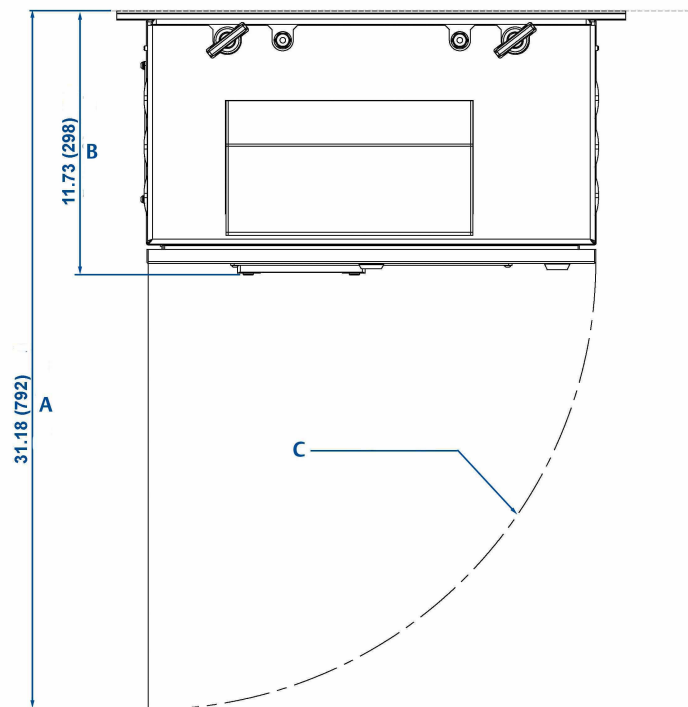
The analyzer operates using mains voltage, which may cause death or serious injury to personnel. Ensure that the circuit breakers are set to Off and locked out and tagged out off before removing the top cover or opening the front cover.

Failure to observe this precaution will cause death, personal injury, and/or damage to persons and/or property.

The analyzer is intended to be installed in a suitable Division 2 shelter to protect it from the elements.

Provide sufficient space around the analyzer to allow the maintenance and servicing of the unit.

Figure 4-1: Clearance with Door Open



- A. Door open
- B. Door closed
- C. Door opening arc

Dimensions are in inches (mm)

4.2 Unpacking

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

⚠ WARNING

HEAVY INSTRUMENT - LIFTING HAZARD

Handle the analyzer with caution during unpacking, installation, maintenance, and transport to prevent crushing of hands, feet, or other body parts.

The analyzer weighs 121 lb (55 kg) and should always be lifted and moved using suitable lifting/moving equipment. Emerson recommends that a minimum of two people using suitable tools for transportation and lifting are employed.

Wear suitable protective gloves and protective footwear.

⚠ CAUTION

EQUIPMENT DAMAGE

When preparing the analyzer for transport by air, road, or rail, safeguard the analyzer against movement or break-away during transport by securely strapping it in place.

Failure to observe may cause damage to the equipment.

⚠ WARNING

EXPLOSION HAZARD

In accordance with IEC 60079-0: 2011 Clause 30.

Installing and wiring the analyzer must comply with all relevant national legislative requirements and regulations.

Consider all safety instructions within this manual and all associated analyzer instruction manuals.

⚠ WARNING

EXPLOSION HAZARD

In accordance with IEC 60079-0: 2011 Clause 30.

Installing the analyzer requires opening the enclosure and working at the open unit. This is permitted only when both the analyzer and connected external circuitry are de-energized.

Depending on the local regulation, this may require a competent hot work supervisor to issue a hot work permit.

⚠ CAUTION

SHOCK AND VIBRATION

The analyzer contains sensitive electronic equipment. It **MUST NOT** be subjected to any shock and or vibration.

Damage to the analyzer may result from a failure to follow this caution.

Procedure

1. On receipt of goods, look for any visible damage to the analyzer and verify that all items noted to be shipped were received. Record on the goods receipt note any damage or missing items, noting both the item(s) and quantity missing.
2. Visually inspect the exterior of the analyzer for signs of damage, corrosion, gas leaks, or signs of previously overheating.
3. Report anything found to the maintenance organization.
4. Attach suitably rated and tested lifting slings to the safety engineered lifting eye bolts mounted on top of the analyzer.
5. One person should carefully guide the equipment from the horizontal to vertical position while the other person lifts the equipment.

6. Use safety approved and tested lifting equipment to remove the analyzer from the shipping container and place it on a solid, level surface.
7. Ensure that the analyzer is stored in its protective plastic cover until installation.

4.3 Mounting the analyzer

This procedure requires two people to safely move and mount the Rosemount CT5100(Ex).

Procedure

1. Ensure that there is free space around the analyzer to allow ventilation of the upper part of the analyzer.

▲ WARNING

HEAVY ITEM

In accordance with IEC 60079-0: 2011 Clause 30.

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

Ensure the wall the analyzer is mounted on is solid, stable, and of suitable material to hold the weight of the analyzer.

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

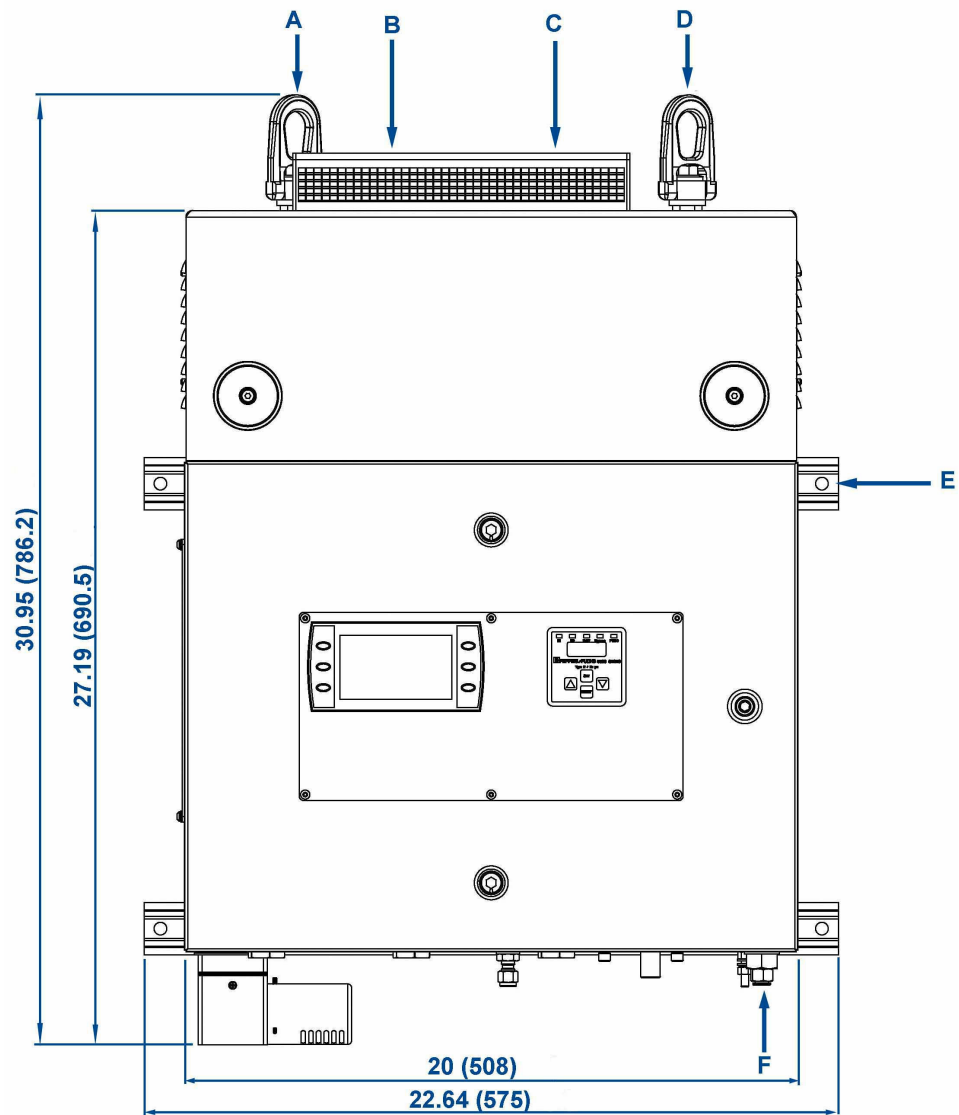
The analyzer weighs 121 lb (55 kg).

Emerson recommends that a minimum of two people move and lift the analyzer.

Wear suitable protective gloves and protective footwear.

2. Attach suitably rated and tested lifting slings to the safety engineered lifting eye bolts (see [Figure 4-2](#), items A and D) mounted on top of the analyzer.

Figure 4-2: Front View Dimensions



- A. Lifting eye bolt
- B. Sample gas input port
- C. Sample gas return port
- D. Lifting eye bolt
- E. 0.413-in. (10.5 mm) diameter mounting points
- F. Purge compressed air supply port

Dimensions are in inches (mm)

3. One person should carefully guide the equipment while the other person operates the lifting equipment.
4. Use safety approved and tested lifting equipment to lift the analyzer from the stable platform.

5. Mount the analyzer using four M8 ($\frac{5}{16}$ -in.) fasteners to attach the wall mount brackets.

The bolts must be positioned in such a way to allow maximum use of all thread length.

The installer must ensure that the fasteners used are suitable for the load and surface that the analyzer is mounted on.

In case you need to thread lock the fittings for extra security, only do this with compounds compatible with the zone classification of the installation location.

The four wall fixing points must be 0.413-in. (10.5 mm) diameter mounting holes. Ensure that the wall fixing points are capable of supporting a load of 242 lb (110 kg) each; this includes a x 2 factor of safety. [Figure 4-4](#) shows the locations of the mounting points on the analyzer. All mounting points are 0.413-in. (10.5 mm) diameter holes.

Confirm the bolts are secure. Do not overtighten the fasteners.

The analyzer must be mounted using the four off factory fitted and predrilled holes on the brace bars. Refer to [Figure 4-2](#).
6. Remove the lifting eyes and retain them for future use.

Threads must be protected with a suitable grease and plastic grommets.

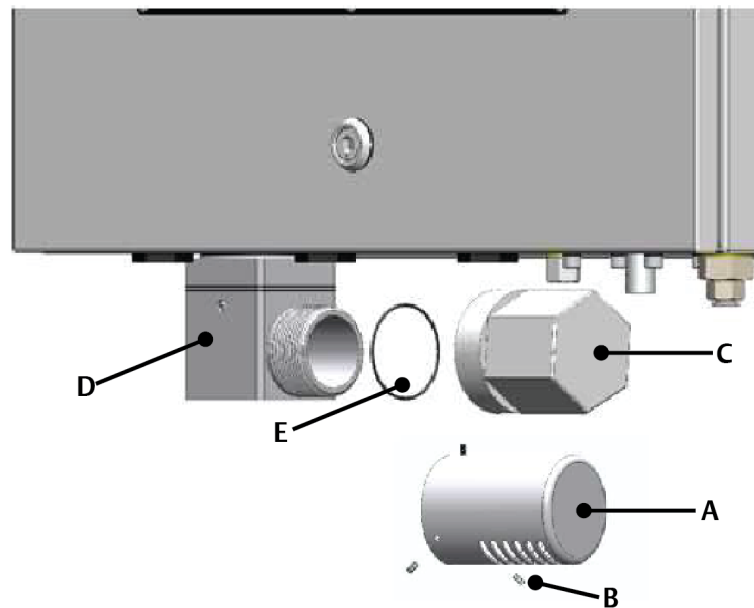
After mounting, do not place any additional load on the analyzer.

Do not place or leave loose items on flat surfaces.

For transportation, the purge vent (D) located on the base of the analyzer is fitted with a temporary protector cap (C). This protector cap **MUST** remain in place until the analyzer is commissioned. Refer to [Figure 4-3](#).

The vent cap (A), O-ring (E) and grub screws (B) are shipped loose in the crate. Refer to [Figure 4-3](#).

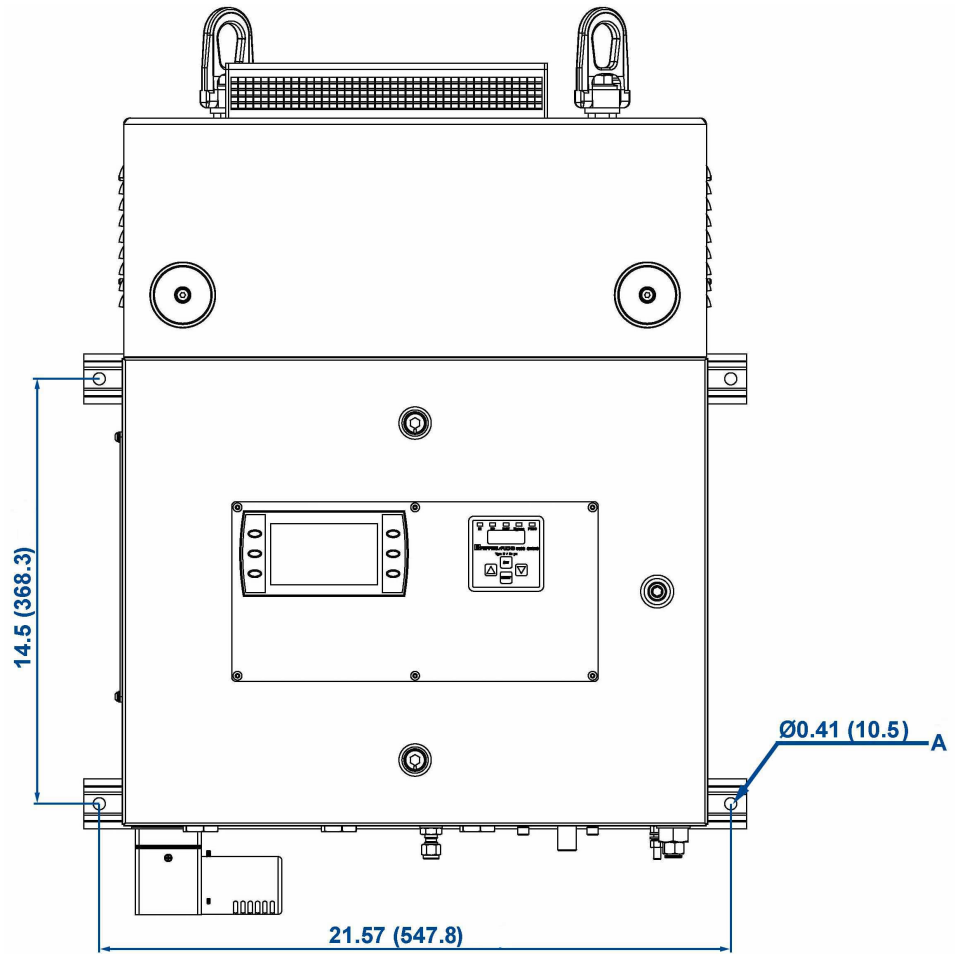
Figure 4-3: Connecting the Purge Vent Cap



- A. Vent cap
- B. 3/32-in. socket grub screws
- C. Protector cap
- D. Purge vent
- E. O-ring

7. To complete the installation, remove the protector cap from the purge vent and the O-ring (E). Install the vent cap, locking it in position with the grub screws. Refer to [Figure 4-2](#). An Allen key is provided for the grub screws. The protector cap (C) must be retained as it will need to be refitted whenever the analyzer is being shutdown for a prolonged period to seal the purge vent from fluid ingress.

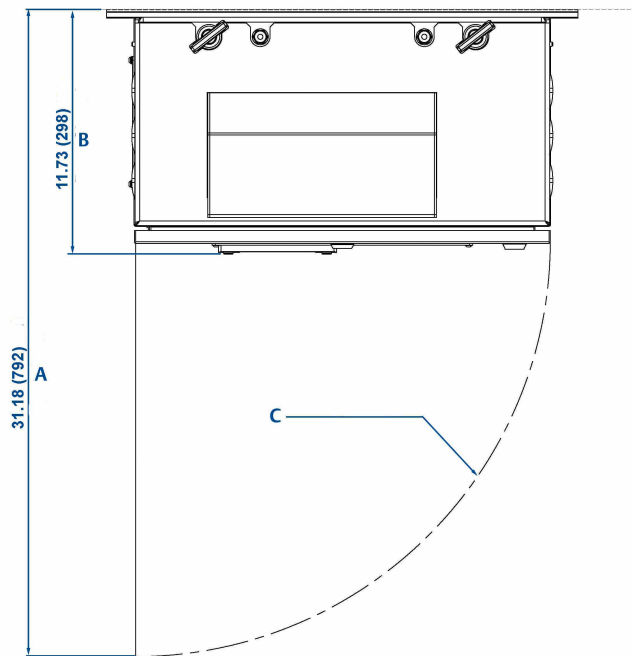
Figure 4-4: Mounting Details



A. Mounting points

Dimensions are in inches (mm)

Figure 4-5: Clearance with Door Open



- A. Door open
- B. Door closed
- C. Door opening arc

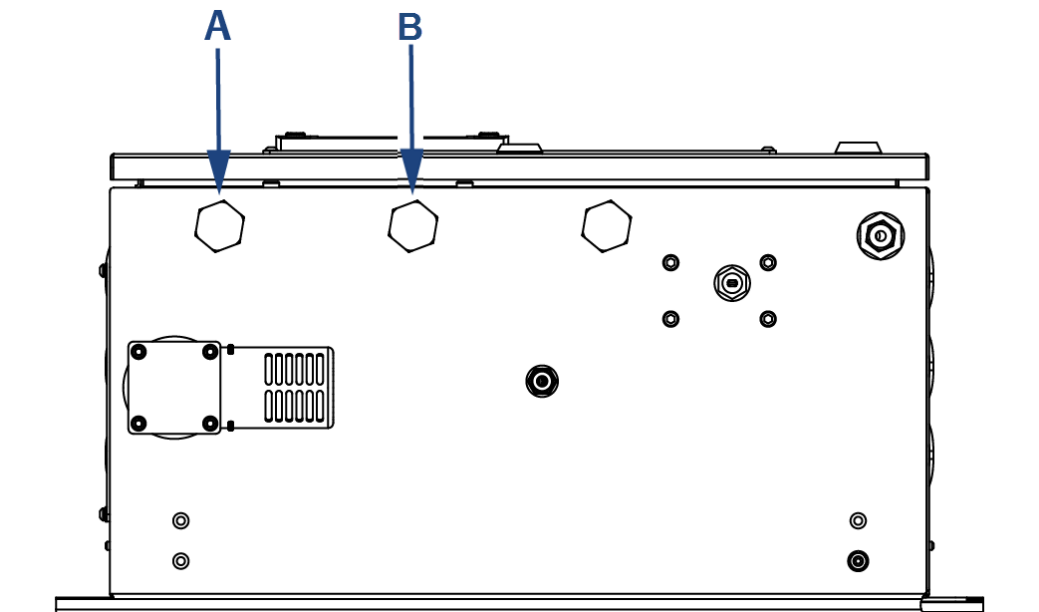
Dimensions are in inches (mm)

4.4 Connecting the electrical/electronic inputs and outputs

4.4.1 AC power

Power is connected to the analyzer instrumentation through the power entry point (B) and the purge controller through the purge power and alarm entry point (A) fitted to the base of the analyzer. Refer to [Figure 4-6](#).

Figure 4-6: Power Gland

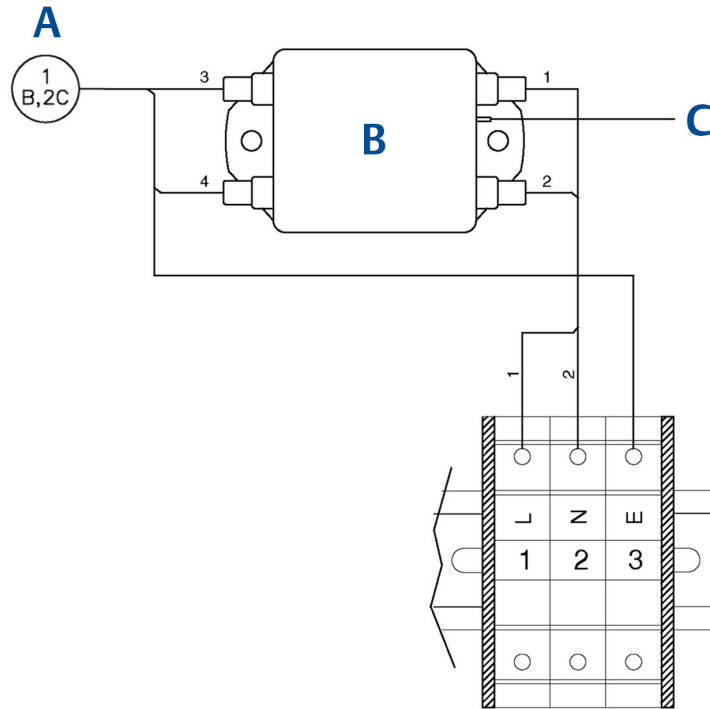


- A. Purge power and alarm entry point
- B. Power entry point

- A purge electrical and alarm supply that is used to power the overpressure facility in the electrical compartment of the analyzer. Refer to [Figure 4-6](#) (Item A).
- An instrumentation electrical supply that is used to power all other functions of the analyzer. See [Figure 4-6](#) (Item B).

The customer supplied circuit breakers **must** be in accordance with ATEX / IECEx / North American protection concepts. The main power isolator controls the application of electrical power to the purge controller with the secondary power isolator controlling the application of electrical power to the remaining analyzer functions.

Figure 4-7: Power Entry Point Connections

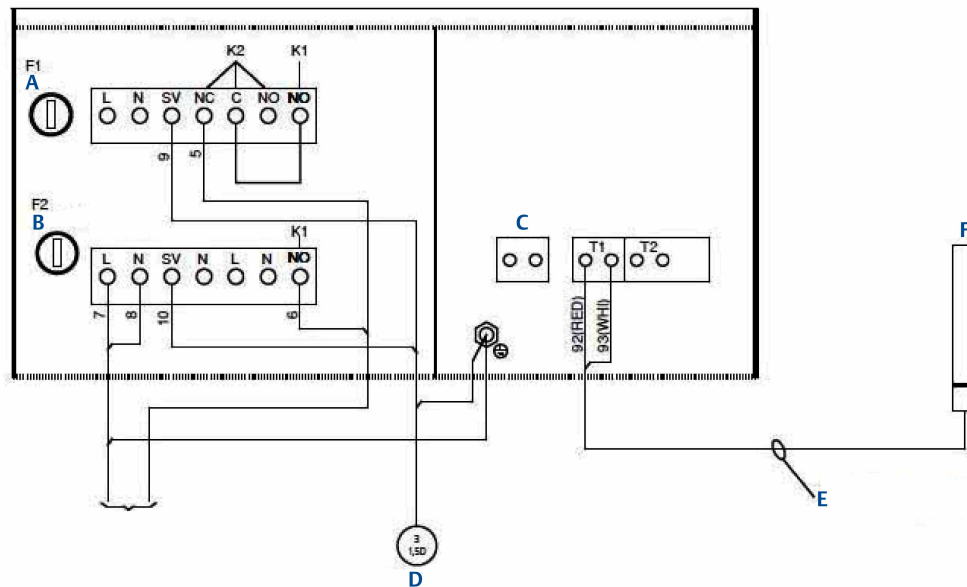


- A. To mains input fuses
- B. Mains input filter
- C. To enclosure earth stud

Table 4-1: Mains Input Terminal

Terminal	Function
1	Sensor system supply (L)
2	Sensor system supply (N)
3	Earth

Figure 4-8: Purge Power and Alarm Entry Point Connections



- A. SV1
- B. Power
- C. Bypass
- D. To purge solenoid
- E. To be run separately from other cables looms
- F. To PT100 sensor

Note

Purge control system power and alarm contact to be directly wired into purge control unit by end user. The cables must use cable glands suitable for the zone of application of the analyzer for entry into the analyzer enclosure and the purge control unit.

Terminal	Function
L	Purge control supply (live)
N	Purge control supply (neutral)
K1 (normally open)	Alarm contract
K2 (normally closed)	Alarm contract

Electrical protection for the instrumentation circuitry of the analyzer is provided by fuses F1 and F2 located inside the analyzer. Refer to [Figure 4-9](#).

The customer supplied power cable for the analyzer instrumentation will be connected to terminals 1 - 3.

Table 4-2: Electrical Power Requirements

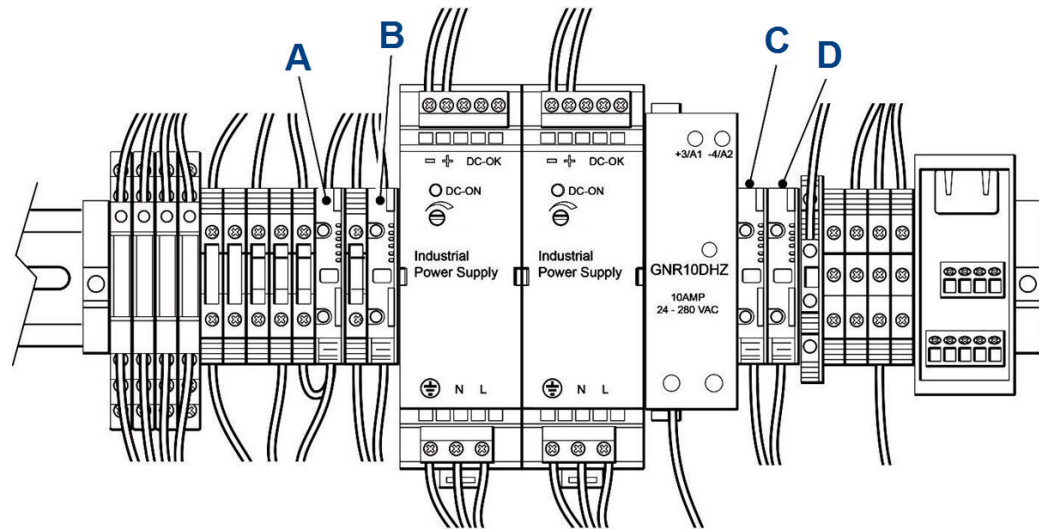
Electrical supply	Power consumption	Voltage	Fuse
Instrumentation supply voltage	400 W	100 to 230 Vac, 50/60 Hz \pm 10%	3.15 A internal fuses F1 and F2
Purge supply voltage	100 to 230 Vac, 2.3 VA (without digital valve)	100 to 240 Vac, 48/62 Hz \pm 10%, single phase Overvoltage category 2	AC: 2.0A

For the electrical power wiring use 16 AWG stranded, three conductor copper or tin-plated copper power wire, rated for at least 250 Vac, of the required length. Cables must be terminated in the power entry points in accordance with local electrical codes. The full electrical wiring diagram is provided in [Engineering drawings](#).

4.4.2 Fuses

Figure 4-9 shows the location of the fuses.

Figure 4-9: Fuses



- A. Fuse F4 (24 Vdc supply)
- B. Fuse F3 (12 Vdc supply)
- C. Fuse F1 (mains supply – live)
- D. Fuse F2 (mains supply – neutral)

Table 4-3: Fuse Requirements

Fuse	Function	Rating	Schurter part number
1	Live line 110/230 Vac (following mains filter)	3.15 A, 250 V, fast acting ceramic	0001.1009
2	Neutral line 110/230 Vac (following mains filter)	3.15 A, 250 V, fast acting ceramic	0001.1009
3	Analyzer 12 Vdc supply rail	5 A, 250 V, fast acting ceramic	0001.1011
4	Analyzer 24 Vdc supply rail	3.15 A, 250 V, fast acting ceramic	0001.9011

4.4.3 Connecting the sample supply and return line

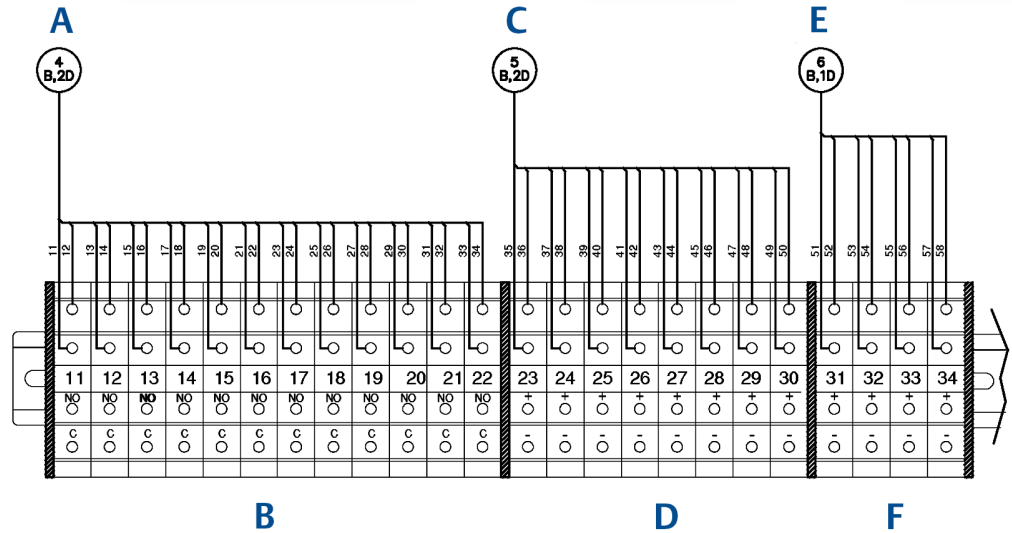
Sample gas supply and sample return connections are ¼-in. (6 mm) "Hamlet" compression tube fittings. To avoid the risk of gas leaks, confirm that these connections are made correctly and tightly. Both the sample gas supply pipe and the sample return pipe should be thermal insulated.

The maximum sample gas supply pressure is 2 BarG.

4.4.4 Connecting the signal cables

The signal cables are connected to the system through an entry point outlet C, as shown in [Figure 4-10](#). All signal cables are to be minimum 20 AWG tri-rated switchgear cable. Customer supplied conduit and cables are to be terminated in the entry point provided in accordance with local electrical codes.

Figure 4-10: Signal Cable Outputs



- A. To digital modules
- B. Digital output terminals
- C. To analog modules
- D. Analog output terminals
- E. To status relays
- F. Status output terminals

Table 4-4: User Connections

Terminal	Function
11	Digital output 1
12	Digital output 2
13	Digital output 3
14	Digital output 4
15	Digital output 5
16	Digital output 6
17	Digital output 7
18	Digital output 8
19	Digital output 9
20	Digital output 10
21	Digital output 11
22	Digital output 12

Table 4-4: User Connections (continued)

Terminal	Function
23	Analog output 1
24	Analog output 2
25	Analog output 3
26	Analog output 4
27	Analog output 5
28	Analog output 6
29	Analog output 7
30	Analog output 8
31	Status output 1 (check function)
32	Status output 2 (maintenance required)
33	Status output 3 (out of specification)
34	Status output 4 (failed)

4.4.5 Power input cables and circuit breakers

⚠ WARNING

FLAMMABLE/EXPLOSIVE GASES

The purge/pressurization cycle expels any flammable or explosive gases from the electrical compartment and **MUST** be completed before applying electrical power to the rest of the analyzer.

Failure to observe this warning could cause an explosion or potentially hazardous situation, which if not avoided, may cause death, personal injury, and/or damage to persons and/or property.

The power input cable/purge power cable circuit breakers can be tested as follows:

- Set the Purge circuit breaker to **ON**. The purge / pressurization process will start **ONLY** when the K1 LED on the purge control panel comes on indicating the purge process is complete can you proceed to the next step. Refer to [Figure 5-4](#).
- The main power input circuit breaker can now be set to **ON**.
- Check that the display controller lights up. The analyzer will then begin to power-up.

4.4.6 Temperature sensor and cell heater

The sample cell is controlled to operate at a pre-set temperature. This involves a heater and a temperature sensor. To test these, check that a temperature reading is displayed against temperature on the display controller as described in [Pressure and temperature screen](#).

Leave the analyzer operating and confirm that the temperature rises until the analysis cell reaches the pre-set operating temperature around 122 °F (50 °C). This will take approximately 90 minutes.

4.4.7 Pressure sensor

The pressure sensor monitors the pressure in the analysis cell. To test that it is functioning, check that a pressure reading is displayed under pressure on the Beka Display Controller as described in [Pressure and temperature screen](#).

The reading will be approximately 760 Torr at atmospheric pressure. If desired, cap off the gas inlet and use an external pump to evacuate the cell. Verify that the pressure drops as expected.

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.

4.4.8 Analog output cables

In order to generate a 4-20 mA output, the analyzer must be left for 90 minutes to warm up, and the analysis cell must be at the correct pressure.

The 4-20 mA outputs will operate when the analysis cell temperature and pressure are within the required test range. It is not essential to flow sample gas through the system; nitrogen or atmospheric air will be adequate for this test.

With the analyzer at operating temperature and pressure, ensure that a current between 4 mA and 20 mA is generated on each 4-20 mA output. This can either be measured as a current with a multimeter, or as a gas concentration through the control station.

4.4.9 Ethernet

To test the Ethernet connection, connect a remote laptop to the Ethernet port and attempt to connect to the internal PC as described in the separate connection procedure. It is not necessary to run the gas sensor on the laptop; once connected, enter the command exit to disconnect again.

⚠ DANGER

FIRE AND EXPLOSION

The electrical compartment of the analyzer must not be opened unless the atmosphere in the area is known to be below the ignitable concentration of combustible gases or materials, or unless all equipment within the protected enclosure is de-energized in accordance with NFPA 496.

Death, personal injury and/or damage to persons and/or property may result if this is not observed.

4.4.10 Seal glands

Where poured seal glands are a local industry requirement for cable termination, they should be made in accordance with the manufacturer's instructions once acceptance tests have been made on the system to ensure that the analyzer does not need to be removed.

4.4.11 Commissioning

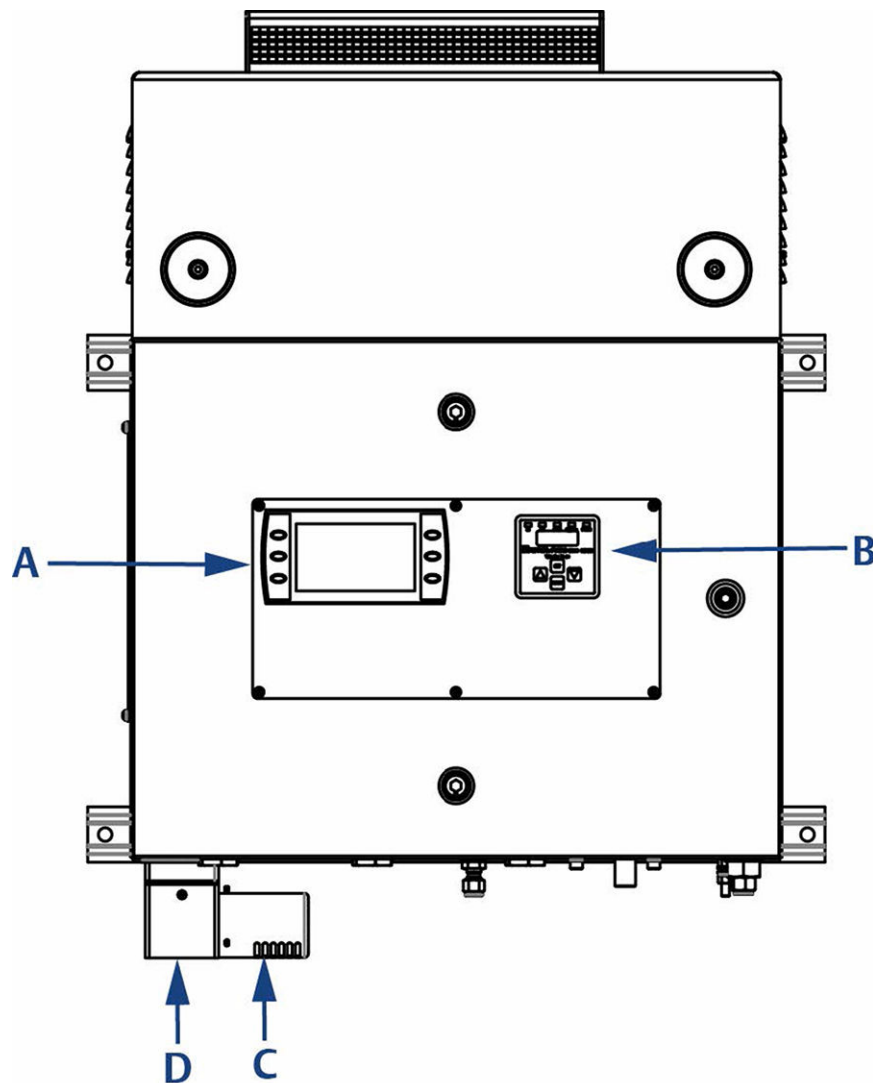
Once the sensor is fully installed as described above, it should be commissioned in accordance with the commissioning plan agreed between Emerson and the customer.

5 Controls and display controller

5.1 Front panel controls and indicators

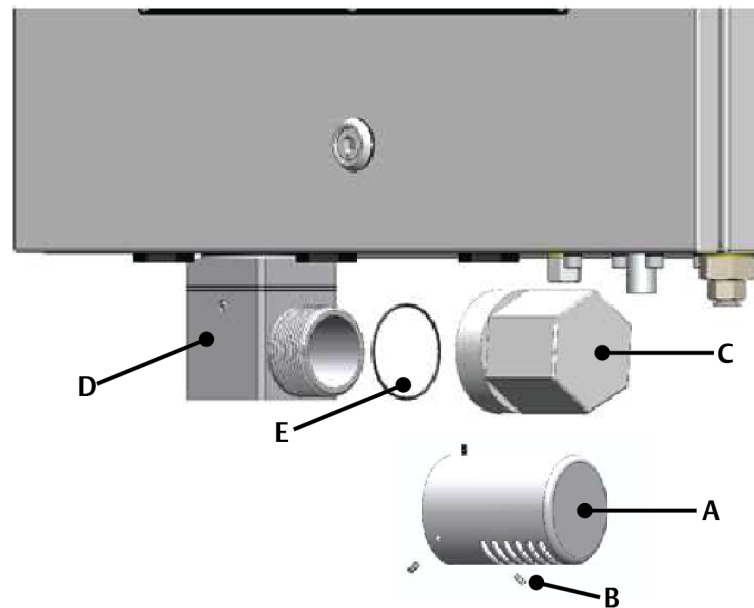
The Rosemount CT5100(Ex) is configured from the two control displays located on the front panel. Refer to [Figure 5-1](#).

Figure 5-1: Front Panel



- A. Display controller
- B. Purge control panel
- C. Protector cap
- D. Purge vent

Figure 5-2: Exploded View



- A. Vent cap
- B. 3/32-in. socket grub screws
- C. Protector cap
- D. Purge vent
- E. O-ring

The protector cap (Figure 5-2, C) must be removed from the purge vent (D) and replaced with the vented cap (A) supplied with the unit.

NOTICE

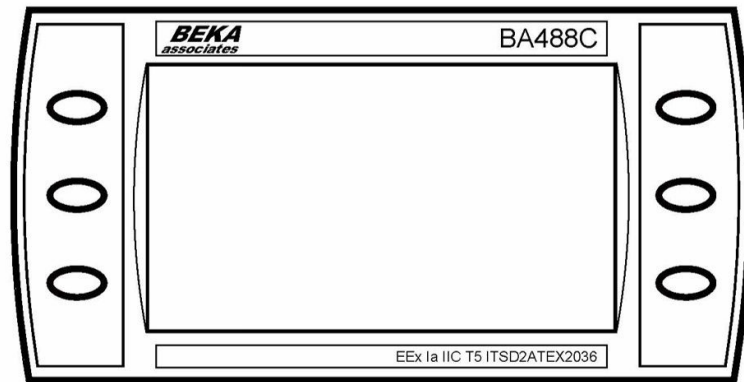
On/Off circuit breakers

There are no **On/Off** switches on the analyzer. The application of electrical power to the analyzer is controlled through two external circuit breakers.

Both external circuit breakers are simple two-pole on/off circuit breakers. Both must be set to On to permit the safe operation of the analyzer.

Operation of the analyzer is controlled primarily through the display controller. Refer to Figure 5-3.

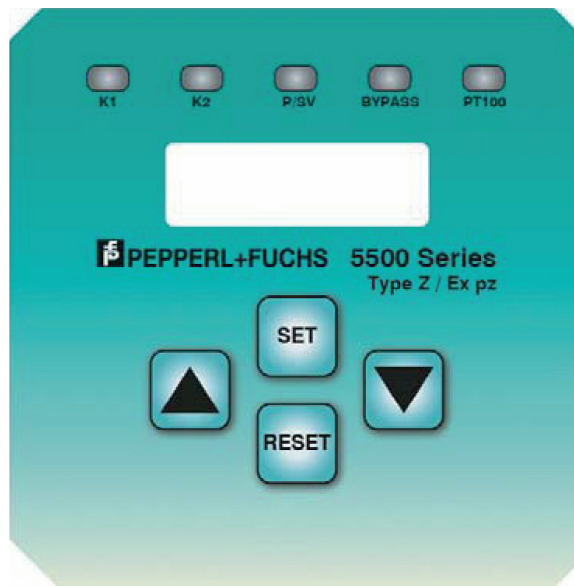
Figure 5-3: Display Controller



The purge control panel (Figure 5-4) is used to program the operation of the overpressure air system that prevents flammable and explosive gases from entering the analyzer's electrical compartment. Adjustment of the overpressure air system **MUST ONLY** be performed by maintenance personnel.

Five LEDs, identified as K1, K2, PSV, Bypass, and PT100, are located on the upper part of the purge control panel. These five LEDs indicate the status of the overpressure air system.

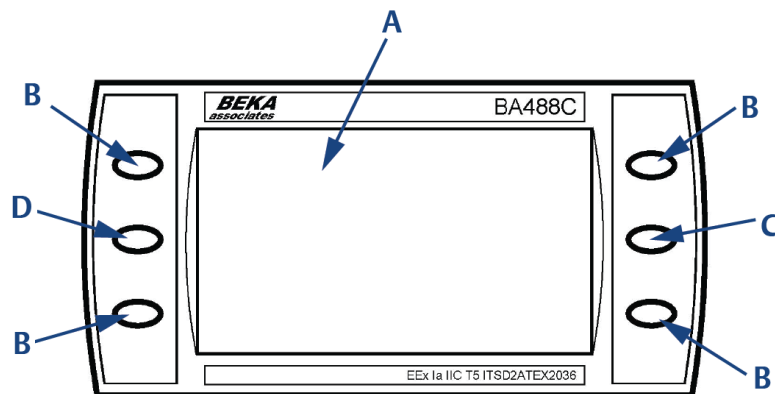
Figure 5-4: Purge Control Panel



5.2 Display controller

Operation of the Rosemount CT5100(Ex) is controlled through the six buttons on the display controller: [Figure 5-5](#).

Figure 5-5: Display Controller Buttons



- A. LCD display
- B. Configurable button
- C. Scroll up button
- D. Scroll down button

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

- Gas concentration measurements obtained.
- Operating temperature and pressure.
- Help screens.
- Step-by-step calibration.
- Diagnostics.

The two scroll buttons (C and D) are used to scroll through the information on the LCD display. The right-hand scroll button (C) is used to scroll up, and the left-hand scroll button (D) is used to scroll down.

5.3 Gas sensor main screen

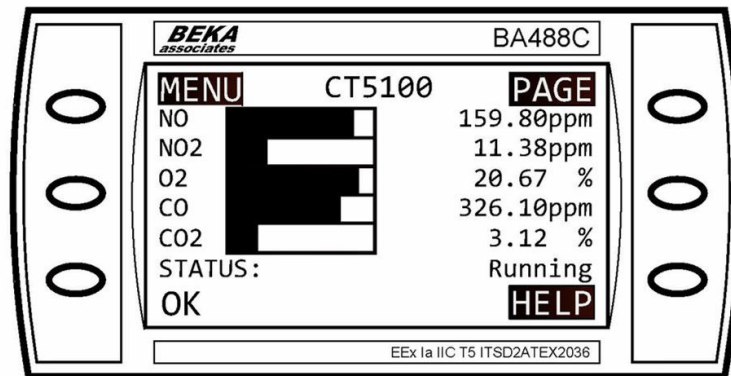
When the analyzer is switched on at the end of the start-up procedure, the **Gas Sensor Main** screen ([Figure 5-6](#)) appears.

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 5-6: Gas Sensor Main Screen



The **Gas Sensor Main** screen displays the gas concentration measurements obtained by the analyzer. In the example shown in [Figure 5-6](#) the gases nitric oxide (NO), nitrogen dioxide (NO₂), oxygen (O₂), carbon monoxide (CO), and carbon dioxide (CO₂) are being measured and, for each gas, the concentration detected is in parts per million (ppm) or percentage as applicable.

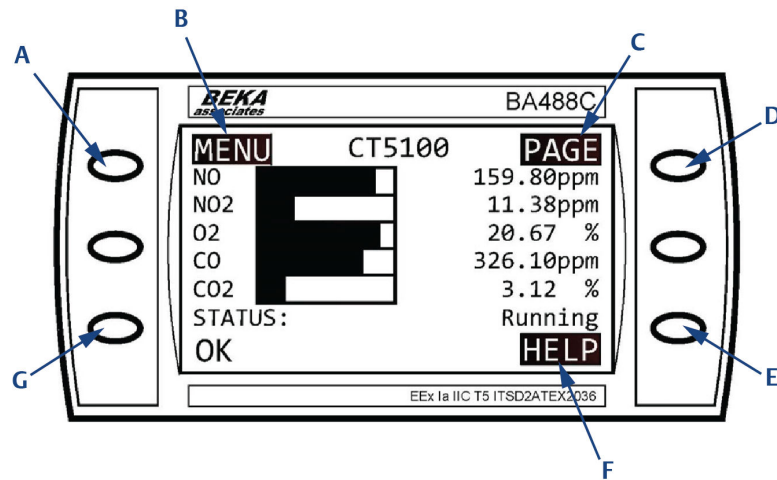
The NO_x reading is the total nitrogen oxide reading, a combination of nitric oxide (NO) and nitrogen dioxide (NO₂).

At the end of the start-up procedure, the gas measurements initially appear as 0.00 ppm 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 [Figure 5-6](#), the analyzer is *Running* and *OK* (e.g., no faults have been identified). This area of the display shows any errors detected by the software.

On the software screens, highlighted items are links to other screens in the software. To access a screen, press the button next to the highlighted item.

Figure 5-7: Gas Sensor Main Screen Buttons



- A. MENU button
- B. MENU text
- C. PAGE text
- D. PAGE button
- E. HELP button
- F. HELP text
- G. STATUS button

PAGE text is a link between the **Gas Sensor Main** screen and the **Pressure and Temperature** screen (described in [Pressure and temperature screen](#)). Press the **PAGE** button to toggle between these two screens.

HELP text is a link to the **Help** system. Press to go to the **Help** screen (described in [Help system](#)).

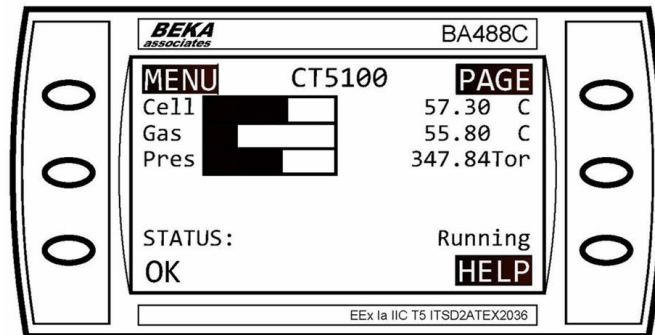
MENU text is a link to the **Main Menu** of the software. Press the **MENU** button to go to the **MAIN MENU** screen (described in [Main menu](#)).

On the **Gas Sensor Main** screen, **STATUS** button (Figure 5-7) 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.

5.4 Pressure and temperature screen

The **Pressure and Temperature** screen (Figure 5-8) shows pressure and temperature measurements taken inside the analyzer.

Figure 5-8: Pressure and Temperature Screen



The `Gas Te` reading is the temperature, in °C, of the gas within the analysis cell.

The `Pres` 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.

5.5 Help system


When the  button is pressed it takes you to the home page. Figure 5-9 shows an example of a help screen.

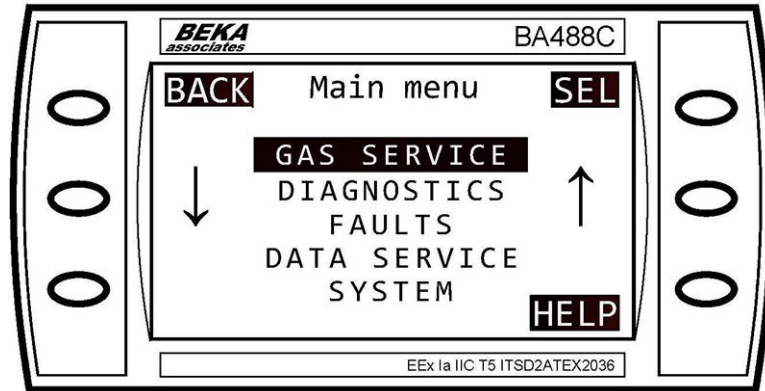
Figure 5-9: Example of a Help Screen



5.6 Main menu

To access the *Main menu* (Figure 5-10), press the MENU button on either side of the Gas Sensor Main screen (Figure 5-6) or the Pressure and Temperature screen (Figure 5-8). The *Main menu* (Figure 5-10) is used for calibration, diagnostics, fault finding, downloading data, and shutting down the analyzer.

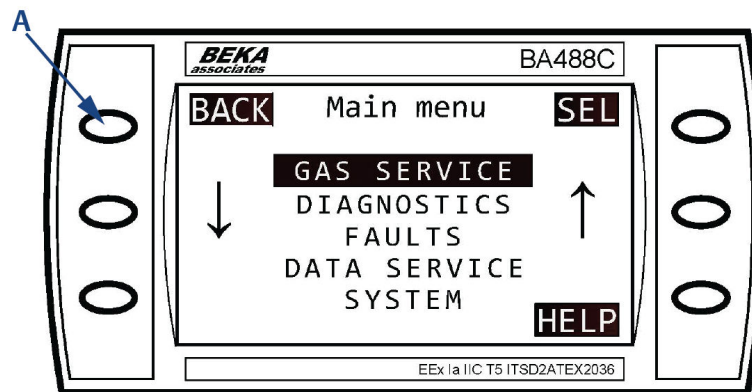
Figure 5-10: Main Menu



5.7 BACK button

On most of the software screens, (Figure 5-11) is configured as a BACK button. Press BACK (A) to return to the previous screen.

Figure 5-11: BACK Button



A. BACK button

6 Start-up procedure

6.1 Introduction

⚠ CAUTION

EQUIPMENT DAMAGE

Damage to the analyzer may result from a failure to follow this procedure.
Always follow the start-up procedure.

The analyzer normally operates continuously. It should only be necessary to start up the analyzer under the following circumstances:

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

6.2 Preparation for use

The Rosemount CT5100(Ex) must be installed and fully commissioned prior to start-up.

⚠ 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, ensure that electrical power, sample gas handling facilities, and any calibration gases that are required are available to the analyzer. Failure to perform pre-system start-up checks may cause damage to equipment.

⚠ WARNING

BURN HAZARD

Some parts of the analyzer may be heated up to 320 °F (160 °C). To prevent burns, do not touch any of the hot parts. All components of the analyzer are hot unless it has been switched off and allowed to cool down.

Before fitting, removing, or performing any maintenance on the analyzer, ensure that it has been switched off and allowed to cool for at least two hours. Before performing any maintenance on or, in the vicinity of the analysis cell, allow the analyzer to cool for at least twelve hours, as the analysis cell is insulated against heat loss.

When handling the analyzer, always use suitable protective gloves.

Personal injury and/or damage to property may result if these safety precautions are not observed. These precautions are especially important when working at heights. If you receive a burn, seek medical treatment immediately.

6.3 Start-up

Note

The gases shown in the screenshots and the measurements thereof may be different from those shown in your particular Rosemount CT5100(Ex). They indicate the functionality of the software, which is the same regardless of the gases being measured.

Note

To stop the start-up procedure at any time, set the main circuit breaker to **Off**.

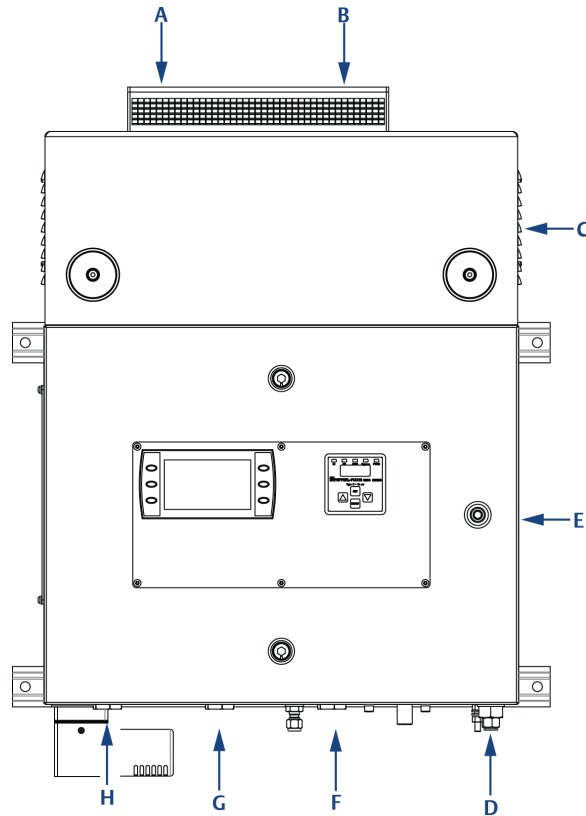
To start up the analyzer,

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. Verify that the analyzer has been correctly installed as described in [Install](#).
3. Ensure that the top cover is fitted to the analyzer. If it is not, report it to the maintenance organization and do not proceed further until the top cover has been fitted.
4. Confirm that the door to the electrical compartment is closed and locked. If the door cannot be closed and locked, report it to the maintenance organization and do not proceed further until the door has been repaired.
5. Ensure that the gas handling system is turned off.
6. Verify that the external main and secondary circuit breakers are set to **Off**.
7. Visually examine the three gas ports.

If necessary, refer to [Figure 6-1](#) to ensure that the sample supply line, the sample return line, and the compressed air line are correctly attached.

Figure 6-1: Rosemount CT5100(Ex) Gas Inlet and Outlet and Electrical Connections



- A. Sample gas return port
- B. Sample gas input port
- C. Top cover of analyzer (cell compartment)
- D. Purge air supply
- E. Laser/electrical compartment
- F. Analog/digital power entry point
- G. Power entry point
- H. Purge power and alarm entry point

8. Visually check that the electrical connections have been made to the three power entry points, [Figure 6-1](#), at the base of the analyzer.
9. Visually check that the vent cap is fitted to the purge vent ([Figure 4-3](#)).
UNDER NO CIRCUMSTANCES may the analyzer be started with the protector cap fitted as this will prevent the analyzer from venting during the purge process.

▲ WARNING

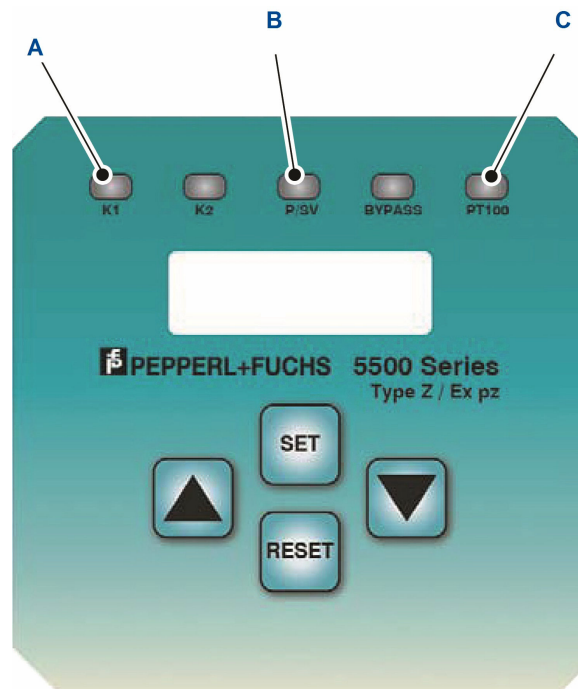
FLAMMABLE/EXPLOSIVE GASES

The purge/pressurization cycle expels any flammable or explosive gases from the analyzer's electrical compartment. The analyzer must be purged for a minimum of 2 minutes 30 seconds at a minimum flow rate of 280 L/m at 1.5 ± 0.5 bar to prevent hazards to personnel during the startup process.

Only after the purge/pressurization cycle has been completed can electrical power be applied to the rest of the analyzer.

10. Turn on the compressed air supply to the analyzer.
11. Set the main circuit breaker to *On*. The air pressurization will begin its automatic start-up and begin to purge the air inside the analyzer.

Figure 6-2: Purge Control Panel



- A. K1 LED
- B. P/SV LED
- C. PT100 LED

12. Observe the PT100 LED on the purge control panel (Figure 6-2).
If the PT100 LED (C) illuminates red, the air pressurization system is unserviceable, and the start-up procedure must be halted immediately. To halt the start-up procedure, set the external main circuit breaker to **Off**. Lock off or tag off the main circuit breaker, turn off the compressed air supply, and report the fault to the maintenance organization.

13. Observe the P/SV LED (B) on the purge control panel.
When the pre-set internal overpressure has been reached, the P/SV LED (B) illuminates orange. If the P/SV LED (B) does not illuminate blue, the pressurization system is unserviceable, and the start-up procedure must be halted immediately. To halt the start-up procedure, set the external main circuit breaker to **Off**, lock off or tag off the main circuit breaker, turn off the compressed air supply, and report the fault to the maintenance organization.

⚠ WARNING

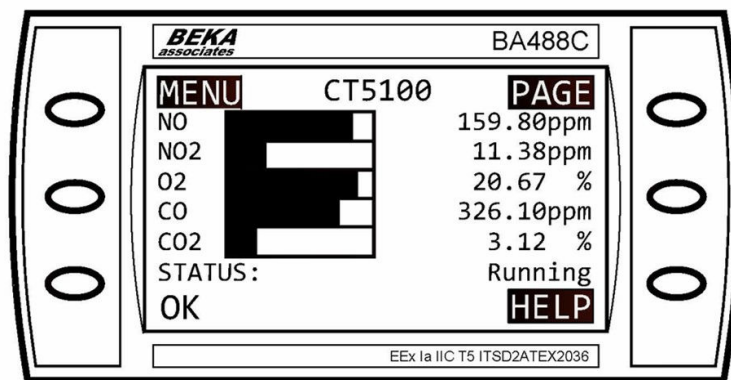
FLAMMABLE/EXPLOSIVE GASES

The purge/pressurization cycle expels any flammable or explosive gases from the analyzer's electrical compartment. The analyzer must be purged for a minimum of 2 minutes 30 seconds at a minimum flow rate of 280 L/m at 1.5 ± 0.5 bar to prevent hazards to personnel during the startup process.

Only after the purge/pressurization cycle has been completed can electrical power be applied to the rest of the analyzer.

14. Wait until the purge cycle is performed.
Do not switch on the secondary circuit breaker until the purge cycle is complete. Observe the K1 LED (A) on the purge control panel, which will illuminate green when the purge cycle is complete.
15. When the purge/pressurization cycle is complete, set the secondary circuit breaker to **On**, which applies electrical power to the rest of the analyzer.
The analyzer begins its automatic start-up. The control PC that forms part of the analyzer is configured to automatically load the necessary gas sensor software and configuration files. The start-up sequence commences automatically under software control.
After a few seconds, the *Gas Sensor main* screen (Figure 6-3) appears on the display controller. If it does not, report the fault to the maintenance organization.

Figure 6-3: Gas Sensor Main Screen



16. Start up the system for returning sample gas.

17. Start up the gas handling system that conditions the sample gas before it is fed into the analyzer.

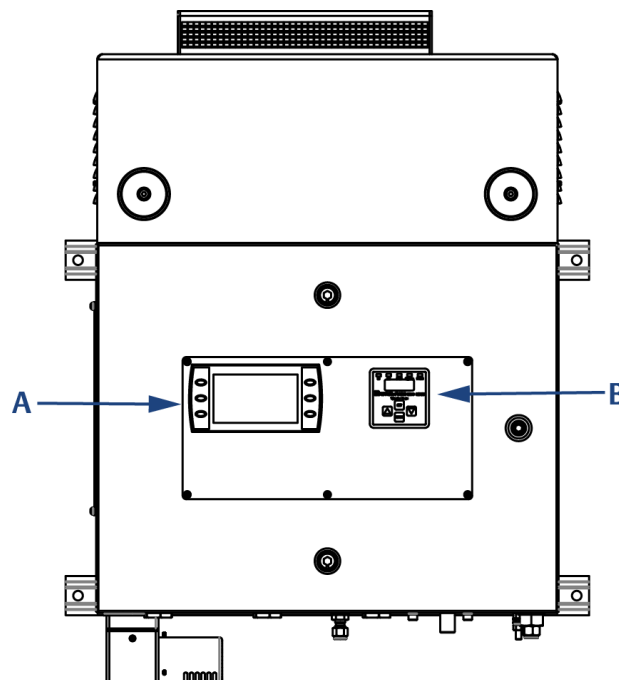
At the end of the start-up procedure, the gas measurements initially appear as 0.00 ppm until the first readings are taken. After a few seconds, the initial gas concentrations are displayed.

The start-up procedure is now complete.

6.4 Front panel controls and indicators

The is configured from the control display located on the front panel (Figure 6-4).

Figure 6-4: Front Panel



- A. Display controller
- B. Purge control panel

NOTICE

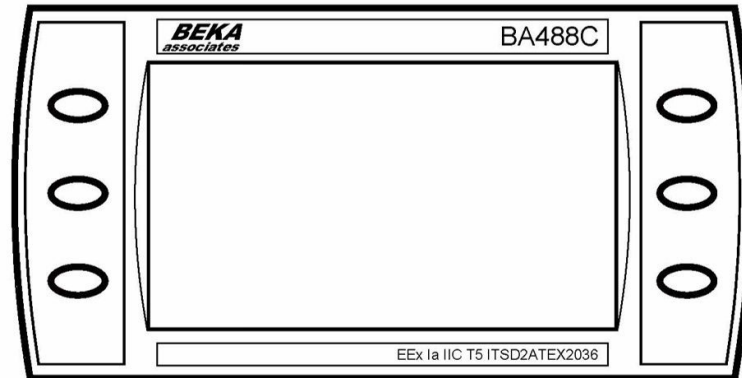
On/Off circuit breakers

There are no **On/Off** switches on the analyzer. The application of electrical power to the analyzer is controlled through a customer provided external circuit breaker.

The circuit breaker is a simple two-pole on/off circuit breaker that must be set to *On* to permit the safe operation of the analyzer.

Operation of the analyzer is controlled primarily through the display controller [Figure 6-5](#).

Figure 6-5: Display Controller



⚠ CAUTION

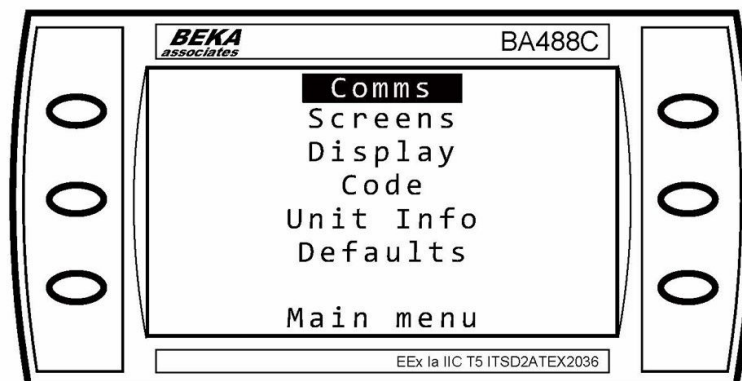
DO NOT, under any circumstances, press the top two buttons on the display controller simultaneously. This will override the system code supplied with the analyzer and display the default program screen for the controller.

This will lock the software controlling the analyzer requiring the analyzer to shut down externally and restarted risking a possible corruption of the software and loss of the analyzer operation during the shutdown and restart process.

It is essential that only trained, qualified personnel operate the controls on the analyzer.

Failure to follow these instructions may cause warranty invalidation, property damage and/or personal injury or death.

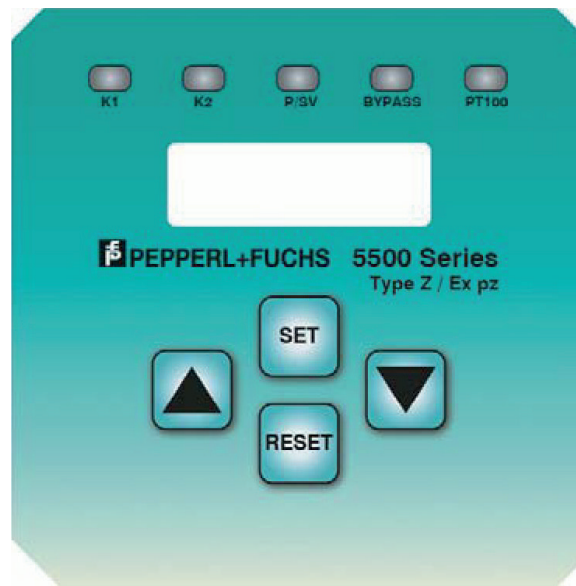
Figure 6-6: Default Program Screen



The purge control panel ([Figure 6-7](#)) is used to program the operation of the overpressure air system that prevents flammable and explosive gases from entering the electrical compartment of the analyzer. Adjustment of the overpressure air system must only be performed by maintenance personnel.

Five LEDs, identified as K1, K2, PSV, Bypass, and PT100 are located on the upper part of the purge control panel. These five LEDs indicate the status of the overpressure air system.

Figure 6-7: Purge Control Panel



7 ATEX/IECEX assessment report summary

7.1 Certification overview

This article is in accordance with IEC 60079-0: 2011 Clause 30. This article must not be changed amended or removed.

This report covers the assessment of the Rosemount CT5100(Ex) Continuous Gas Analyzer to the standards listed in [Assessment standards](#), in order to support the issue of prime ATEX and IECEx certification.

7.2 Applicant's name and address

Cascade™ Technologies Ltd.
Glendevon House
Castle Business Park
Stirling
FK9 4TZ
UK

7.3 Manufacturer's name and address

As applicant.

7.4 Trademark



7.5 Product name/model number

Rosemount CT5100(Ex) Continuous Gas Analyzer

7.6 Rating

110 V to 120 V, 60 Hz
220 V to 240 V, 50 Hz
1100 W

7.7 Assessment standards

Table 7-1: Europe

IECEX	ATEX
IEC 60079-0:2011 Ed 6	EN 60079-0:2012/A11:2013
IEC 60079-2:2014 Ed 6	EN 60079-2:2014
IEC 60079-28:2015 Ed 2	EN 60079-28:2015

(The requirements of the equivalent ATEX and IECEx standards are similar; therefore, any references in the following report can be regarded as referring to either format unless stated otherwise.)

This report may be issued against standards that do not appear on the UKAS Scope of Accreditation, but have been added through Sira's flexible scope of accreditation. Sira's flexible scope is available on request.

7.8 Markings

Table 7-2: IECEx and ATEX Markings



Detail	IECEX	ATEX
Certificate number	IECEX SIR 16.0050X	Sira 16ATEX1158X
Certification code	EX ia d [ia Ga] op is pzc IIC T3 Gc Tamb -20 to +55 °C	EX ia d [ia Ga] op is pzc IIC T3 Gc Tamb -20 to +55°C
Other marking	N/A	  II 3 (1) G

Table 7-3: North American Markings

Detail	CSA North American Marking
Certificate number	70044220
Marking class	CLASS- 2258-02
Certification code	Class I, Division 2, Groups A, B, C, D; T3. Tamb-20 °C to +55 °C
Marking class	CLASS- 2258-82
Certification code	Class I, Division 2, Groups A, B, C, D; T3. Tamb-20 °C to +55 °C

Table 7-4: Common Markings

Details	
Model number	Rosemount CT5100(Ex) Continuous Gas Analyzer
Manufacturer's name	Cascade Technologies Ltd
Manufacturer's address	Glendevon House Castle Business Park Stirling FK9 4TZ UK
Ambient range	-4 to 131 °F -20 to 55 °C
Serial number	As applicable
Year of manufacture	As applicable

Table 7-4: Common Markings (continued)

Details	
Warnings (English/French)	<p>WARNING Pressurized enclosure AVERTISSEMENT Enveloppe à surpression interne</p> <p>WARNING Do not open when an explosive atmosphere is present. AVERTISSEMENT Ne pas ouvrir si une atmosphère explosive est présente.</p> <p>WARNING Power shall not be restored after an enclosure has been opened until enclosure has been purged for a minimum of two minutes 30 seconds at a minimum flow rate of 280 L/m at 1.5 ± 0.5 bar to prevent hazards to personnel during maintenance. AVERTISSEMENT À la suite d'une ouverture, la mise sous tension ne doit pas être effectué avant que l'enveloppe n'ait été balayée pendant 2½ minutes sous un débit de 280 L/min.</p> <p>WARNING This enclosure contains inert gas and may be an asphyxiation hazard. AVERTISSEMENT Cette enveloppe contient un gaz inerte et peut constituer un danger d'asphyxie.</p> <p>WARNING Batteries are located inside this enclosure. Do not open when an explosive atmosphere is present. AVERTISSEMENT Présence de batteries à l'intérieur de cette enveloppe. Ne pas ouvrir si une atmosphère explosive est présente.</p> <p>WARNING This pressurized enclosure contains a battery which remains connected after the external power has been isolated. Consideration should be given to the removal of the battery if the enclosure is to remain unprotected by Ex for a significant time. AVERTISSEMENT Cette enveloppe à surpression interne contient une batterie qui reste connecté après que l'alimentation externe a été isolée. Il convient de retirer la batterie s'il faut que l'enveloppe reste sans protection ex pendant une durée prolongée.</p>
Type of protective gas	Instrument quality air or inert gas
Minimum overpressure	0.5 mbar
Maximum overpressure	10 mbar

Table 7-4: Common Markings (continued)

Details	
Minimum purge flow rate	280 L/min
Leakage rate	25 L/min
Minimum purge supply pressure	1 Bar
Maximum purge supply pressure	2 Bar
Minimum purge time	2 minutes 30 seconds
Minimum supply pressure	1 Bar
Maximum supply pressure	2 Bar

7.9 Conditions of certification/special conditions for safe use

Europe

- The purge controller keypad mounted on the front of the equipment shall not be exposed to direct UV light sources or direct sunlight. Example methods of protection include, but are not limited to, indoor applications away from UV sources and outdoor locations under shading. As part of regular inspections, if damage to or deterioration of the membrane keypad is detected, the unit is to be taken out of service for repair or replacement.
- The purge controller bypass function shall only be enabled during setup or maintenance and only when the area is known to be non-hazardous.
- The equipment shall be installed in an area of not more than pollution degree 2 as defined in IEC 60664-1.
- The cable glands used in the equipment are only suitable for use in areas with a low risk of mechanical damage and must be suitably protected.
- Rosemount CT5100(Ex) purge controller automatically monitors the internal pressure of the enclosure and will output any fault conditions onto contact K2. It is the responsibility of the end user to connect this contact to a suitable facility, such as an alarm or an automatic shutdown system.
- For correct operation the on-site pressurizing air supply must be capable of providing at least 25 L/min for leakage compensation.
- When using the Rosemount CT5100(Ex) variant fitted with the Elmess gas cell heater certified as BVS 14ATEXE155U and IECEx BVS 14.0106U, the equipment top compartment should be cooled with a source of compressed air at a minimum flow rate of 280 L/min.
- The Elmess gas cell heater certified as BVS 14ATEXE155U and IECEx BVS 14.0106U may only be used in combination with the ESI Technology gas cell pressure transducer certified as TRAC12ATEX0060X and IECEx TRC 12.0025X.

North America

- The purge controller keypad mounted on the front of the equipment shall not be exposed to direct UV light sources or direct sunlight. Example methods of protection include, but are not limited to, indoor applications away from UV sources and outdoor locations under shading. As part of regular inspections, if damage to or deterioration of the membrane keypad is detected, the unit is to be taken out of service for repair or replacement.
- The purge controller bypass function shall only be enabled during setup or maintenance and only when the area is known to be non-hazardous.
- The cable glands used in the equipment are only suitable for use in areas with a low risk of mechanical damage and must be suitably protected.
- The purge controller provided with this equipment provides alarm signals at various contacts as described in the equipment instructions. The alarms relate to low-flow and loss of purged air supply and must be connected to the end-users remote, monitored, alarm system.
- For correct operation the on-site pressurizing air supply must be capable of providing at least 25 L/min for leakage compensation.
- This assessment does not cover reliable function, performance, or other properties of the equipment not related to safety.
- The equipment is to be installed using wire no larger than the protective earth wire.
- Equipment is only to be installed by manufacturer trained personnel.
- If at anytime there is a conflict between the system safety provisions and any relevant local (national or regional) requirements, the local requirements always take precedence.
- Equipment is not to be used with flammable liquids.
- The relief valve sealing cap must be fitted to maintain IP66 when the unit is in a non-operational state.
- Equipment is subject to acceptance of the local inspection authorities having jurisdiction.
- The equipment is intended for use only with air of instrument quality; all piping up to and including the shut-off valve adjacent to the equipment must be protected against mechanical damage.
- The protective gas supply to the equipment must be marked with the warning as detailed in NFPA496 Clause 4.12.5.
- When installing conduit for power and data connections the end-user must select suitably certified conduit.

7.10 Conditions of certification for the replacement of simple devices

Approval for the PT100 temperature sensor as a simple device.

- To permit connection of a suitable temperature sensor, the following intrinsically safe (IS) parameters have been declared.
- For the connections emerging from the purged enclosure:

Parameter	IS
Voltage U_o	12.4 V
Current I_o	17.4 mA
Power P_o	54 mW
Capacitance C_i	0
Inductance L_i	0

- The capacitance and either the inductance or L/R of the load connected to hazardous area terminals of the apparatus must not exceed the following values for Group IIC:

Capacitance	Inductance	L/R ratio
1.24 μ F	117 mH	597 μ H/ohm

The above parameters apply when one of the two conditions below is given:

- The total L_i of the external circuit (excluding the cable) is < 1 percent of the L_o value **or**
- The total C_i of the external circuit (excluding the cable) is < 1 percent of the C_o value.

The above parameters are reduced to 50 % when both of the two conditions below are given:

- The total L_i of the external circuit (excluding the cable) is \geq 1 percent of the L_o value **or**
- The total C_i of the external circuit (excluding the cable) is \geq 1 percent of the C_o value.

Note

The reduced capacitance of the external circuit (including cable) shall not be greater than 600 nF for Group IIC.

A Engineering drawings

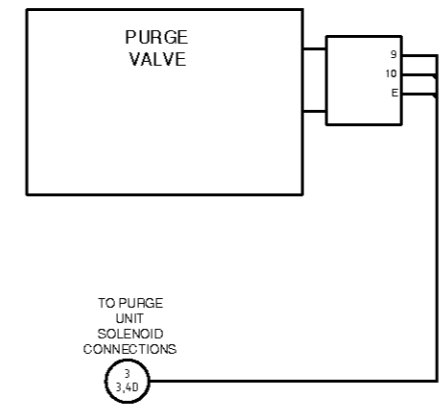
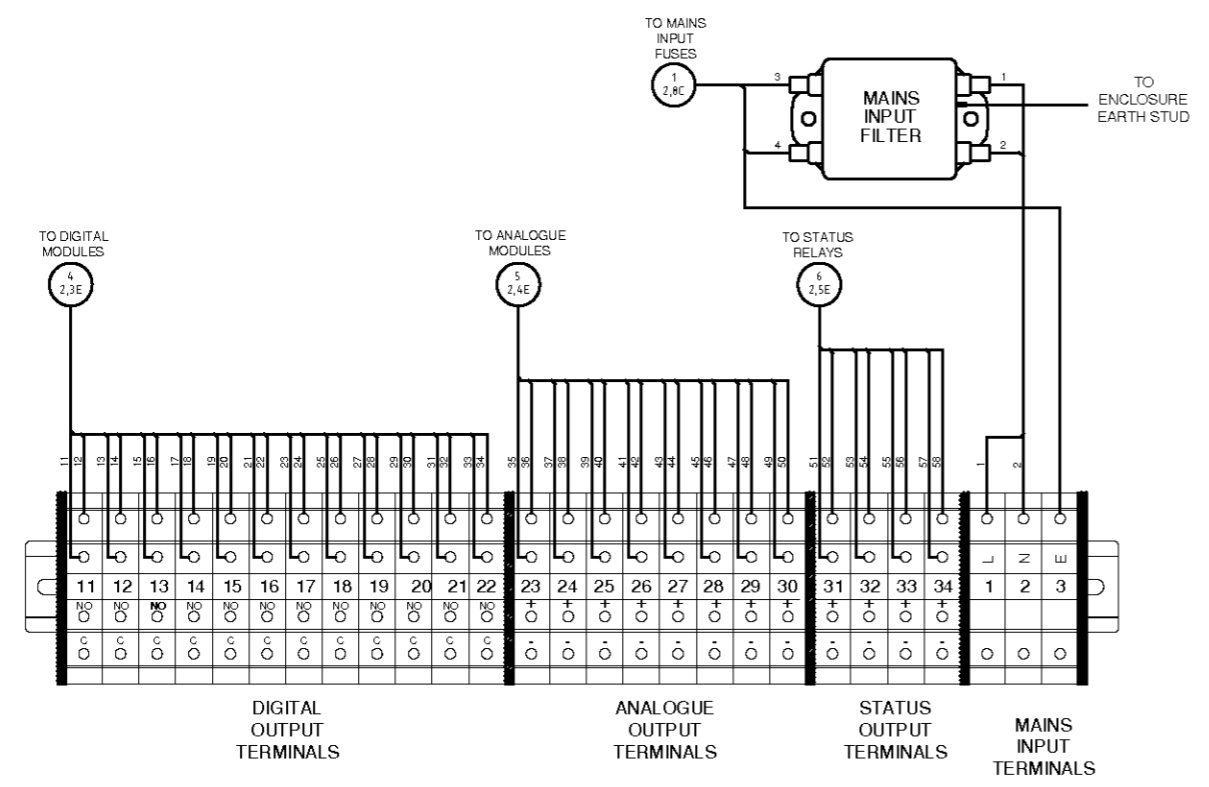
Use the wiring diagrams for the Rosemount™ CT5100(Ex) analyzer to assist with troubleshooting faults. These diagrams may be used to locate the position of a wiring connector should it become disconnected.

Table A-1: List of Engineering Drawings

Drawing number	Description
W-2000-0034 (Sheets 1-5)	Rosemount CT5100(Ex) heated

CERTIFICATION RELATED DOCUMENT, UNAUTHORISED ALTERATION, STRICTLY NON PERMISSIBLE

USER CONNECTIONS	
TERMINAL	FUNCTION
1	SENSOR SYSTEM SUPPLY (L)
2	SENSOR SYSTEM SUPPLY (N)
3	EARTH
11	DIGITAL OUTPUT 1
12	DIGITAL OUTPUT 2
13	DIGITAL OUTPUT 3
14	DIGITAL OUTPUT 4
15	DIGITAL OUTPUT 5
16	DIGITAL OUTPUT 6
17	DIGITAL OUTPUT 7
18	DIGITAL OUTPUT 8
19	DIGITAL OUTPUT 9
20	DIGITAL OUTPUT 10
21	DIGITAL OUTPUT 11
22	DIGITAL OUTPUT 12
23	ANALOGUE OUTPUT 1
24	ANALOGUE OUTPUT 2
25	ANALOGUE OUTPUT 3
26	ANALOGUE OUTPUT 4
27	ANALOGUE OUTPUT 5
28	ANALOGUE OUTPUT 6
29	ANALOGUE OUTPUT 7
30	ANALOGUE OUTPUT 8
31	STATUS OUTPUT 1 (Check Function)
32	STATUS OUTPUT 2 (Maintenance Required)
33	STATUS OUTPUT 3 (Out Of Specification)
34	STATUS OUTPUT 4 (Failed)



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 GLENDEVON HOUSE-CASTLE BUSINESS PARK
 STIRLING FK9 4TZ-UK

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A3

DO NOT SCALE
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 MANUALLY

DRAWING No:
W-2000-0034

DESCRIPTION:
CT5100 EX HEATED

REV. D	DRAWN BY	JMC
	CHECKED BY	MD
	ISSUE DATE	23/MAR/2016

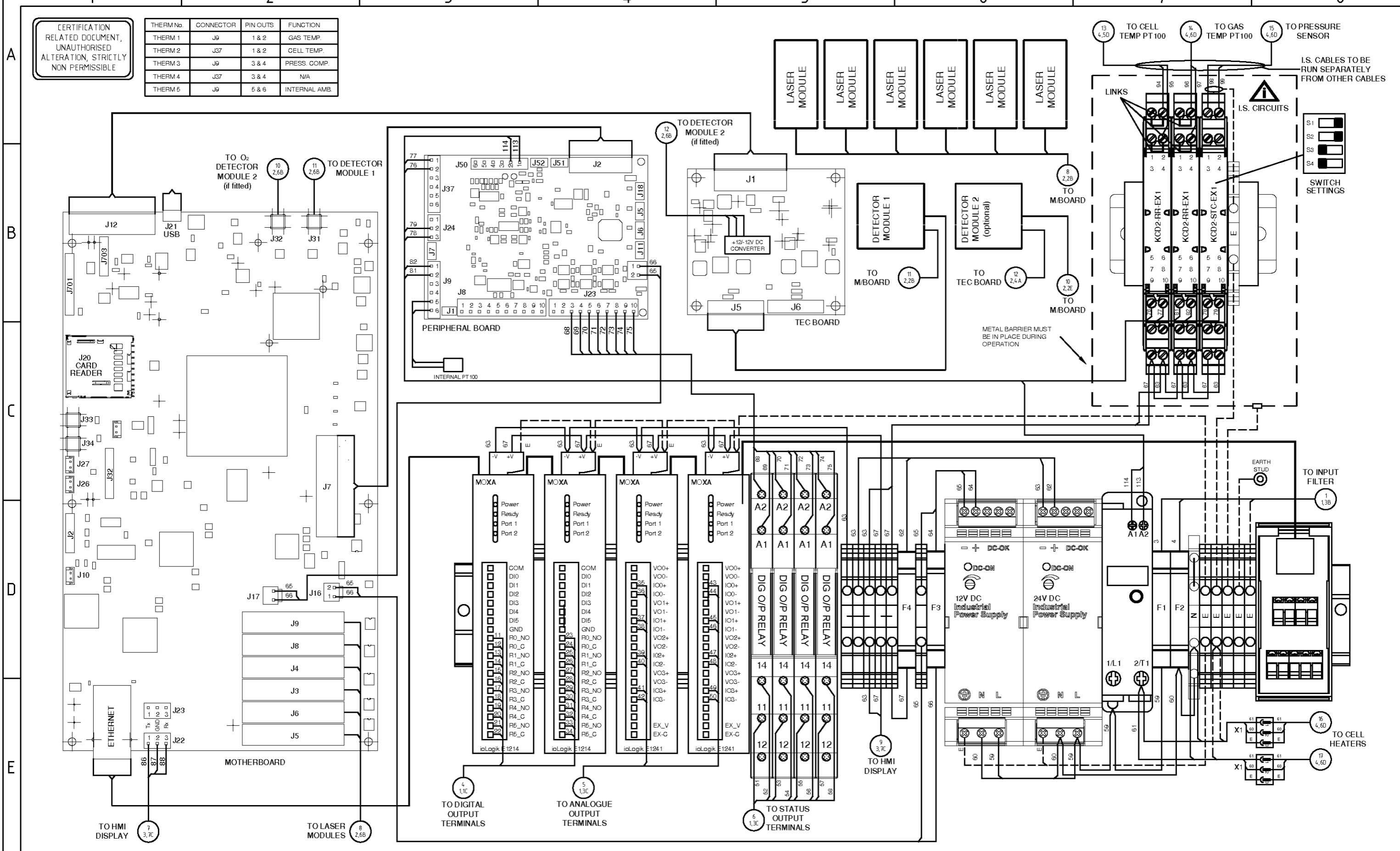
SHEET 1 OF 5

1
 1,2A

BALLOON I.D. NO.
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 DRAWING SHEET NO.

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THERM No	CONNECTOR	PIN OUTS	FUNCTION
THERM 1	J9	1 & 2	GAS TEMP.
THERM 2	J37	1 & 2	CELL TEMP.
THERM 3	J9	3 & 4	PRESS. COMP.
THERM 4	J37	3 & 4	N/A
THERM 5	J9	5 & 6	INTERNAL AMB.



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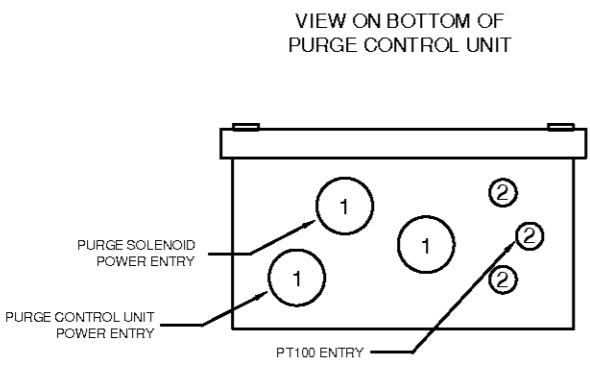
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CHECKED BY	MD
ISSUE DATE	23/MAR/2016

SHEET 2 OF 5

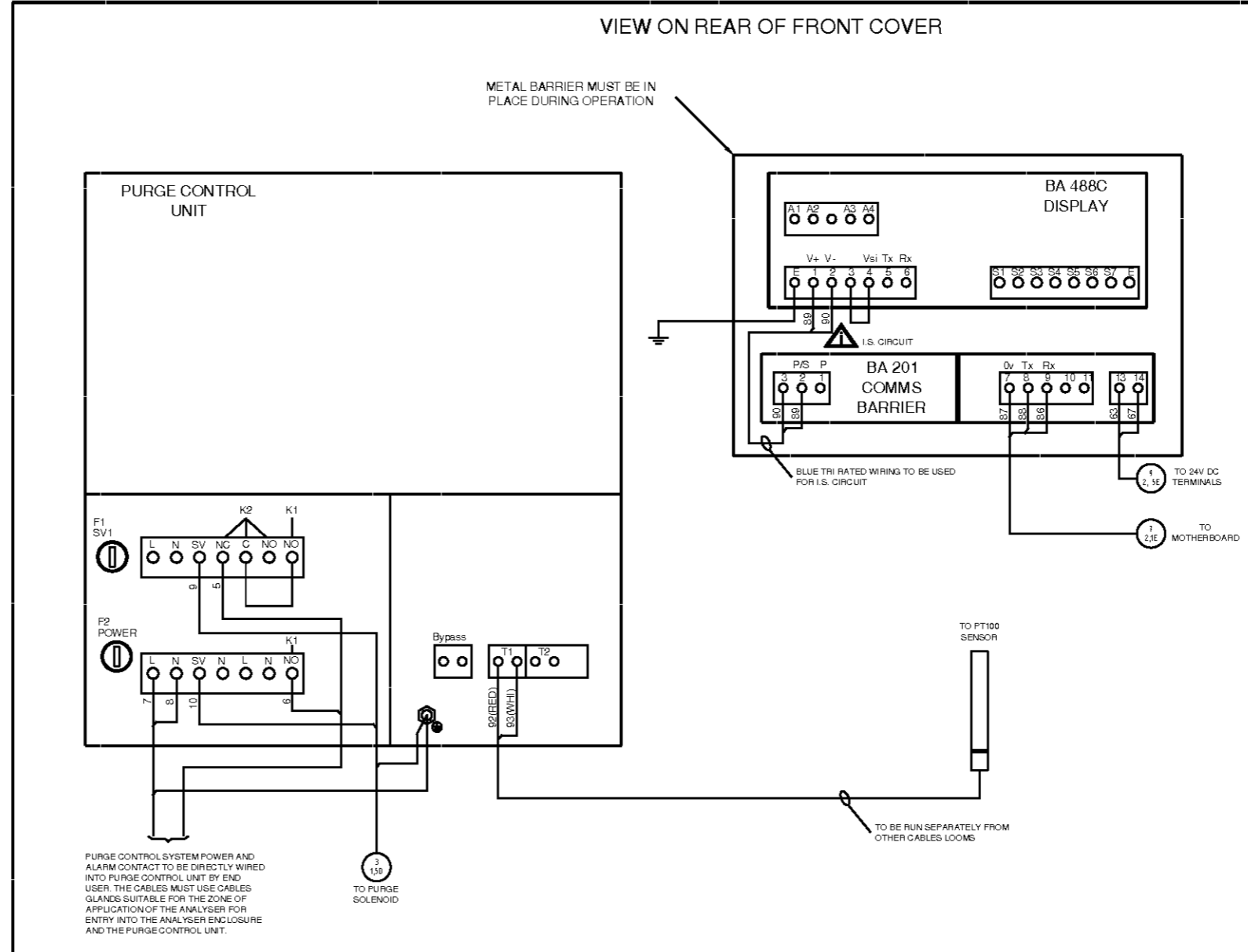
1.2A BALLOON I.D. NO.
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 DRAWING SHEET NO.

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NOTE:

1. CABLE ENTRIES MARKED (1) ARE M20 X 1.5, CABLES ENTRIES MARKED (2) ARE M12 X 1.5
2. ALL CABLES ENTERING THE PURGE CONTROL UNIT MUST DO SO THROUGH SEPARATE CABLE GLANDS
3. ALL UNUSED CABLE ENTRIES TO BE FITTED WITH SUITABLE BLANKING PLUGS
3. REFER TO MANUAL PAGES 17 & 18 FOR FURTHER GUIDANCE ON THE PURGE CONTROL UNIT WIRING



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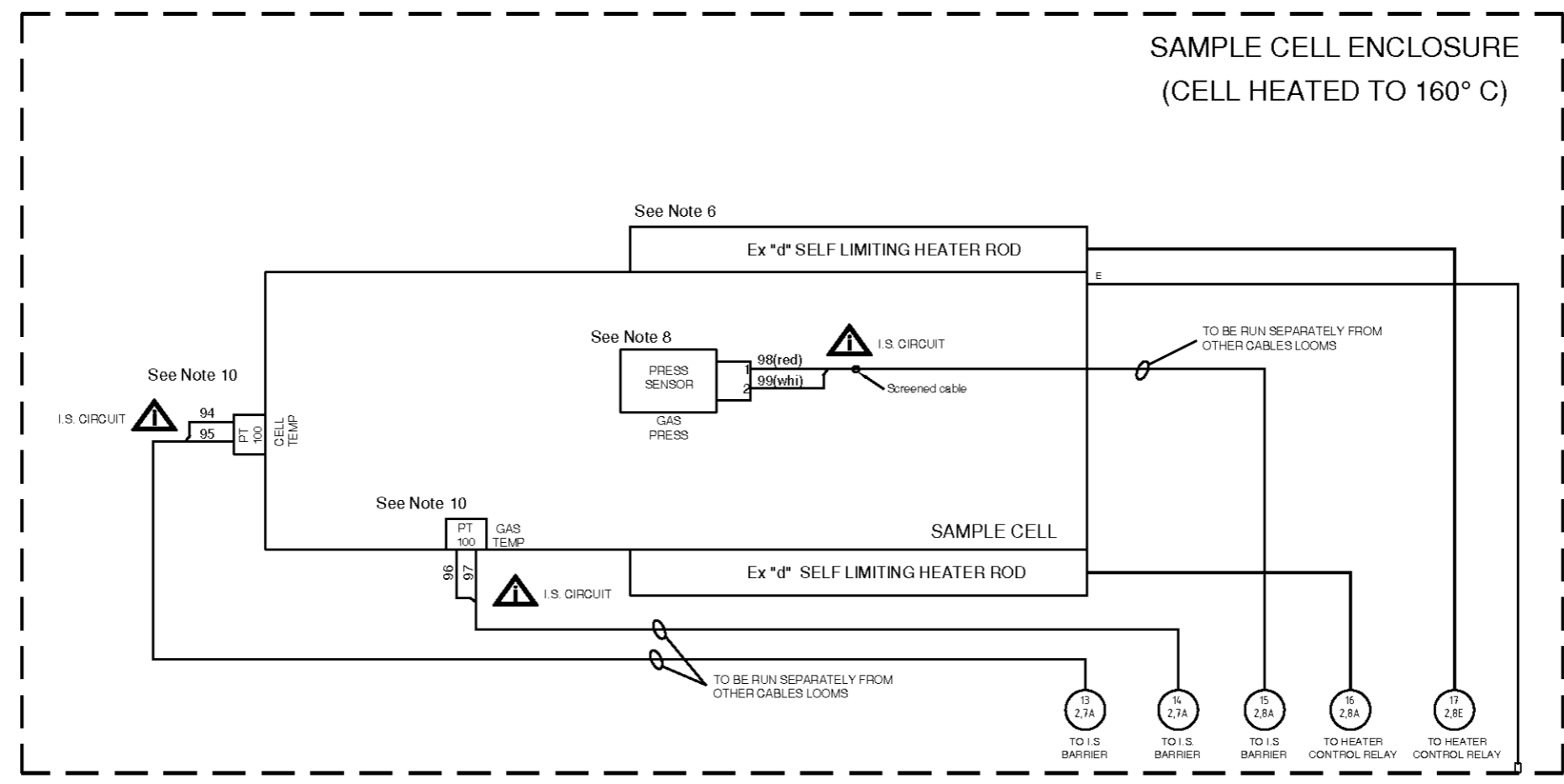
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SHEET 4 OF 5

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BALLOON I.D. NO.
DRAWING SHEET LOC.
DRAWING SHEET NO.

DRG No: W-2000-0034 REVISION: D
 DATE LAST SAVED: #####
 TEMPLATE: 7.3.3.00001-06

CERTIFICATION
 RELATED DOCUMENT,
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MOD REV	DESCRIPTION OF CHANGE	CCAR	BY DATE	APR'D DATE
C	TRANSFERRED TO NEW TEMPLATE, CERTIFICATION LABEL ADDED. STATUS RELAYS ON SHEET 2 ENLARGED FOR CLARITY OF READING. CHANGE CONTROL SHEET ADDED	CCAR 0013 CN 1571	JMC 19/10/18	MD 20/10/18
D	TERMINALS 4,5,6,7,8,9 AND 10 FOR PURGE CONTROL SYSTEM WIRING REMOVED FROM SHEET 1. WIRING FOR PURGE POWER AND ALARM ON SHEET 3 SHOWN CONNECTING DIRECTLY INTO PURGE CONTROL UNIT BY END USER. WIRING FOR PURGE SOLENOID SHOWN CONNECTING DIRECTLY INTO PURGE CONTROL UNIT ON SHEET 3. CABLE GLAND LAYOUT OF PURGE CONTROLLER AND NOTES ON WIRING ADDED TO SHEET 3	CCAR 0018 CN 1749	JMC 03/04/19	MD 03/04/19



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SHEET 5 OF 5
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