

# Model 400A

## Hydrocarbon Analyzer





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# Hydrocarbon Analyzers

**READ THIS PAGE BEFORE PROCEEDING!**

## ESSENTIAL INSTRUCTIONS

Emerson Process Management designs, manufactures and tests its products to meet many national and international standards. Because these instruments are sophisticated technical products, **you MUST properly install, use, and maintain them** to ensure they continue to operate within their normal specifications. The following instructions **MUST be adhered to** and integrated into your safety program when installing, using, and maintaining Emerson's Rosemount Analytical products. Failure to follow the proper instructions may cause any one of the following situations to occur: Loss of life; personal injury; property damage; damage to this instrument; and warranty invalidation.

- **Read all instructions** prior to installing, operating, and servicing the product.
- If you do not understand any of the instructions, **contact your Emerson Process Management representative** for clarification.
- **Follow all warnings, cautions, and instructions** marked on and supplied with the product.
- **Inform and educate your personnel** in the proper installation, operation, and maintenance of the product.
- **Install your equipment as specified in the Installation Instructions of the appropriate Instruction Manual and per applicable local and national codes.** Connect all products to the proper electrical and pressure sources.
- To ensure proper performance, **use qualified personnel** to install, operate, update, program, and maintain the product.
- When replacement parts are required, ensure that qualified people use replacement parts specified by Emerson Process Management. Unauthorized parts and procedures can affect the product's performance, place the safe operation of your process at risk, **and VOID YOUR WARRANTY.** Look-alike substitutions may result in fire, electrical hazards, or improper operation.
- **Ensure that all equipment doors are closed and protective covers are in place, except when maintenance is being performed by qualified persons, to prevent electrical shock and personal injury.**

The information contained in this document is subject to change without notice.



## Section i Introduction

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### PREFACE

The purpose of this manual is to provide information concerning the components, functions, installation and maintenance of the Model 400A Hydrocarbon Analyzer, Catalog No. 194106, Serial No. 2000001 and greater.

Some sections may describe equipment not used in your configuration. The user should become thoroughly familiar with the operation of this module before operating it. Read this instruction manual completely.

### DEFINITIONS

The following definitions apply to WARNINGS, CAUTIONS, and NOTES found throughout this publication.

#### **WARNING**

Highlights an operation or maintenance procedure, practice, condition, statement, etc. If not strictly observed, could result in injury, death, or long-term health hazards of personnel.





#### **CAUTION**

Highlights an operation or maintenance procedure, practice, condition, statement, etc. If not strictly observed, could result in damage to or destruction of equipment, or loss of effectiveness.

#### **NOTE**

Highlights an essential operating procedure, condition, or statement.

## SYMBOLS

-  : EARTH (GROUND) TERMINAL
-  : PROTECTIVE CONDUCT OR TERMINAL
-  : RISK OF ELECTRICAL SHOCK
-  : WARNING: REFER TO INSTRUCTION MANUAL

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### NOTE TO USERS

The number in the lower right corner of each illustration in this publication is a manual illustration number. It is not a part number, and is not related to the illustration in any technical manner.

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## TECHNICAL SUPPORT HOTLINE

For assistance with technical problems, please call the Customer Support Center (CSC). The CSC is staffed 7:00 AM to 6:00 PM Monday through Friday.

Phone: 1-800-433-6076

1-440-914-1261

In addition to the CSC, you may also contact Field Watch. Field Watch is staffed 24 hours per day, 7 days per week. Field Watch coordinates Emerson Process Management's field service throughout the U.S. and abroad.

Phone: 1-800-654-RSMT (1-800-654-7768)

Emerson Process Management may also be reached via the Internet through:

e-mail:

[GAS.CSC@emerson.com](mailto:GAS.CSC@emerson.com)

World Wide Web:

[www.raihome.com](http://www.raihome.com)



## Section 1 Description and Specifications

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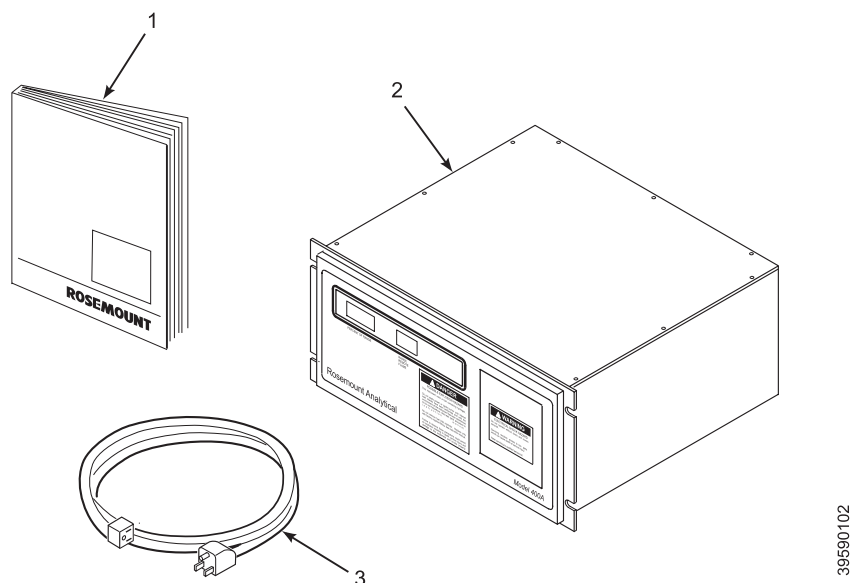
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### COMPONENT CHECKLIST

A typical Rosemount Analytical Model 400A Hydrocarbon Analyzer should contain the items shown in Figure 1-1. Record the part number, serial number, and order number for your analyzer in the table located on the back cover of this manual.

Also, use the product matrix in Table 1-5 at the end of this section to compare your order number against your unit. The product matrix defines the various options and features of the Model 400A Hydrocarbon Analyzer. Ensure the features and options specified by your order number are on or included with the unit.

Figure 1-1. Typical System Package



1. Instruction Manual IM-103-400A
2. Model 400A Hydrocarbon Analyzer (analyzer configuration dependent on selected options)
3. Power Cord

## OVERVIEW

The following paragraphs provide the equipment descriptions, operating principles, and specifications for the Model 400A Hydrocarbon Analyzer.

### System Description

The Model 400A Hydrocarbon Analyzer automatically and continuously measures the concentration of hydrocarbons in a gas stream. Typical applications include monitoring atmospheric air for low-level hydrocarbon contaminants and determining the hydrocarbon content of exhaust emissions from internal combustion engines.

The analyzer provides readout on a front-panel digital display and a selectable output for an accessory recorder.

The Model 400A may be equipped with optional features in addition to or in place of the standard equipment features.

## PRINCIPLES OF OPERATION

The Model 400A Hydrocarbon Analyzer uses the flame ionization method of detection. The sensor is a burner in which a regulated flow of sample gas passes through a flame sustained by regulated flows of air and a fuel gas (hydrogen or a hydrogen/diluent mixture). Within the flame, the hydrocarbon components of the sample stream undergo a complex ionization that produces electrons and positive ions. Polarized electrodes collect these ions, causing current to flow through electronic measuring circuitry. Current flow is proportional to the rate at which carbon atoms enter the burner.

To ensure stable, drift-free operation, particularly in high-sensitivity applications, an internal temperature controller maintains the analyzer interior at a constant 50°C. This feature minimizes temperature-dependent variations in: a) electronic current-measuring circuitry, and b) adsorption/desorption equilibrium of background hydrocarbons within the internal flow system.

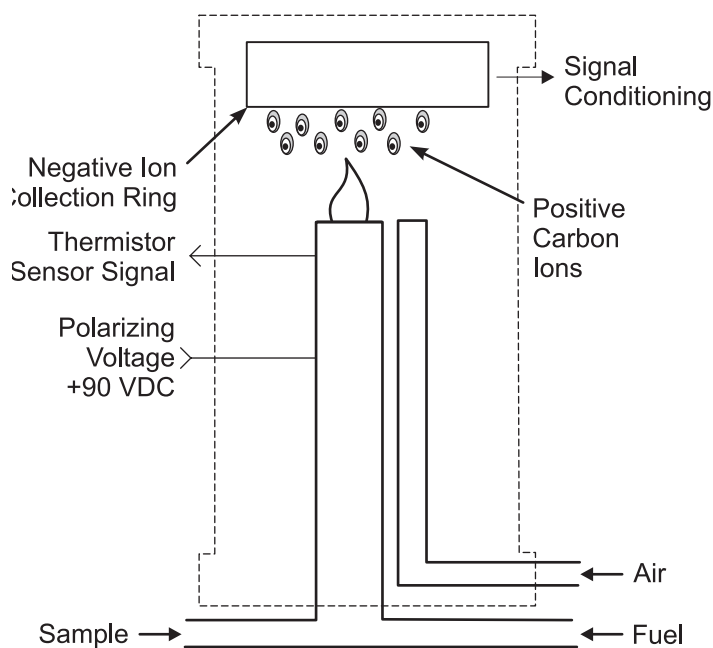
To minimize system response time, an internal sample-bypass feature provides high-velocity sample flow through the analyzer.

## Burner Operation

Principal components of the burner are the manifold, burner jet, and the collector.

Streams of sample, fuel and air delivered by the analyzer flow system (described later) are routed through internal passages in the manifold and into the interior of the burner (Figure 1-2). Here the sample and fuel pass through the burner jet and into the flame; the air stream flows around the periphery of the flame.

Figure 1-2. Flame Ionization Detection Diagram



The burner jet and collector function as electrodes. The jet is connected to the positive terminal of the +90 VDC polarizing voltage. The collector is connected to the signal amplifier. The two polarized electrodes establish an electrostatic field in the vicinity of the flame. The field causes the charged particles formed during combustion to migrate. Electrons go to the burner jet; positive ions go to the collector. Thus a small ionization current flows between the two electrodes. Magnitude of the current depends on the concentration of the carbon atoms in the sample. The burner current serves as the input signal to the electronic measuring circuitry (described later).

Mounted on the burner are 1) an igniter, driven by flame ignition circuit and 2) a thermistor sensor for the flame status indicator circuit.

## Response to Different Hydrocarbons

Both speed and magnitude of analyzer response are affected by the type of hydrocarbon in the sample. Typical curves of response versus time for various hydrocarbons are given in Figure 1-3.

Magnitude of the analyzer response to an atom of carbon depends on the chemical environment of this atom in the molecule. The characteristic response of a given type of atom may be expressed approximately by a value designated the "effective carbon number." The effective carbon number of a particular type of carbon atom is defined as the ratio between the instrument response caused by an atom of this type and the instrument response caused by an aliphatic carbon atom.

Figure 1-3. Downscale Response vs. Time - Typical Curves for Three Samples

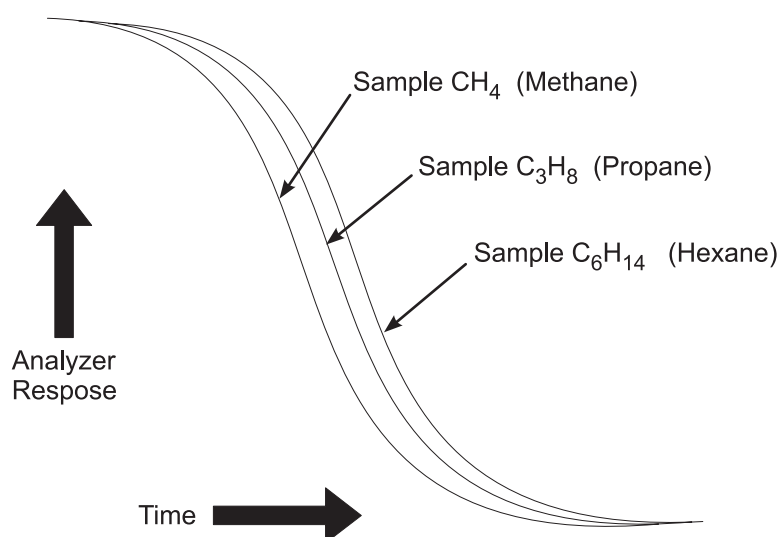


Table 1-1 lists approximate effective carbon numbers for several types of carbon atoms. Although the instrument does not respond directly to atoms other than carbon, in some compounds certain other atoms do change instrument sensitivity to carbon. For this reason, values are listed for a few non-carbon atoms. Values in the table were determined experimentally, on a single analyzer. Because of slight variations in characteristics of individual analyzers, these values should be regarded as approximations only.

To determine the effective carbon number of a molecule of a given organic compound, algebraically add the individual values for the constituent atoms. Examples of effective carbon numbers of molecules are: Butane ( $C_4H_{10}$ ), 4; octane ( $C_8H_{18}$ ), 8; and ethyl alcohol ( $C_2H_5OH$ ), 1.4.

Table 1-1. Approximate Effective Carbon Numbers

Type of Atom	Occurrence	*Effective Carbon Number
Carbon	In Aliphatic Compound	+1.00
Carbon	In Aromatic Compound	+1.00
Carbon	In Olefinic Compound	+0.95
Carbon	n Acetylenic Compound	+1.30
Carbon	In Carbonyl Radical	0.00
Carbon	In Nitrile	+0.30
Carbon	In Ether	-1.00
Carbon	In Primary Alcohol	-0.60
Carbon	In Secondary Alcohol	-0.75
Carbon	In Tertiary Alcohol, Ester	-0.25
Chlorine	As two or more chlorine atoms on single aliphatic carbon atom	-0.12
Chlorine	On Olefinic Carbon Atom	+0.05
Nitrogen	In Amine	Value similar to that for oxygen atom in corresponding alcohol

$$\text{*Effective Carbon Number} = \frac{\text{instrument response to atom of given type}}{\text{instrument response caused by aliphatic carbon atom}}$$

## Analyzer Flow System

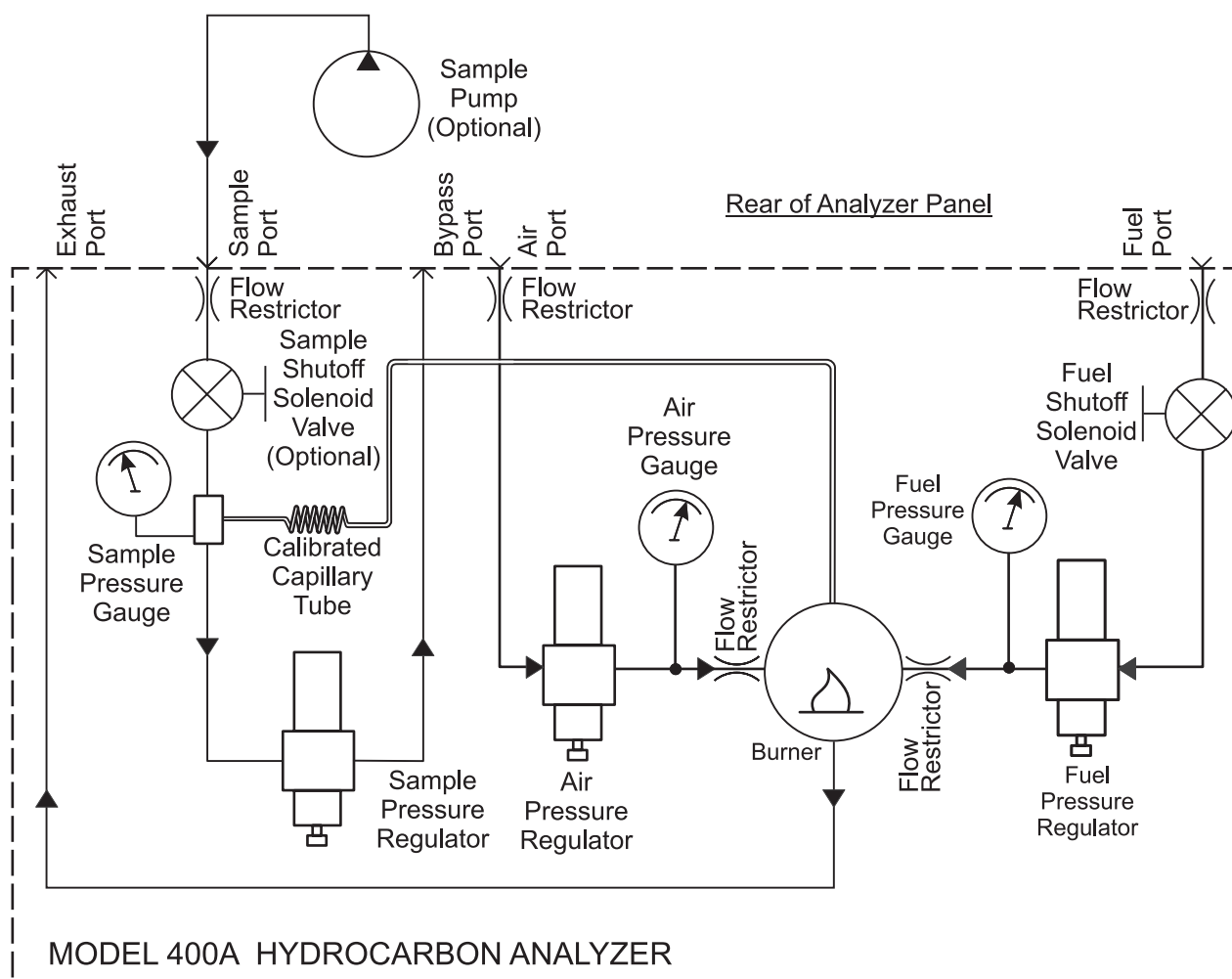
The internal flow system of the analyzer is shown in Figure 1-4. Its basic function is to deliver regulated flows of sample, fuel, and air to the burner. In addition, the system routes the burner exhaust gas and sample bypass flow out of the analyzer through the corresponding outlet ports.

Pressurized gases are supplied to the sample, fuel, and air inlet ports. Each inlet fitting contains an internal filter and flow restrictor.

Each of the three gas streams is routed to the burner via a flow control arrangement consisting of the following elements:

1. An adjustable pressure regulator. The air and fuel pressure regulators provide controlled pressure on the downstream side. The sample pressure regulator is a back-pressure regulator that provides controlled pressure on the upstream side. The sample pressure regulator discharges excess sample gas through a bypass port. This bypass feature provides a high velocity sample flow through the analyzer to minimize the system response time.
2. A flow restrictor designed to flow a desired volume of gas. The required flow rate is achieved when the related pressure regulator is properly adjusted. The air and fuel streams use inlet port fittings with sintered metallic flow restrictor elements. The sample stream uses a calibrated capillary tube.
3. A gauge that indicates the pressure at the inlet end of the related flow restrictor or capillary tube. The pressure gauge ranges are: sample pressure gauge, 0 to 5 psig (0 to 35 kPa); air and fuel pressure gauges, 0 to 30 psig (0 to 207 kPa).

Figure 1-4. Schematic Flow Diagram



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## Preamplifier Board

The ionization current generated by the burner is measured by an electrometer preamplifier board located adjacent to the burner assembly. This small current is amplified and transformed into a signal voltage that is then further amplified by a post amplifier before being converted to a digital display suitable for direct data presentation. To cover the required dynamic range the amplifier is provided with two gain ranges that differ by a factor of 100.

Output voltage from the preamp board is a precise function of ionization current. In equation form:

$$V_{out} = I_{in} \times R_f$$

Where:  $V_{out}$  = Voltage Out

$I_{in}$  = Ionization current

$R_f$  = Feedback resistance

The most sensitive gain range includes a trim adjustment so that inter-range correlation can be obtained over the entire signal span.

A buffer signal offering unity gain and noise filtration provide a low output impedance to drive the signal cable and post amplifier circuits on the main circuit board. Selection of the low or high range feedback resistors (R13 or R14) is made by relay K1 on the preamplifier board. Refer to the preamplifier board diagram, Figure 1-5.

A variable offset current is injected into the summing node of the electrometer amplifier to compensate for background offset current. These currents influence the measurement procedure, and a variable voltage at the front panel allows the user to visually cancel these currents during the calibration procedure. Background current is due to unavoidable traces of carbonaceous material introduced into the burner flame by the fuel gas and air.

Figure 1-5. Preamplifier Board Diagram

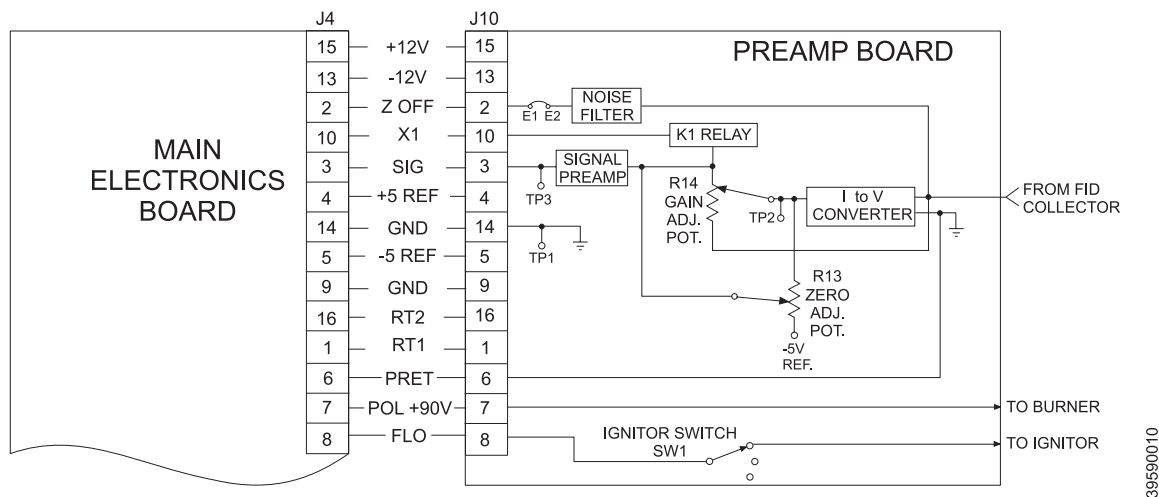


Table 1-2 gives the full scale sensitivity of the current measuring circuitry for various settings on the RANGE MULTIPLIER switch and the SPAN potentiometer (Figure 1-7).

Table 1-2. Full Scale Sensitivity - Amperes

Range	Range Multiplier Setting	Maximum Span	Minimum Span
1	1	$5 \times 10^{-12}$	$1.66 \times 10^{-12}$
2	2.5	$2 \times 10^{-12}$	$6.66 \times 10^{-11}$
3	10	$5 \times 10^{-11}$	$1.66 \times 10^{-11}$
4	25	$2 \times 10^{-11}$	$6.66 \times 10^{-10}$
5	100	$5 \times 10^{-10}$	$1.66 \times 10^{-10}$
6	250	$2 \times 10^{-12}$	$6.66 \times 10^{-9}$

### Main Electronics Board

The main electronics board hosts several of the functional circuits and features used in the Model 400A Hydrocarbon Analyzer. A diagram of the board is shown in Figure 1-6.

#### Post Amplifier

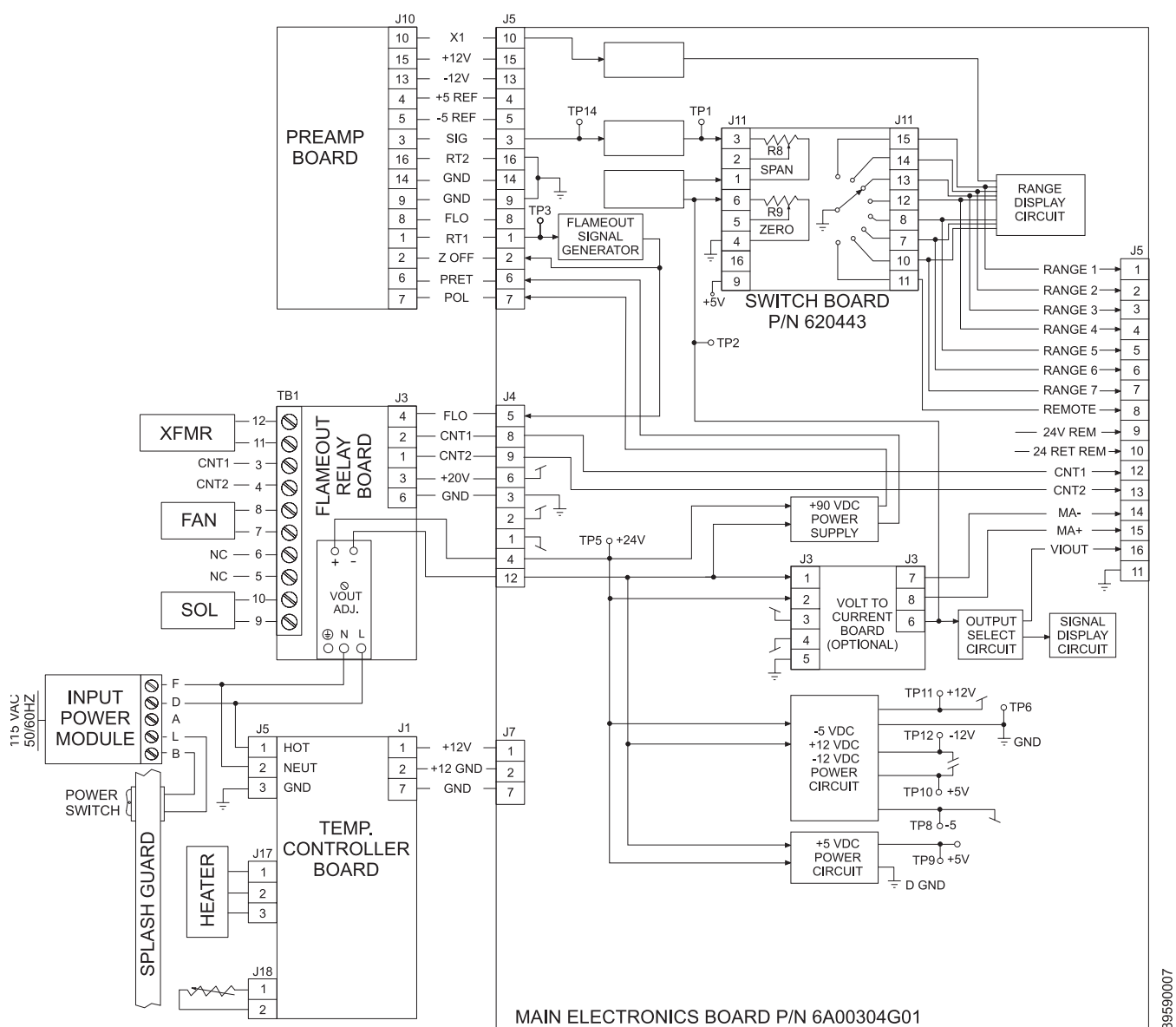
The post amplifier circuit comprises two amplifiers with various combinations of feedback resistances that are logically selected by the front panel RANGE MULTIPLIER switch or external inputs. The range selection process provides a total of seven possible gains corresponding to the input sensitivities in Table 1-3.

Table 1-3. Input Sensitivities

Range	Range Multiplier Setting	Preamp Gain	Post Amp Gain
1	1	High	50
2	2.5	High	20
3	10	High	5
4	25	High	2
5	100	Low	50
6	250	Low	20
7	1000	Low	5
8	RMT	-	Remote

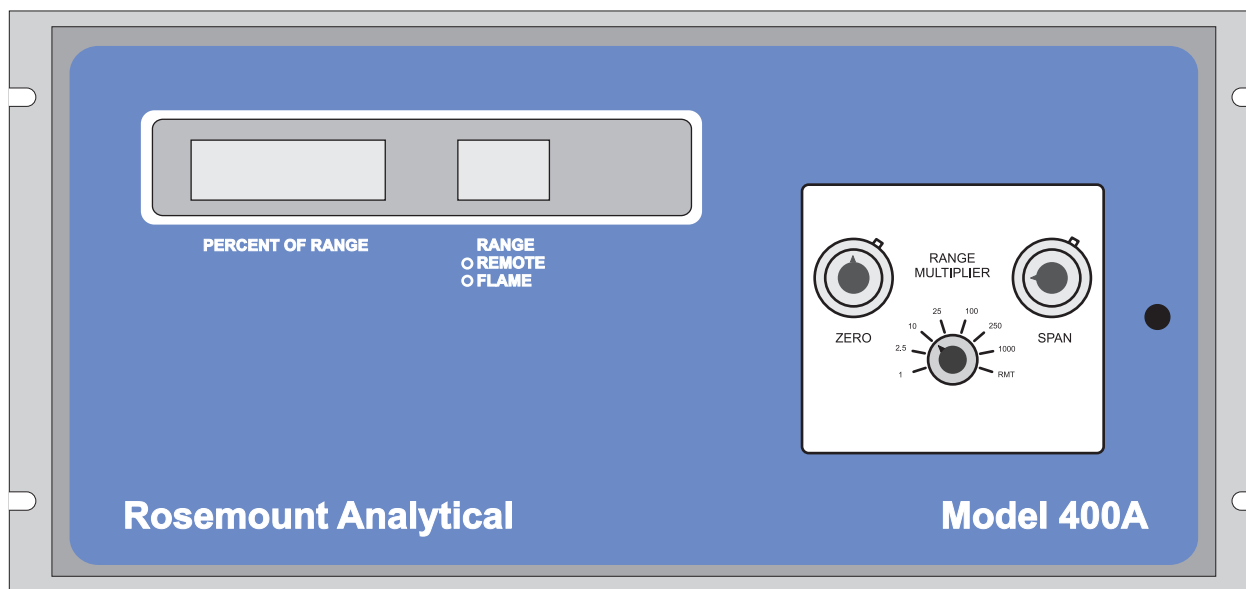


Figure 1-6. Main Electronics Board Diagram



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Figure 1-7. Analyzer Front Panel Display and Controls



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### Digital Displays

The voltage originating from the signal amplifiers is made available to output terminals and directly to an analog to digital (A-D) converter for LED data display in digital form. See the PERCENT OF RANGE display in Figure 1-7.

The A-D converter is termed 3-1/2 digits, which implies a maximum reading of 1999. The one bit signifying overrange allows 100% excursion above the normal 99.9% range. Thus the user, depending upon span and zero offset conditions, may select the presentation to read directly in percent of full scale and still have 100% overrange capability remaining.

A single digit RANGE display indicates the operator selected range (1 through 7) for the hydrocarbon signal voltage. The RANGE indicated is selected by connecting a conductor wire between the SMD terminal and the desired RANGE CONTROL terminal on the rear panel of the analyzer.

Two LED indicators (REMOTE and FLAME) can light up to indicate 1) that the range selection is being controlled via a REMOTE customer connection, and 2) that the analyzer FLAME is burning. One or both of the indicators may be lighted when the analyzer is operating.

### Span

To compensate for various calibration gases, provision is made to vary the gain with a variable span control. The variable span, accessed on the front panel through a calibrated SPAN potentiometer (Figure 1-7), allows gain variation of 400%.

**Optically Isolated Remote Range Control**

To allow for external range control the main electronics board has seven optically isolated digital inputs and one optically isolated digital output. (The digital output is for external range verification.)

The external remote range control requires the use of an external (customer supplied) 24 VDC power supply. The range terminals are not suitable for connection to any TTL or equivalent logic circuit sensing. See Section 2, Installation, Electrical Connections.

**Heater Temperature Assembly**

The temperature controller is located in the heated compartment of the instrument. The RTD temperature sensor, in conjunction with a control circuit, maintains the internal temperature to meet performance specifications for the instrument. The temperature is controlled at 122°F (50°C). Refer to Figure 1-8.

This temperature is maintained at a constant level to minimize temperature dependent variations in amplifier sensitivity and to prevent changes in absorption/desorption equilibrium of trace hydrocarbons in the internal flow system. A blower fan runs continuously to circulate air and equalize the temperature throughout the analyzer.

The temperature control board is a multipurpose board with a control resistor that is factory-selected with jumper settings for the applicable analyzer model. The correct jumper settings for the Model 400A temperature control board are made by installing jumper JP3.

---

**NOTE**

230 VAC operation requires an accessory transformer mounted external to the instrument. If external 230 VAC power is provided, do not change the switch setting on the temperature control board, which is factory-selected for 115 VAC.

Selecting the 230 VAC switch setting will cause the case temperature controller to malfunction.

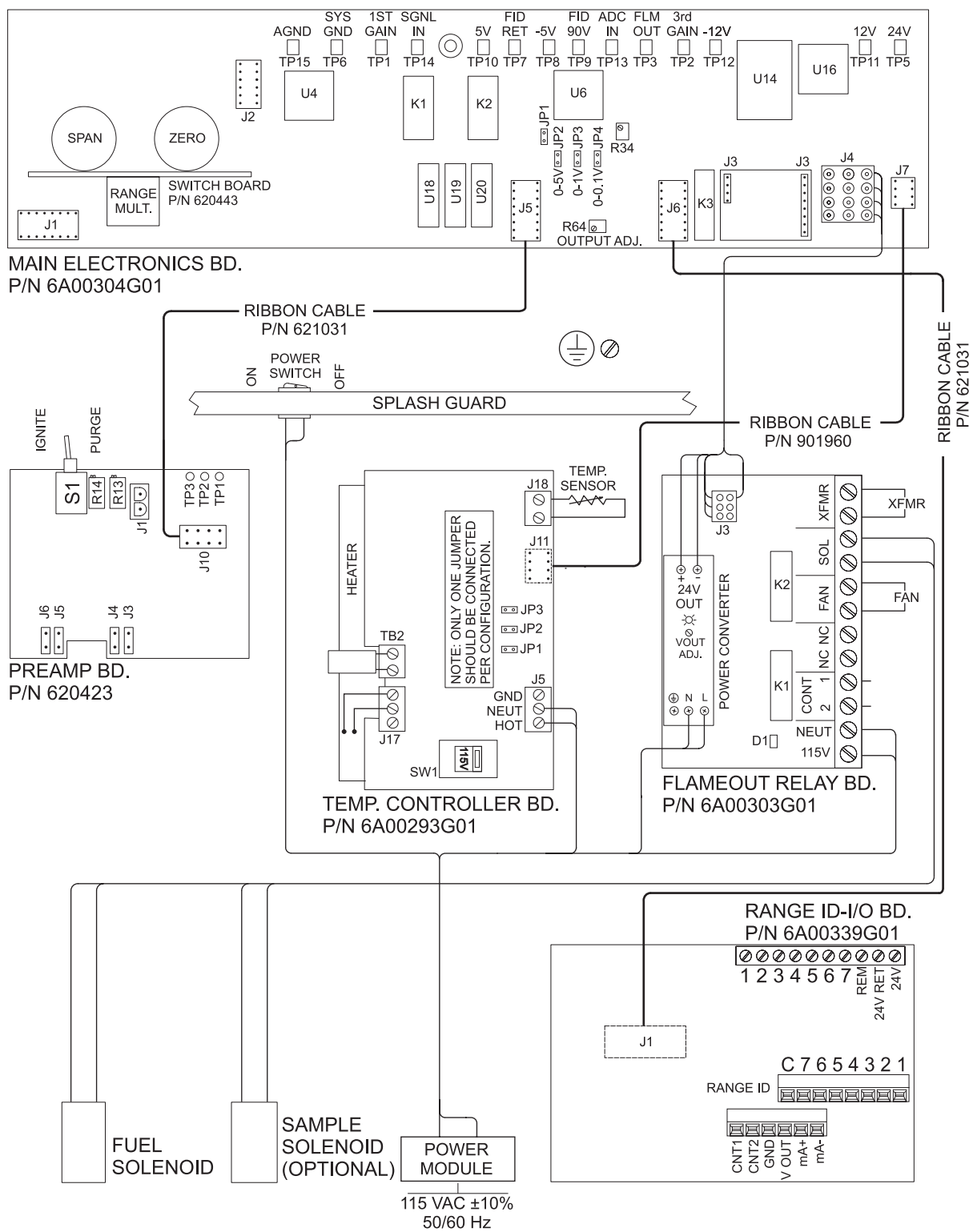
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**Ignition Circuit**

The ignition circuit is used to light the burner flame during instrument startup. The principle circuit components are as follows:

- Igniter element mounted in the burner cap
- Step-down transformer (PN 621049)
- IGNITE switch mounted on the preamp board and connected in series with the primary of the transformer

Figure 1-8. Analyzer Components Layout and Interconnect Diagram



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## **System Power Supplies**

### **±12 VDC**

Used for most analog functions.

### **±5 VDC**

These two voltages derived from a precision reference are used for zero offset and bias requirements.

### **+5 VDC**

Used to power the digital circuit range decoding A-D display, etc.

### **+93 VDC**

Used for the burner tip polarizing voltage.

### **+24 VDC**

Used for system power generator

## **Flame-Out Relay Board**

Loss of flame shuts down the fuel solenoid. If there is a flammable component in the sample, a fail-safe solenoid accessory is available for wiring in parallel with the fuel solenoid. The flame-out relay board (Figure 1-8) includes the 115 VAC to 24 VDC power converter needed to operate the main electronics board. The flameout relay board provides the 24 VDC power source and relay needed to signal a flameout condition at the customer's remote monitor station.

## **EQUIPMENT OPTIONS**

The following optional equipment and features are available for use with the Model 400A Hydrocarbon Analyzer. Refer to the product matrix at the end of this section and the product order number for your analyzer to determine which of the options are included with your unit.

### **Analyzer Mounting Options**

The standard analyzer is housed in a case designed for bench-top use. If desired, the analyzer may be mounted in a cabinet or rack using RETMA spaced mounting holes. Analyzer mounting dimensions are shown in Section 2, Installation.

### **⚠ WARNING**

For safety, the analyzer should be installed in a non-confined, ventilated space.

### **Fuel Gas Options**

For burner fuel gas, the standard analyzer requires 40% hydrogen/60% nitrogen or helium. Through installation of the optional 400A hydrogen fuel kit (P/N 622576), the analyzer may be converted to use 100% hydrogen. This kit may be ordered as a factory installed option or supplied as an option for installation by the user.

The preferred type of fuel depends on the particular application and the characteristics of the sample gas:

- For measuring low-level hydrocarbons in ambient air, or in other sample gas with relatively constant oxygen content, 100% hydrogen is preferable. It provides the highest obtainable sensitivity and the maximum stability. Zero drift caused by ambient temperature variations of the fuel cylinder is somewhat lower for 100% hydrogen than for mixed fuel. (With either fuel, it is desirable to maintain cylinder temperature constant.)
- For monitoring vehicular exhaust emissions, or other sample gas with varying oxygen content, mixed fuel is preferable; and a hydrogen/helium mixture is more desirable than a hydrogen/nitrogen mixture. With this type of sample, the use of mixed fuel gas minimizes the error introduced by oxygen synergism. The preferred way to reduce the effect of internal oxygen is to dilute it with an inert gas. This might be accomplished by a constant dilution of sample and calibration gases ahead of the burner but it is simpler and more accurate to provide that diluent in the form of premixed fuel. Both nitrogen and helium have been used as a diluent, but helium has proven to be most effective in improving the equality of response to the various species of hydrocarbons.

As indicated earlier the flame output signal is optimum when the ratio of hydrogen flow to inert flow is about 40/60; therefore, this is the chosen composition for hydrogen/helium premixed fuel.

The sample flow is kept low to maximize the dilution effect while still providing adequate sensitivity. The burner air flow is normally about four times the fuel flow, and changes have little effect on signal strength. For a given sample flow, the signal can be optimized by adjusting the fuel flow rate. Typical flow rates with premixed fuel are:

Fuel	100 cc/min.
Sample	7 cc/min.
Air	400 cc/min.

With a 40/60 premixed fuel, the above flows amount to 40 cc (8%) hydrogen, 67 cc (13%) inert plus sample and 400 cc (79%) air, which compare closely to the 30 cc (8%) hydrogen, 45 cc (12%) inert/sample and 300 cc (80%) air given earlier for straight hydrogen fuel.

Since the sample flow in the case of mixed fuel operation is only about one-sixth of that with straight hydrogen fuel, it is clear that higher sensitivity is obtained with straight hydrogen fuel operation. However, in any application where the sample contains more than one species of hydrocarbon and/or a varying concentration of oxygen, the mixed fuel operation should be used.

The mixed fuel is recommended, not only for sample containing variable concentrations of oxygen, but for two specific pure gas applications. The first is the case of pure hydrogen samples. The other is the case of pure oxygen samples. If straight oxygen samples are used with straight hydrogen fuel, the mixture entering the burner is essentially 40% H<sub>2</sub>/60% O<sub>2</sub>, which tends to produce an unstable signal. The mixed fuel works better. Note that the choice of fuel determines certain analyzer characteristics, as tabulated in Table 1-4.

Table 1-4. Fuel Gas vs. Analyzer Characteristics

Analyzer Characteristics	100% H <sub>2</sub>	40% H <sub>2</sub> /60% N <sub>2</sub> or 40%H <sub>2</sub> /He
Full Scale Sensitivity	Adjustable from 1 ppm to 2500 ppm CH <sub>4</sub>	Adjustable from 4 ppm to 1% CH <sub>4</sub> or 100 ppm to 10% CH <sub>4</sub>
Fuel Composition	35 to 40 cc/min.	75 to 80 cc/min.
Operating Range for Sample Pressure Regulator	4 to 5 psig (27 to 34.5 kPa)	1.5 to 5 psig (10.3 to 34.5 kPa)

**Output Options**

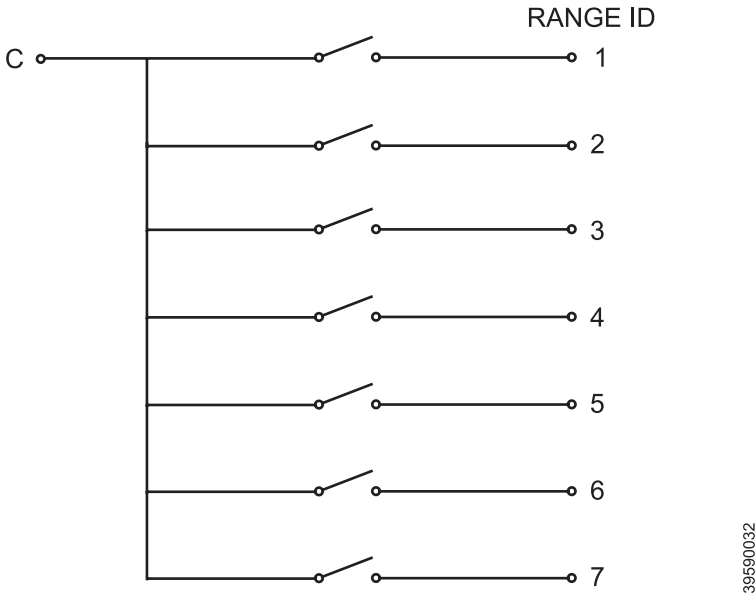
The standard analyzer provides (a) direct digital readout in percent of full scale on a front-panel display calibrated linearly from 0 to 100%, (b) a selectable buffered output of 0 to 5.0 VDC, 0 to 1 VDC, or 0.1 VDC.

An isolated output of 4 to 20 mA DC (max. load resistance 700 ohms) is obtainable through use of the optional current output board (P/N 6A00302G01) installed during factory assembly or as a subsequent addition. When this board is installed the Model 400A Analyzer provides a selectable buffered output of 0 to 5.0 VDC, 0 to 1 VDC, or 0 to 0.1 VDC.

**Range ID**

This option provides the user with a remote range identity loop via a dry contact relay output in the ladder logic. See Figure 1-9. This range ID option allows for: 1) remote range control, 2) remote range identification, and 3) terminals for a flameout indication. The range ID option requires a customer-supplied, external, 24 VDC power supply.

Figure 1-9. Remote Range ID Logic Diagram



**Sample Pump Option**

To provide the required sample flow, the sample gas must be under adequate pressure when applied to the analyzer inlet. To permit analysis of gases at atmospheric or sub-atmospheric pressure, the analyzer may be shipped with a sample pump accessory, P/N 621062. Refer to Section 2, Installation, Fuel and Air Requirements.

### Gas Safety Features

The Model 400A is designed to provide a high degree of operational safety. In all analyzers, a front-panel LED indicates that the burner flame is lit. In addition, fuel gas is automatically shut off when a flame-out condition occurs.

All tubing ahead of the burner is rigid metallic tubing made up with ferrule/nut type compression fittings. However, should there be an internal fuel leak, an inlet fuel flow limiting restrictor, ventilation holes in the enclosure and an internal circulation fan serve to dilute and dissipate the hydrogen fuel for a worst case leak to a safety factor below 25% of the LEL of hydrogen. The design basis for this system presumes 100% hydrogen fuel at 50 psig inlet pressure. 40% hydrogen fuel and lower inlet pressure serve to further reduce hydrogen concentration in the event of a leak. In reality, an open fitting leak would never occur. As a leak developed the burner would eventually be starved of fuel and flame-out would occur at a leak equivalent of a loss of about 20 psig fuel pressure, thus actuating the fuel shut-off solenoid valve .

If the sample is flammable, accessory kit P/N 624080, must be utilized. This kit provides a restrictor to limit sample flow and a solenoid valve to shut-off sample in the event of burner flame-out. The design basis for this kit presumes a maximum sample flow rate of 470 cc/min and a sample with LEL not below that of hydrogen (4% v/v in air).

### WARNING

Protection against explosion depends on a special fuel flow restrictor in the fuel inlet fitting. Do not remove the restrictor. Replace the fuel inlet fitting only with a factory supplied fitting.

### SPECIFICATIONS

Feature	Specification
Power Requirements	115 VAC $\pm 10\%$ , 50/60 $\pm 3$ Hz, 250 W
Operating Temperature	32°F to 110°F (0°C to 43°C)
Case Temperature	Controlled at 122° $\pm 5.4$ °F (50° $\pm 3$ °C)
Ambient Humidity	95% relative humidity, but not in excess of 34°C wet bulb
Dimensions	8.75 in. (22.2 cm) H 18.75 in. (47.6 cm) W 15.88 in. (40.3 cm) D Recommended panel cutout is 17.75 in. X 8.25 in. (45,1 cm x 21,0 cm).
Weight	22 lbs (10 kg)
Repeatability	1% of full scale for successive identical samples
Response Time	90% of full scale in 0.6 seconds with sample bypass flow at 3
Full Scale Sensitivity:	
Standard Analyzer	Adjustable from 4 ppm CH <sub>4</sub> to 1% CH <sub>4</sub> . (Adjustable from 100 ppm CH <sub>4</sub> to 10% CH <sub>4</sub> using high-range capillary.)
Equipped with 100% Hydrogen Fuel Ass'y	Adjustable from 1 ppm CH <sub>4</sub> to 0.25% CH <sub>4</sub> .
Fuel Gas Requirements	
Standard Analyzer	75 to 80 cc/min premixed fuel consisting of 40% hydrogen and 60% nitrogen or helium (THC <0.5 ppm) supplied at 45 to 50 psig (309 to 344 kPa) at instrument
Equipped with 100% Hydrogen Fuel Ass'y	35 to 40 cc/min of clean, zero grade hydrogen (THC <0.5 ppm) at 45 to 50 psig (309 to 344 kPa) at instrument



Feature	Specification
Sample Gas Requirements	
Non-Flammable Sample	0.35 to 3.0 liters/minute at 5 to 10 psig (34 to 69 kPa)
Flammable Sample	470 cc/minute maximum for safety
Burner Air Requirements	350 to 400 cc/minute of zero grade (THC <1 ppm) air, supplied at 25 to 50 psig (172 to 344 kPa)
Sample Bypass Flow	0,3 to 3,0 liters/minute
Stability	Electronic stability at maximum sensitivity is 1% of full scale throughout ambient temperature range of 32°F to 110°F (0°C to 43°C). Built-in temperature controller minimizes effect of ambient temperature variations on internal flow and electronic systems.
Range	Eight ranges: 1, 2.5, 10, 25, 100, 250, 1000 and REMOTE. In addition SPAN control provides continuously variable adjustment within a dynamic range of 4:1
Output	
Standard	0 to 5 VDC, 0 to 1 VDC, 0 to 0.1 VDC fully buffered
Optional	4 to 20 mA isolated voltage to current
Safety Features	1) Flame-on indication and automatic flame-out fuel shutoff. 2) All metal tubing with ferrule/nut compression fittings to minimize potential fuel leaks. 3) Self-ventilated system maintains internal atmosphere below 25% of LEL for worst case internal leakage.
Contacts	Form A contact operates in parallel with flame-out fuel shut-off solenoid contact rating (24 VDC at 1 A) for sample shut-off by use of factory ordered kit (PN 624080) if sample is flammable (Hydrogen)
Temperature Control	Setpoint maintained at 122°F (50°C)
Data Display	3-1/2 digit LED, characters 0.52 inch (13,2 mm) high, range 0000 to 1999
Range Display	1 digit LED, character 0.52 inch (13,2 mm) high (1 to 7 normal ranges, 0 to remote control)
Remote Range Control	Optically isolated range control
Range ID	Range ID is optional

Table 1-5. Product Matrix

400A	Process Hydrocarbon Analyzer									
Process Hydrocarbon Analyzer - Instruction Manual										
Code		Seven Ranges with Isolated Remote Range Control and Range Multiplier								
1		Seven ranges adjustable between 0-4ppm through 0-1%								
3		Seven ranges adjustable between 0-100ppm through 0-10%								
4		Seven ranges adjustable between 0-1ppm through 0-2500ppm (Includes 100% H <sub>2</sub> capillary)								
Code		Output								
1		Selectable 0-100 mV, 0-1 V, 0-5 VDC								
2		Current, 4-20 mA Isolated								
Code		Operation								
1		115 VAC, 50/60 Hz								
Code		Sample Line								
1		Standard (brass/copper)								
2		Standard with Sample Shutoff Valve								
3		Stainless Steel								
4		Stainless Steel with Sample Shutoff Valve								
Code		Case								
1		Standard								
Code		Range ID								
1		Features as selected above								
2		Range ID								
400A	3	1	1	2	1	1	Example			

- Notes:**
- Code 1, Option 4 - Low range requires pure hydrogen fuel.
  - Code 1, All Options - X1, X2.5, X10, X25, X100, X250, X1000

## Section 2 Installation

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Location .....	page 2-2
Voltage Requirements .....	page 2-3
Fuel and Air Requirements .....	page 2-3
Sample Handling .....	page 2-4
Gas Connection .....	page 2-5
Leak Check .....	page 2-6
Electrical Connections .....	page 2-7

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### WARNING

Before installing this equipment, read the "Safety instructions for the wiring and installation of this apparatus" located in Appendix A of this Instruction Manual. Failure to follow safety instructions could result in serious injury or death.

## UNPACKING

Carefully examine the shipping carton and contents for signs of damage. Immediately notify the shipping carrier if the carton or its contents are damaged. Retain the carton and packing materials until the instrument is operational.

## LOCATION

Install analyzer in a clean area, not subject to excessive vibration or extreme temperature variations. Preferably, the analyzer should be mounted near the sample stream to minimize sample-transport time.

The analyzer is equipped for rack mounting. Refer to Figure 2-1 for mounting dimensions.

### **WARNING**

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

A thermostatically controlled heating circuit holds internal temperature of the analyzer to the correct operating temperature for ambient temperatures in the range 32°F to 110°F (0°C to 43°C).

The cylinders of fuel, air, and calibration gas(es) should be located in an area of relatively constant ambient temperature.

## VOLTAGE REQUIREMENTS

This instrument was shipped from the factory configured to operate at 115 VAC, 50/60 Hz. Verify that the power source conforms to the requirements of the individual instrument, as noted on the name-rating plate.

### **WARNING**

Do not operate without doors and covers secure. Servicing requires access to live parts which can cause death or serious injury. Refer servicing to qualified personnel.

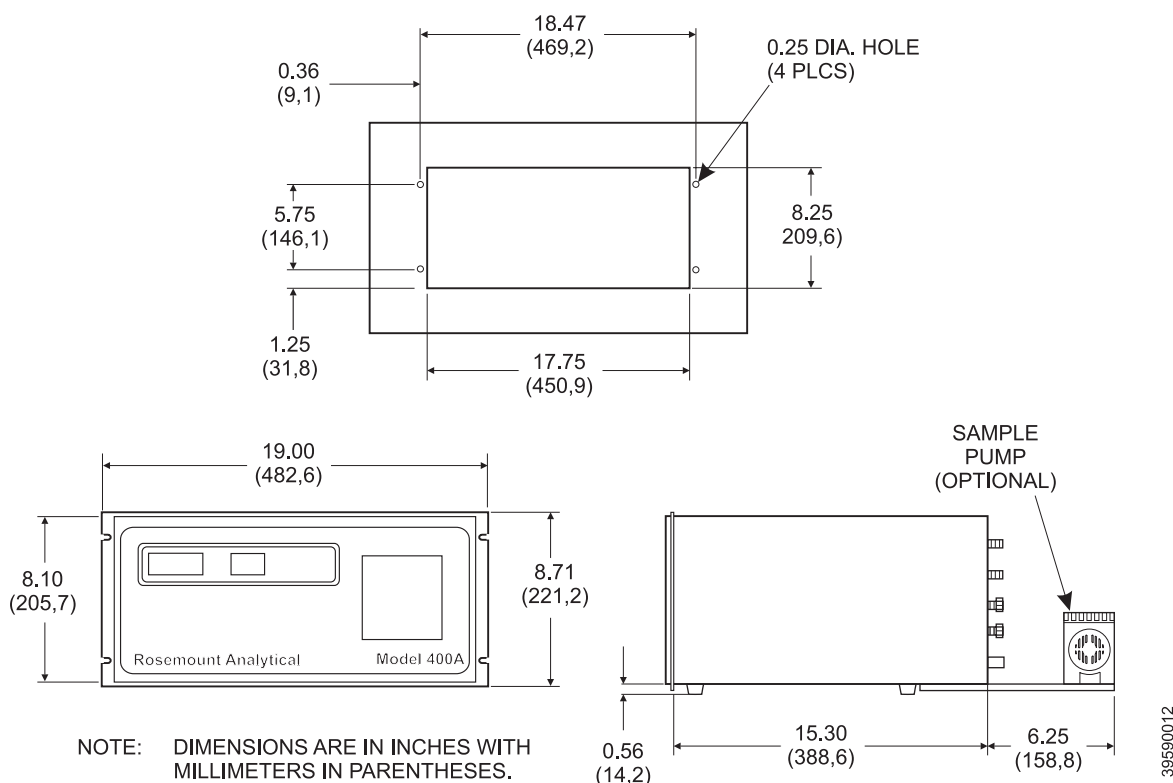
For safety and proper performance this instrument must be connected to a properly grounded three-wire source of power.

### **NOTE**

230 VAC operation requires an accessory transformer mounted external to the instrument. If external 230 VAC power is provided, do not change the switch setting on the Temperature Control Board, which is factory-selected for 115 VAC. A 230 VAC switch setting will cause the case temperature controller to malfunction.

---

Figure 2-1. Mounting Dimensions



## FUEL AND AIR REQUIREMENTS

During normal operation, the analyzer uses fuel and air to maintain the burner flame. Criteria for selection of these gases are defined in the paragraphs that follow. In addition, the analyzer requires suitable standard gas(es) for calibration. Refer to Section 3: Startup and Operation.

### **⚠ WARNING**

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

Each gas used should be supplied from a tank or cylinder equipped with a clean, hydrocarbon-free, two-stage regulator. In addition, a shutoff valve is desirable. Install the gas cylinders in an area of relatively constant ambient temperature.

## Fuel Gas

The standard analyzer is equipped to use only mixed fuel, i.e. 40% hydrogen/60% nitrogen or helium. Such blends are supplied by many gas vendors specifically for this use, with a guaranteed maximum total hydrocarbon content of 0.5 ppm, measured as methane (THC < 0.5 ppm). This specification should be used when buying such mixtures.

When the analyzer is equipped with the optional hydrogen fuel kit, P/N 622576, 100% hydrogen fuel is to be used. This is also supplied by many gas vendors specifically for this use, with the same guaranteed total hydrocarbon content (THC < 0.5 ppm) which should be specified when buying the gas.

### NOTE

Always make sure the sample flow is present when using the 100% hydrogen fuel option. Absence of sample flow can result in burning of detector tip when using 100% hydrogen.

## Air

Burner air should be relatively free of hydrocarbons in order to ensure a low background signal. Several grades of air are supplied by gas vendors for this use. A maximum total hydrocarbon content of less than 1 ppm is required. (Less than 1 ppm is the THC zero standard).

An alternate source of pure air for burner and zero gas can be provided by a diaphragm pump and heated palladium catalyst which effectively removes moderate amounts of both hydrocarbons and carbon monoxide from ambient air on a continuous basis.

## SAMPLE HANDLING

### ⚠ CAUTION

When applying sample pressures greater than 5 psig insure that the bypass regulator is fully open to protect the bypass gauge.

Operating range for the internal sample pressure regulator is 4 to 5 psig (28 to 34 kPa) for an analyzer using 100% hydrogen fuel, and 1.5 to 5 psig (10 to 34 kPa) for an analyzer using mixed fuel. With either fuel, sample and calibration gas(es) must be supplied to the sample inlet at a pressure slightly, but not excessively higher than the desired setting on the internal sample pressure regulator. The criterion for correct supply pressure is that the gas flow discharged from the bypass outlet must be between 0.5 and 3.0 liters/minute to operate within the control range of the sample pressure regulator. The flow should be between 2 and 3 liters/minute to minimize system response time.

Using excess bypass flow will cause the sample pressure regulator to operate outside its control range and rapid use of the sample and standard gases.

If the analyzer is equipped with the accessory 400A sample pump (P/N 621062) the acceptable pressure range at the pump inlet is approximately -1 to +2.5 psig (-7 to 17 kPa). When used, the sample pump automatically provides a sample bypass flow within the correct range. If the sample pump is not used, the bypass flow adjustment is made by a flow controller or a throttle valve in the customer's sample line, upstream to the sample inlet. Flow may be measured by connecting a flowmeter to the bypass outlet.

### ⚠ WARNING

In the event that flammable sample is to be introduced into the analyzer it must be equipped with accessory kit P/N 624080, which restricts sample flow and provides automatic sample shutoff in the event of burner flameout. DO NOT OPERATE WITHOUT SAMPLE FLOW RESTRICTOR IN PLACE. The sample containment system should also be thoroughly leak checked. This kit is designed considering application on hydrogen sample (LEL=4% v/v). The instrument must not be used on a sample having a LEL less than 4% in air.

**GAS CONNECTION**

For external gas lines, the use of all new tubing throughout is strongly recommended. Copper refrigeration tubing is preferred. Stainless steel tubing is less desirable; it contains hydrocarbon contaminants, necessitating thorough cleaning before installation.

**NOTE**

In connecting gas supply lines and associated fittings, use Teflon tape only. Do not use pipe thread compound or other substance with an organic base.

**⚠ WARNING**

Do not apply power to analyzer or ignite burner until all leak checks have been performed and until the environment of the analyzer has been determined to be non-hazardous. Refer to leak check procedure presented later in this section of the manual.

This analyzer has been designed for use in environments that do not contain combustible or explosive materials.

This analyzer uses a fuel containing hydrogen. Leakage from the fuel containment system can result in an explosion. The fuel supply and containment system, both inside and outside the analyzer, should be carefully checked for leaks upon installation, before initial startup, during routine maintenance or any time the integrity of the system is broken.

If hazardous sample is to be introduced into this analyzer the leak check procedure should also be applied to the sample containment system, both inside and outside the analyzer.

Proceed as follows:

1. Inspect analyzer to make sure that plugs and caps are removed from all inlet and outlet fittings.
2. If a vent line is to be connected to exhaust outlet, use 1/2-inch 10 tube slanted downward at least 10 degrees from horizontal.

**NOTE**

Since water vapor is formed during oxidation of hydrogen, burner exhaust gas always contains moisture, even if air and fuel entering the burner are completely dry. Unless exhaust line slants down, water may accumulate in line, causing back pressure and noisy readings. If exhaust line becomes blocked, water may back up in line and flood burner.

3. If sample is toxic or noxious, or is to be reclaimed, connect bypass outlet to suitable disposal system. Do not use any device causing back pressure on burner.
4. Clean external fuel, air, and sample lines and regulators. If necessary, heat lines with torch to drive out contaminants.

**⚠ CAUTION**

Do not perform this operation with the fuel, air and sample lines connected to the analyzer.

5. Recommended method is to attach the tubing to either a nitrogen or helium cylinder through a two-stage regulator and adjust the regulator for a low flow of gas through the tubing. Use a propane or natural gas torch to heat the tubing to at least 300°C, working the heat source slowly from the regulator end to the open end. This will remove contaminants from the inside walls of the tubing, and drive them out the open end.
6. Connect external fuel and air lines to fuel and air inlet fittings on analyzer. Connect external sample line to sample inlet on analyzer (or to inlet fitting on sample pump, if used).
7. Adjust regulators on fuel and air cylinders (or other gas supply sources) for appropriate output pressure. maximum permissible pressure at air and fuel inlets of analyzer is 50 psig (345 kPa). The pressure at the air inlet must be at least 5 psig (34 kPa) higher than the desired setting on the air pressure gauge within the analyzer. Thus if the internal fuel pressure regulators are to be set at a typical value of 25 psig (172 kPa), the pressure at the fuel inlet must be set 15 to 20 psi (103,4 to 137,9 kPa) higher than the operating pressure.
8. Supply sample gas at appropriate pressure, as explained in "Sample Handling". Sample bypass flow must be between 0.5 and 3.0 liters/minute for proper operation. Preferably, it should be between 2.0 and 3.0 liters/minute, to minimize system response time. Flow may be measured by connecting a flowmeter to bypass outlet.

## LEAK CHECK

**⚠ WARNING**

Be particularly careful in checking for leaks in the fuel lines. Fuel gas leakage can cause an explosion.

Check all gas connections to ensure that they are leak free. Use of SNOOP (P/N 837801) or other suitable leak-test liquid is recommended. Do not use soap or other organic substances; they will contaminate the system resulting in excessive noise and background current. To leak check the fuel containment system, it is necessary to have full operating pressure within the system. To accomplish this, hold the momentary IGNITE/PURGE switch in the up or PURGE position.



## ELECTRICAL CONNECTIONS

### ⚠ WARNING

Before supplying electrical power to analyzer, complete the gas connections and verify that fuel gas connections are leak free.

### ⚠ WARNING

Do not operate without doors and covers secure. Servicing requires access to live parts which can cause death or serious injury. Refer servicing to qualified personnel.

### Line Power Connection

The Model 400A is manufactured to operate only on 115 VAC power. (Note that the power input box and power selection card display only 115 VAC operation.)

The power cable supplied is provided with a North American-style parallel blade grounded plug which must be inserted into a 3-wire grounded receptacle.

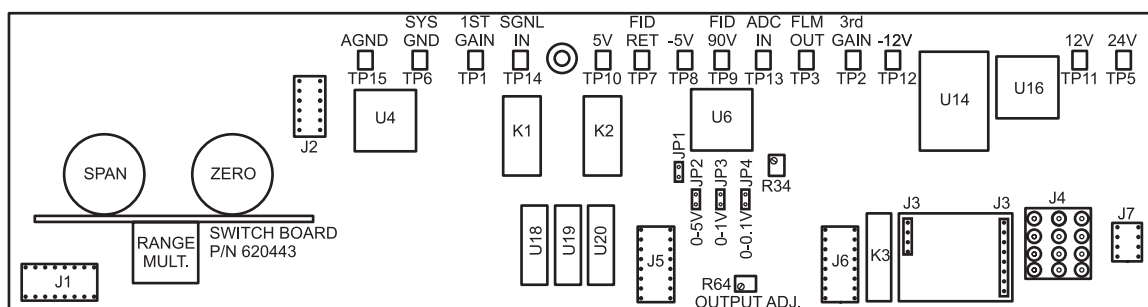
If 230 VAC operation is desired, an external isolated step-down transformer accessory (not supplied) is required.

### Voltage Output Selection and Cable Connections for Recorder

The standard analyzer provides voltage output only. As shipped from the factory, the analyzer is set up for use with a 100 mV recorder (program header jumper JP4).

A selection of three voltage output ranges, 0 to 0.1 VDC, 0 to 1.0 VDC or 0 to 5.0 VDC are available at terminals 3 and 4 of the lower six-position barrier strip labeled OUTPUT. Refer to Figure 2-2. To select 0 to 1.0 VDC range, install jumper JP3 on the main electronics board assembly. For the 0 to 5.0 VDC range, install jumper JP2, and for the 0 to 0.1 VDC range, install jumper JP4. This is a fully buffered signal and can be used with most types of voltage recorders. A 10 VDC output displays 1999 on digital readout, indicating 99.9% overrange. A 5 VDC output displays 1000 on digital readout and indicates 100%, the normal instrument span. Fine adjustments to the output voltage can be made with trim potentiometer R64, shown in Figure 2-2.

Figure 2-2. Main Electronics Board



39590014

# Model 400A

## Voltage to Current Output Board (Optional)

The optional current output in the range of 4 to 20 mA DC appears at terminals mA+ and mA- on the lower barrier strip. Refer to Figure 2-3. This current may be transformed back to a voltage using the appropriate resistor. This fully isolated current board is an instrument option and mounts internally on the Model 400A front panel assembly. The maximum value of load resistor is 700 ohms. The 4 to 20 mA is valid over the range of 0 to 100%; the overrange capability of 99.9% is not usable with this option because maximum output of 20 mA corresponds to 5 VDC out.

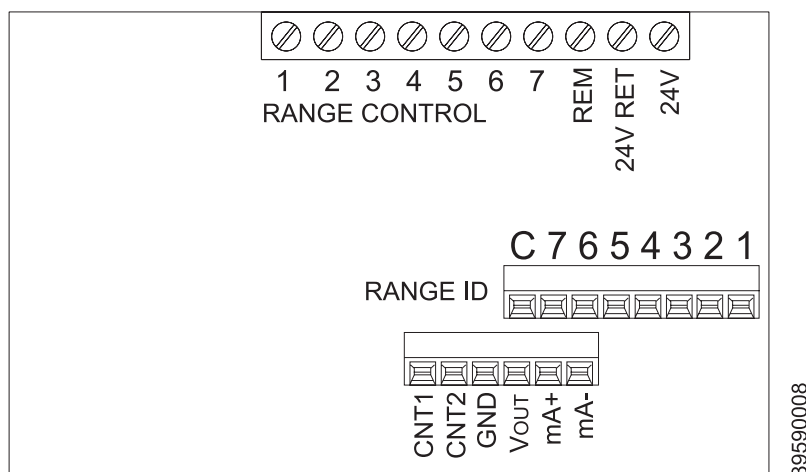
## Auxiliary Contacts

A Form A contact closure is available on pins CNT1 and CNT2 of the lower barrier strip at the rear of instrument. Refer to Figure 2-3. These contacts may be used with an existing alarm panel or annunciator system, providing the current and voltage limits are observed. The rating for the contacts is 24 V at 1A DC. Contacts operate in parallel with the internal fuel shutoff solenoid and may be used for an external "flameout" indication.

## Isolated Remote Range Control

The analyzer is equipped with an isolated remote range control feature. To use the feature the analyzer requires an external 24 VDC power supply.

Figure 2-3. Range ID I/O Board



Upper terminals 1 through 7 on the Range ID I/O Board (Figure 2-3) are used for this function. Select RMT on the front panel RANGE MULTIPLIER switch. Connect the respective line, 1 through 7, to pin 3 (GND) on the lower barrier strip or to pin 9 (24V RET) on the upper barrier strip. The front panel will indicate the range selected.

### NOTE

If no range is selected, the front panel Range LEDs will display a lower case "r". If no external power supply is connected to the analyzer the front panel Range LEDs will display a dash "-".

Terminals 1 through 7 correspond to ranges 1 through 7. Table 2-1 shows a simple range selection arrangement.

Table 2-1. Range Control

Terminal Board								
	24V RET or GND	1	2	3	4	5	6	7
Range 1	X	X						
Range 2	X		X					
Range 3	X			X				
Range 4	X				X			
Range 5	X					X		
Range 6	X						X	
Range 7	X							X

When the front panel RANGE MULTIPLIER switch is in the RMT position and an external 24 VDC power supply is properly connected to the analyzer, the REM terminal on the Range ID I/O Board (Figure 2-3) will provide a 24 VDC output with respect to terminal 9 (24V RET) to indicate that the analyzer is in the REMOTE condition. In addition, the REM Range LED on the front panel will light up to indicate that the analyzer is in the REMOTE condition.

## Remote Range ID

The Remote Range ID terminals are also located on the rear panel of the instrument and are shown in Figure 2-3. Range 1 through 7 can be selected by connecting one of the terminals 1 through 7 on the Range ID I/O Board to the 24V RET terminal on the rear panel. Connections are made to bare wire terminals and which are easily removed to facilitate installation.

### NOTE

Range Identity is accomplished by completing a conductive path from the common (C) pin to one of the remote range terminals on the rear panel.

Range changes are achieved by applying 24VDC at about 250 mW to the Remote Range ID terminals. Only one range may be selected at a time. Range indication is achieved by individual 24 VDC (1 amp) relay contacts.

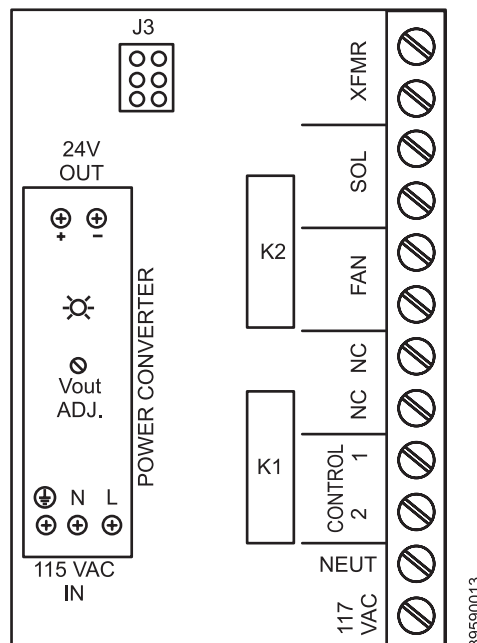
### WARNING

Range identity relay contacts are limited to 24 VDC. Use of 115 VAC is unsafe.

Common control/sense connections may be made to the range control terminals.

Voltage and current output signals are also available on the Range ID board. For a current output with less than 600 ohms, the resistor must be placed between terminals +mA and -mA. Voltage output interconnects should be shielded (use the GND output for shield connection) but current output shielding is less critical. If used, current output shielding should be grounded on the reception end (computer or chart recorder).

Figure 2-4. Remote Flameout Relay Board



### Remote Flameout Indication

Terminals for flameout indication (Control 1 and 2) are shown in Figure 2-4. Whenever the process flame is detected there is no conductive path between Control 1 and Control 2. When the process flame goes out there is a conductive path between Control 1 and Control 2. The maximum flameout indicator power provided at the control terminals is 24VDC at 1amp.

### Sample Pump Accessory

If a sample pump is used, 115 VAC, 50/60 Hz power must be provided to the pump accessory independently. A power cord is provided with this option and mates with a standard 3-pin power connector at the rear of the housing.

## Section 3 Startup and Operation

Initial Startup and Operation .....	page 3-1
Routine Operation .....	page 3-8
Recommended Calibration Frequency .....	page 3-8
Shutdown .....	page 3-9
Obtaining Maximum Sensitivity .....	page 3-9

### INITIAL STARTUP AND OPERATION

#### Initial Analyzer Startup

The following paragraphs discuss initial startup, calibration procedures, use of the range switch, and other operating topics for the Model 400A Hydrocarbon Analyzer.

After installing analyzer per Section 2: Installation, perform the initial analyzer startup and calibration procedure according to the following instructions:

1. Set the RANGE MULTIPLIER switch (located inside the small door on the analyzer front panel) at 1000.

Figure 3-1. Range Multiplier Switch

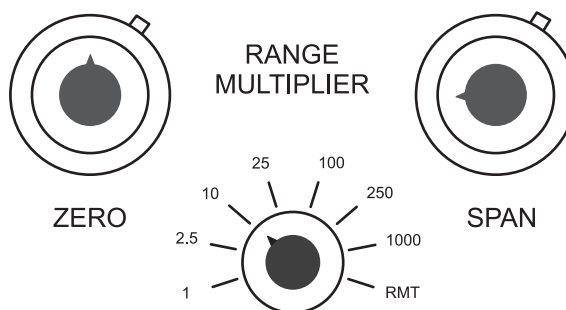
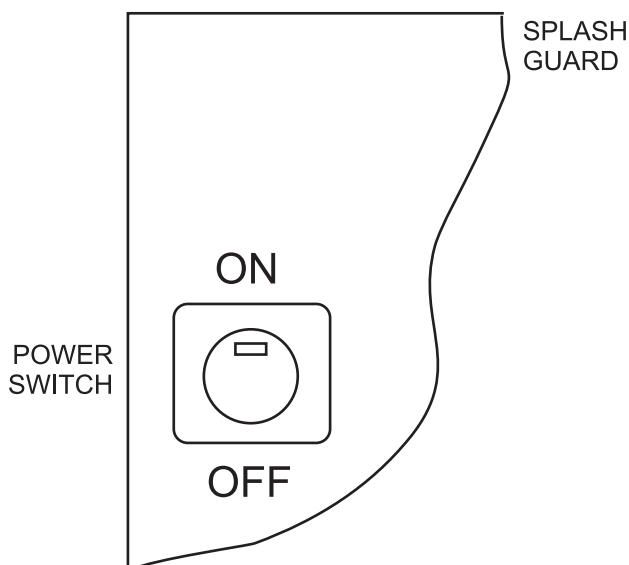


Figure 3-2. Power Switch



2. Locate the rotary latch on the right-hand side of the front panel. Turn the latch screw counterclockwise to unlatch and open the front panel door.
3. Place the power switch (Figure 3-2) to ON. The front panel display should light up.
4. Set external regulators on air and fuel cylinders (or other gas supply sources) for suitable output pressure. Maximum permissible pressure at air and fuel inlets of analyzer is 50 psig (345 kPa). The pressure at the air inlet must be at least 5 psig (25 kPa) higher than the desired setting on the air pressure gauge within the analyzer. The internal fuel pressure regulator is to be set at a typical value of 25 psig (172 kPa), the pressure at the fuel inlet must be set at least 20 lbs. higher than the operation pressure.
5. If analyzer uses 100% hydrogen fuel, supply actual sample or other suitable gas to sample inlet port of analyzer (or to inlet fitting on sample pump, if provided). Note pressure and flow requirements explained in Section 2: Installation, Fuel and Air Requirements.

### ⚠ CAUTION

If analyzer uses 100% hydrogen fuel, an adequate flow of sample or other gas must sample inlet at all times when flame is burning. Otherwise, burner will overheat and damage burner tip.

6. If analyzer uses mixed fuel, sample flow may be initiated at this time, although it is not necessary.
7. Set internal pressure regulators at values appropriate to the fuel gas used. Refer to Table 3-1.

Table 3-1. Internal Pressure Regulator Settings

Internal Pressure Regulator	Fuel Gas	
	100% H <sub>2</sub> Fuel psig (kPa)	Mixed Fuel psig (kPa)
Air	5 (34)	5 (34)
Fuel	25 (172)	30 (207)
Sample	5 (34)	0 (0)

8. With PURGE/IGNITE switch in PURGE position, wait about one minute for fuel gas to purge flow system. During purging period, rotate fuel pressure regulator alternately clockwise and counterclockwise several times then return to setting specified in step 5.
9. Briefly hold (2 to 4 sec.) PURGE/IGNITE switch in IGNITE position then release. FLAME indicator should now be ON indicating that flame is burning. If so, proceed with following steps. If FLAME indicator does not stay on the flame is not burning. Again actuate IGNITE switch. If flame does not ignite after several attempts refer to troubleshooting chart, Section 4: Troubleshooting. If difficulty is experienced, allowing gas to flow for 20 or 30 seconds in the PURGE position prior to actuating the IGNITE switch may be helpful.

#### NOTE

If ignition indication (FLAME ON) is observed without obtaining proper sensitivity, refer to Section 4: Troubleshooting.

#### NOTE

When lighting the burner after extended shutdown, the instrument will require time to allow fuel to reach the burner. Extended operation of the switch may be required.

10. Increase setting on internal air pressure regulator to at least 15 psig (103 kPa). Recommended operating settings for internal pressure regulators are air, 15 psig (103 kPa); fuel, 25 psig (172 kPa). Verify that FLAME indicator is still on.

The analyzer is equipped with an automatic fuel shutoff solenoid. If flame goes out during subsequent operation, fuel gas flow will shut off automatically.

If analyzer has been in regular use, it is now ready for calibration followed by normal operation. However, during initial startup or startup following a prolonged shutdown, the following steps should first be performed.

11. Check for contamination in air and fuel systems:
  - a. Supply a clean, hydrocarbon-free gas, such as pure nitrogen to the sample inlet. Adjust external flow controller or throttle valve so that flow discharged from bypass outlet is between 0.5 and 3.0 liters/minute (preferably between 2.0 and 3.0 liters/minute). Set internal sample pressure regulator at 5.0 psig (34.5 kPa).

- b. Set RANGE switch at 10, SPAN control at 1000 (maximum sensitivity), and ZERO control at 1000 (minimum zero suppression). Approximate full scale sensitivity is now 10 ppm as methane for mixed fuels if the analyzer uses 100% hydrogen fuel, and 40 ppm methane if the analyzer uses mixed fuel.
  - c. Check display. Maximum acceptable reading is 50% of full scale. A higher reading indicates that the contamination level is undesirably high. Excessive noise and baseline drift may result, depending on the desired operating range. If the instrument is to be operated at high sensitivity, the source of the contamination must be determined and the condition corrected. The most probable contamination sources are the fuel and air supplies, external regulators and connecting lines, and the internal flow system of the analyzer. If the instrument is to be operated at a sensitivity low enough so that the noise and drift will not be observable on the display or recorder, removal of the source of contamination is unnecessary.
12. With flame burning, allow system to stabilize for at least two hours, and preferably for a day. After initial startup, or after startup following a prolonged shutdown, the analyzer may display baseline drift for a considerable period of time, particularly on the more-sensitive ranges. Commonly, small amounts of hydrocarbons are present on the inner walls of the tubing in both the internal flow system and the external gas-supply system. Drift results from any factor influencing the equilibrium of these absorbed hydrocarbons. Typical causes are change of fuel cylinders or change in temperature or pressure.

This type of drift occurs only when the flame is burning. If drift occurs when the flame is extinguished, the electronic circuitry is at fault. To minimize drift, use clean fuel and air, keep the analyzer clean, and locate the gas cylinders in an area of relatively constant ambient temperature.

## Selection of Calibration Method and Associated Standard Gas(es)

Preparatory to normal operation of the analyzer, it is necessary to select a suitable calibration method and appropriate standard gas(es). Proper choice depends on the type of fuel gas, the intended operating range, and the desired accuracy. In all methods, the objective is to establish both a downscale point and an upscale point on the display or recorder chart. Different methods are described in the following paragraphs.

### Downscale Calibration Point

The downscale calibration point is set with the ZERO control, by the appropriate one of two methods:

1. The generally preferred method is to adjust the ZERO control while a zero standard gas of low, accurately-known, hydrocarbon content is entering the sample inlet port. This method is desirable with all analyzers, and is mandatory if the analyzer utilizes 100% hydrogen fuel. Typically, nitrogen (zero gas grade) is used as the zero gas. If desired, the burner air may be used as zero gas, provided that its hydrocarbon content is sufficiently low and accurately known. Although ideally the zero gas should be completely hydrocarbon-free, even the most carefully prepared bottled gas contains trace hydrocarbons. If the analyzer is to be used at high sensitivity, request that the supplier of the zero gas provide an exact determination of its hydrocarbon content.



2. If the analyzer utilizes mixed fuel, an alternative method eliminates the requirement for a special zero gas. Instead, the ZERO control is adjusted with no gas entering the sample inlet. This method is not possible with analyzer utilizing 100% hydrogen fuel, because the burner would overheat. Even with mixed fuel, the method is not recommended if the analyzer is to be used at sensitivity less than 100 ppm full scale.

Refer to Figure 3-3 for typical curves of downscale response versus time for various hydrocarbons.

### Upscale Calibration Point

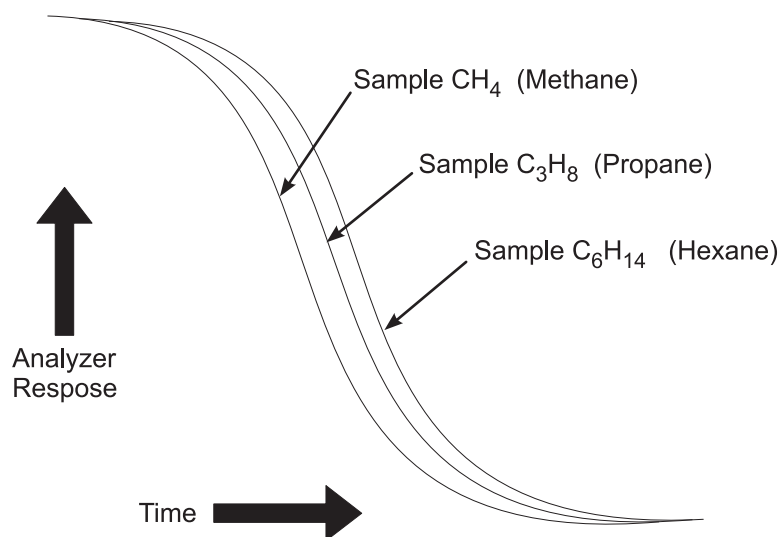
In all applications, the upscale calibration point is established by adjustment of the SPAN control, while a standard gas of accurately known hydrocarbon content is flowing into the sample inlet port. Since instrument response is linear, it is not necessary that the hydrocarbon content of the span gas fall within the desired operating range. The instrument may be standardized on one range, and then switched to another range without loss of accuracy. Commonly, a conveniently obtained standard such as 100 ppm methane or 1000 ppm methane is used regardless of range.

A span gas consists of a specified concentration of methane or other hydrocarbon in a background gas such as nitrogen. Instrument response is affected by the composition of the background gas. Therefore, it is desirable that the span gas contain the same background gas as the actual sample. If so, the background effect is automatically canceled out.

### Standard Gas(es)

Upscale standard gas (and zero standard gas, if used, should be supplied from a tank or cylinder equipped with a clean, hydrocarbon-free, two-stage pressure regulator.

Figure 3-3. Typical Curves of Downscale Response vs. Time for Various Hydrocarbons



39590004

## Calibration Procedure

After completing the startup procedure calibrate the analyzer according to the instructions that follow.

1. Set downscale calibration point as follows:
  - a. Supply zero gas to sample inlet. Adjust external flow controller or throttle valve so that flow discharge from bypass outlet is between 0.5 and 3.0 liters/minute (preferably between 2.0 and 3.0 liters/minute). Set the internal sample pressure regulator at 5 psig.
  - b. Supply span gas to sample inlet. Adjust external flow controller or throttle valve so that flow discharged from bypass outlet is between 0.5 and 3.0 liters/minute (preferably between 2.0 and 3.0 liters/minute). Verify that reading on internal sample pressure gauge is 5 psig or other desired value; if not, adjust sample pressure regulator as required.
  - c. Adjust SPAN control so that the display or recorder gives the desired indication. Lock SPAN control by pushing lever down. Analyzer calibration is now sufficiently accurate for most applications. However, if instrument is to be used for high sensitivity analysis, recheck zero setting (refer to Obtaining Maximum Sensitivity). If recorder readout and display do not agree, correct display by adjusting R1 on front panel board.
  - d. Supply zero gas to sample inlet as in step 1. a. Set RANGE MULTIPLIER switch at 10. Note reading on indicator or recorder; if incorrect, adjust ZERO control as required. Lock ZERO control by pushing lever down. The analyzer is now ready for routine operation.

Table 3-2. Range Switch Settings

Range Multiplier Setting	Approximate Operating Range Span Control at 1000	
	100% H <sub>2</sub>	40/60 Mixed Fuel
1	0 to 1 ppm CH <sub>4</sub>	0 to 4 ppm CH <sub>4</sub>
2.5	0 to 2.5 ppm CH <sub>4</sub>	0 to 10 ppm CH <sub>4</sub>
10	0 to 10 ppm CH <sub>4</sub>	0 to 40 ppm CH <sub>4</sub>
25	0 to 25 ppm CH <sub>4</sub>	0 to 100 ppm CH <sub>4</sub>
100	0 to 100 ppm CH <sub>4</sub>	0 to 400 ppm CH <sub>4</sub>
250	0 to 250 ppm CH <sub>4</sub>	0 to 1000 ppm CH <sub>4</sub>
1000	0 to 1000 ppm CH <sub>4</sub>	0 to 4000 ppm CH <sub>4</sub>

### NOTE

For best results, calibrate with appropriate span gas every time the range is changed. For a clear understanding of the function of the Range Multiplier, refer to the discussion that follows

## Range Switch (Multiplier)

The operator can choose from seven range multipliers as represented by the settings on the range multiplier: 1, 2.5, 10, 25, 100, 250, and 1000.

Range 1 is the most sensitive, range 1000 the least sensitive. Range 1 is 10 times more sensitive than Range 10.

The range multiplier settings and the display outputs do not represent hydrocarbon concentrations in percent or ppm. The LED display shows the percent of the full scale range which has been calibrated on the multiplier selected. The display also shows which range multiplier has been selected on the range multiplier (1 = 1, 2 = 2.5, 3 = 10, 4 = 25, 5 = 100, etc.).

### NOTE

If the Range multiplier switch is faulty, the front panel will display and "E".

If no range is selected when in the remote range mode the front panel will display a lower case "r".

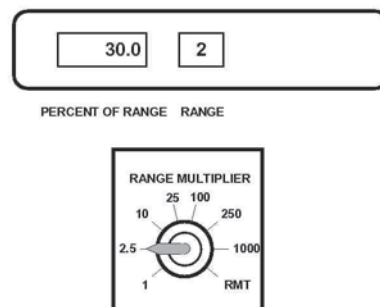
If no external power supply is connected to the analyzer, the front panel will display a dash "-".

Range 1 has a maximum sensitivity of 1 ppm CH<sub>4</sub> (as 100% full scale) if 100% H<sub>2</sub> fuel is used, or 4 ppm CH<sub>4</sub> if mixed fuel is used. Range 2.5 has a maximum sensitivity of 2.5 ppm CH<sub>4</sub> with 100% H<sub>2</sub> and 10.0 ppm CH<sub>4</sub> with mixed fuel.

### Example 1

With the range multiplier switch set at 2.5, the operator can use a 6 ppm CH<sub>4</sub> span gas to calibrate the instrument for 20 ppm full scale (30.0% x 20 ppm CH<sub>4</sub> = 6.0 ppm). See Figure 3-4 for the display output and range multiplier switch setting.

Figure 3-4. Example 1 Display

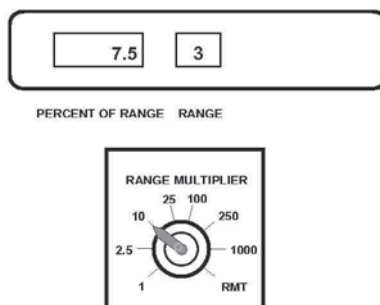


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### Example 2

After the calibration in example 1, range 10 is now automatically calibrated for 80 ppm CH<sub>4</sub> as 100% full scale. (Note that range 10 is 4 times less sensitive than range 2.5). When the operator switches from range 2.5 to range 10, the display (Figure 3-5) will show 7.5% full scale for ppm CH<sub>4</sub> calibration gas since 7.5% x 80 ppm CH<sub>4</sub> = 6.0 ppm CH<sub>4</sub>.

Figure 3-5. Example 2 Display

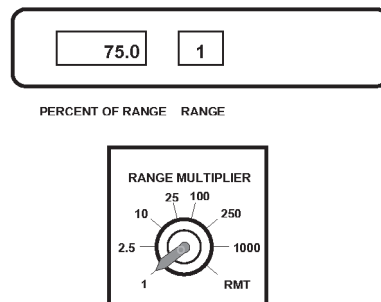


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### Example 3

Likewise, after the calibration in example 1, range 1 is automatically calibrated for 8 ppm as 100% full scale. When switching from range 2.5 to 1 (which is 2.5 times more sensitive than 2.5), the display will show 75.0% full scale for 6.0 ppm CH<sub>4</sub> calibration gas (because 75.0% x 8 ppm CH<sub>4</sub> = 6 ppm CH<sub>4</sub>). See Figure 3-6 for the display output and range multiplier switch setting.

Figure 3-6. Example 3 Display



39590017

### NOTE

The precision of the analyzer is  $\pm 1\%$  full scale of range. Analyzer should be calibrated with a span gas that has a hydrocarbon concentration as close to the full scale concentration as possible.

## ROUTINE OPERATION

After calibrating instrument per "Typical Curves of Downscale Response vs. Time for Various Hydrocarbons", proceed as follows:

1. Supply sample gas to sample inlet. Adjust external flow controller or throttle valve so that flow discharged from bypass outlet is between 0.5 and 3.0 liters/minute (preferably between 2.0 and 3.0 liters/minute).
2. Note reading on bypass pressure gauge. It should be the same as that used during adjustment of the SPAN control; if not, adjust sample pressure regulator as required.
3. Turn RANGE MULTIPLIER switch to appropriate position. Indicator (and recorder, if used) will now automatically and continuously indicate the hydrocarbon content of the sample. Normally, the readout is in terms of CH<sub>4</sub>, since this is the particular hydrocarbon present in the usual span gas. Readings obtained during operation depend on the type, as well as the concentration, of hydrocarbons in the sample.
4. If maximum accuracy and stability are desired, observe the operating requirements explained in "Obtaining Maximum Sensitivity".

## RECOMMENDED CALIBRATION FREQUENCY

After initial startup, or startup following a prolonged shutdown, the analyzer requires about one day for stabilization. For the first few days thereafter, calibrate daily. Subsequently the frequency of calibration can be reduced as experience dictates, consistent with the accuracy requirements of the particular application.

## SHUTDOWN

Use the following procedure to shut down the Model 400A Hydrocarbon Analyzer.

### ⚠ WARNING

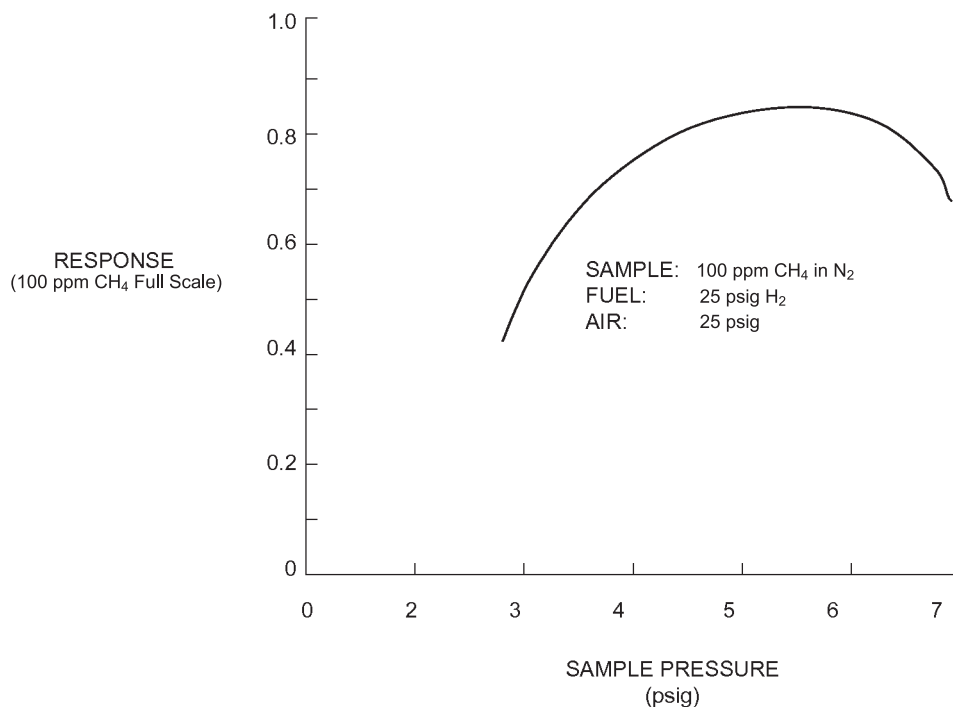
For safety in shutdown, always turn off the fuel gas first, then turn off the air and sample lines.

1. Close the fuel gas supply valve.
2. Close the air and sample line valves.

## OBTAINING MAXIMUM SENSITIVITY

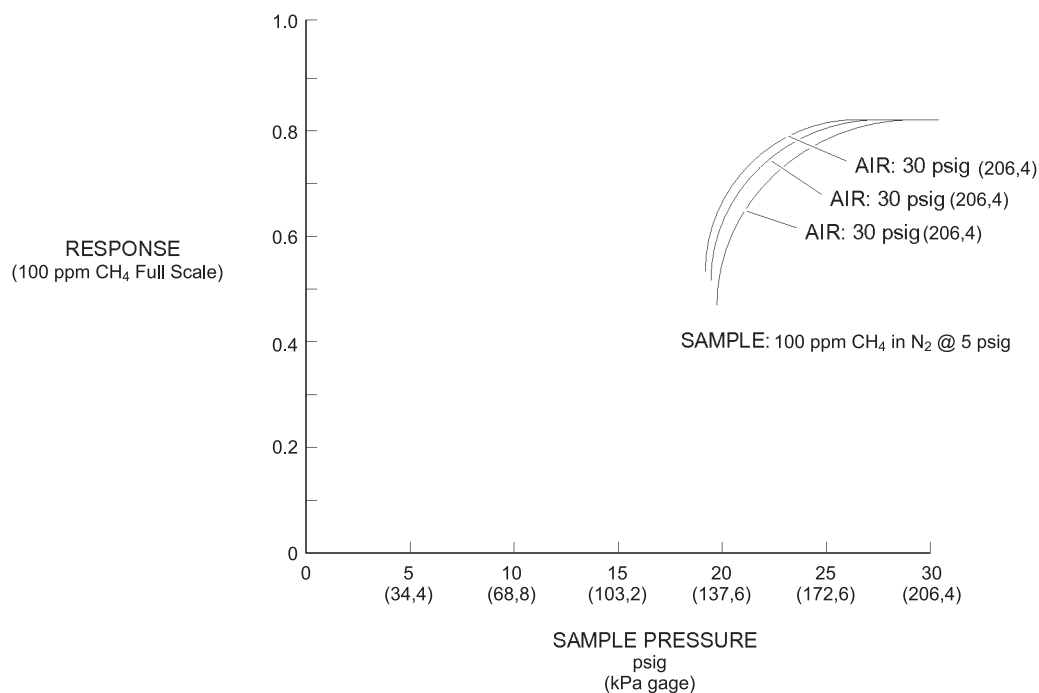
If maximum sensitivity is desired, it is necessary to use an optimum combination of settings on the sample, fuel, and air pressure regulators. Settings must be determined experimentally; however, the curves of Figure 3-7, Figure 3-8, and Figure 3-9 may be used as guides.

Figure 3-7. Typical Curve of Analyzer Response vs. Sample Pressure Setting



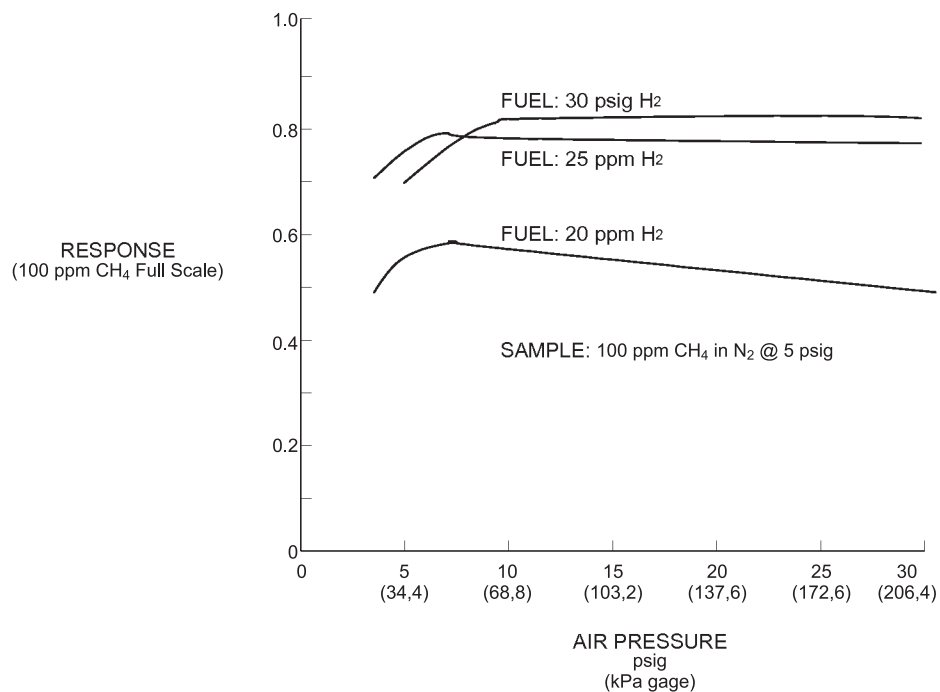
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Figure 3-8. Typical Curves of Analyzer Response vs. Fuel Pressure Regulator Setting



39590020

Figure 3-9. Typical Curves of Analyzer Response vs. Air Pressure Regulator Setting



39590021

## Section 4 Troubleshooting

General .....	page 4-1
System Checkout .....	page 4-1
Troubleshooting .....	page 4-3

### GENERAL

This troubleshooting section describes how to identify and isolate faults that may occur in the Model 400A Hydrocarbon Analyzer.

#### WARNING

Do not operate without doors and covers secure. Servicing requires access to live parts which can cause death or serious injury. Refer servicing to qualified personnel.

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

The power plug must be disconnected from the rear of the instrument before removing any of the boards and/or interconnect plugs.

### SYSTEM CHECKOUT

If analyzer performance is unsatisfactory make the following tests in the sequence given.

#### Amplifier Zero Adjustment

Place POWER switch at ON; RANGE MULTIPLIER switch at 1000; ZERO and SPAN potentiometers at 1000. With flame extinguished, note reading on front panel indicator, or on potentiometric recorder if used. Reading should be zero; if not, adjust trimming potentiometer R13 on amplifier circuit board. Potentiometer R13 is adjusted by inserting a screwdriver through the lower hole in the amplifier shield.

#### Signal Voltage Trim Adjustment

When the voltage output is noticeably higher than the corresponding Percentage of Range display, adjust R64 on the main electronics board until they are equal. Potentiometer R64 can only be used to reduce the output signal voltage.

#### Electrical Leakage Check

Turn RANGE MULTIPLIER switch from position 1000 to position 1; indicator or recorder should still read  $0 \pm 5\%$ . If reading is outside this range, leakage is excessive. To determine the source of the leakage, disconnect the amplifier input cable from burner, and note response of indicator or recorder. If abnormal reading persists, leakage is in either the cable or electronics. If reading drops to zero, leakage is in the burner. Clean burner per Section 5: Maintenance and Service. Reconnect cable to burner.

### Flame Ignition

Start up analyzer per Section 3: Startup and Operation, and attempt to ignite flame. If flame will not ignite refer to Table 4-2, Symptom 2.

### Noise Check

With flame burning, observe indicator or recorder. If noise is greater than 2% of full scale, refer to Table 4-2, Symptom 3.

### Overall Sensitivity Check

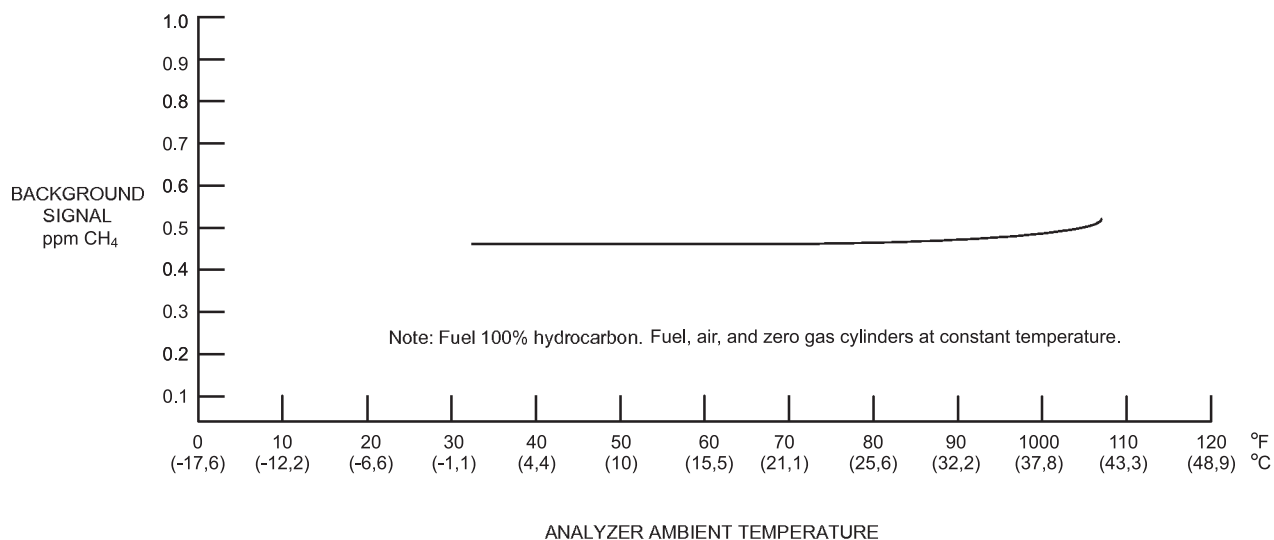
With flame burning, supply a suitable span gas to sample inlet. Turn RANGE MULTIPLIER switch to a setting appropriate to the hydrocarbon content of the particular span gas. Adjust SPAN control for reading of 100% on indicator or recorder. If the desired upscale reading is unobtainable by adjustment of the SPAN control, the fault may be in either the flow system (Table 4-2, Symptom 4) or in the electronics.

### Stability Check

Supply zero gas to sample inlet. Turn RANGE MULTIPLIER switch to position 1. Observe indicator or recorder over several hours of operation. Drift greater than the stability specification may be due to malfunctioning of the internal temperature control. For comparison Figure 4-1 shows the typical effect of ambient temperature variations on background reading for a standard analyzer, with internal temperature controller functioning normally. In this example, temperature dependent variations in background signal are very small. However, note that such high stability is obtainable only with exceedingly clean cylinder gases. Background signal, and temperature dependent variations in this signal, increase with level of trace hydrocarbon contaminants.

If the internal temperature controller is functioning normally, apparent drift may be due to changes in ambient temperature of the fuel and air cylinders. For further information, refer to Section 3: Startup and Operation, "Obtaining Maximum Sensitivity".

Figure 4-1. Effect of Analyzer Temperature on Background Signal - Typical Curve



39590022



- Thermistor**

The thermistor sensor for the FLAME OUT indicator circuit is mounted in the burner. See Figure 1-2. Thermistor resistance should be approximately 100K ohms at 77°F (25°C). An alternate method requires that the comparator input signal be measured at the junction of R32 and R33. When the flame is burning normally, the voltage at this point will be 0.1 VDC to 0.3 VDC, indicating that the thermistor circuit is functional and the flame temperature is correct.
- Fuel and Air Restrictors**

Fuel and air restrictors are porous, sintered metallic, restrictor elements mounted within fittings. If a restrictor becomes plugged, replace it. Do not attempt to clean restrictors with solvents.
- Sample Capillary**

The sample capillary is equipped with fittings, permitting convenient removal and replacement. If necessary, the capillary may be cleaned with acetone or methyl.

**TROUBLESHOOTING**

Refer to Table 4-1 for LOI fault indications and related probable causes.

Refer to Table 4-2 for Symptoms, Probable Causes, and Recommended Corrective Actions applicable to the Model 400A Hydrocarbon Analyzer.

**NOTE**

If no range is selected, the front panel will display a lower case "r". If no external power supply is connected to the analyzer, the front panel will display a dash "-". If the Range ID switch is faulty, the front panel will display and "E".

Table 4-1. LOI Troubleshooting




LOI Display	Probable Cause
	No signal voltage range selected
	No external 24VDC power source to analyzer
	Range ID switch faulty

Table 4-2. Analyzer Troubleshooting

Symptom	Probable Cause	Recommended Corrective Action
Indicator shows upscale reading when flame is out	Electrical leakage in burner assembly.	Clean burner per Section 5, page 5-4.
Burner will not ignite	Fuel gas emerging from burner jet diluted with other gases because fuel system is insufficiently purged.	Purge fuel pressure regulator by allowing gas to flow for several minutes, while turning regulator alternately clockwise and counterclockwise.
	air and/or fuel pressure regulator improperly adjusted.	Check readings on air and fuel pressure gauges. Adjust air pressure regulator to increase or decrease air pressure slightly.
	No flow, or reduced flow, of fuel and/or air into burner combustion chamber.	Constriction in fuel and/or air passage in burner jet, restrictor, etc. Find cause of constriction and remove.
	Malfunction in igniter circuit	Remove cap from burner. Actuate IGNITE switch. Igniter should glow red. If not, check the following probable causes.
	Ignite leads improperly connected.	Check igniter plugs for proper contact.
	Igniter burned out.	Replace igniter (glow plug).
	Transformer circuit open.	Check voltage.
	IGNITE switch defective.	Test switch for continuity. Replace if necessary.
Indicator reading noisy	Contamination of flow system: fuel and air supplies, external pressure regulators, connecting tubing.	Replace fuel and/or air supply; clean or replace tubing and regulators.
	Pressure regulator(s) and/or pressure gauge(s) clogged.	Clean or replace regulators and gauges.
	Water or condensate in burner or exhaust line.	Clean burner and exhaust line.
Loss of sensitivity	Fuel and/or air filter clogged.	Check filters; replace if necessary.
	Plugged restrictor or capillary	Verify that fuel and air restrictors and sample capillary are open. An abnormally low background signal, together with sensitivity loss, indicates plugged restrictor. Note that flame will not light unless fuel and air restrictors are open, but will not light even though sample capillary is completely closed.
	Electrical elements of burner partially short circuited by combustion products.	Clean burner per Section 5, page 5-4.
Sample pressure fluctuations	Check valve in sample pump not functioning.	Examine check valve.
	Obstruction in bypass outlet.	Examine bypass outlet, remove obstruction.
False flame (FLAME-ON) indication of span gas produces little or no upscale deflection.	Flame may be lifting above burner tip (unusual condition).	With the front panel door open, connect a voltmeter from ground to TP3. If flame is properly lit, the voltage will be below 0.2 VDC. If voltage is high, readjust air-fuel ratio to obtain proper ignition. Re-light burner with richer fuel and air setting. FUEL: 30 psig AIR: 2 to 5 psig.

**Section 5**
**Maintenance and Service**

<b>Overview</b>	<b>page 5-1</b>
<b>Amplifier Adjustments</b>	<b>page 5-3</b>
<b>Servicing Flow System and Burner</b>	<b>page 5-4</b>

**OVERVIEW**

This section provides the procedures to maintain and service the Model 400A Hydrocarbon Analyzer.


**Authorized Personnel**

To avoid explosion, loss of life, personal injury and damage to this equipment and on-site property, all personnel authorized to install, operate, and service this equipment should be thoroughly familiar with and strictly follow the instructions in this manual. **SAVE THESE INSTRUCTIONS.**

**Safety Summary**


**WARNING**

Install all protective equipment covers and safety ground leads after equipment repair or service. Failure to install covers and ground leads could result in serious injury or death.


**WARNING**

Do not operate without doors and covers secure. Servicing requires access to live parts which can cause death or serious injury. Refer servicing to qualified personnel.


**WARNING**

Tampering or unauthorized substitution of components may adversely affect safety of this product. Use only factory documented components for repair.


**WARNING**

**EXPLOSION HAZARD**

 Ensure that all gas connections are made as labeled and are leak free. Improper gas connections could result in explosion or death.

### **WARNING**

#### EXPLOSION HAZARD

Do not apply power to analyzer or ignite burner until all leak checks have been performed and until the environment of the analyzer has been determined to be non-hazardous. See Section 2, page 2-6 for the leak check procedure.

This instrument uses a fuel containment hydrogen. The instrument is designed to protect against the formation of an explosive gas mixture within the enclosure. It must NOT be operated if the internal ventilation fan is not functioning. Do NOT operate without factory installed fuel flow restrictor in place.

Check the fuel supply and containment system for leaks, both inside and outside the analyzer, upon installation, before initial startup, during routine maintenance, or any time the integrity of the fuel containment system is broken, to assure that the system is leak-tight. Refer to Leak Check, Section 2, page 2-6.

The enclosure is protected by a continuous dilution air purge system, as recommended in IEC\* Publication 79-2 (Third Edition - 1983). Do not operate unless the continuous dilution air purge system is properly installed and functioning. Upon startup or loss of pressurization, purge for fifteen minutes before restoring power unless the internal atmosphere is known to be non-explosive.

### **WARNING**

#### TOPPLING HAZARD

This instrument's internal pullout chassis is equipped with a safety stop latch located on the left side of the chassis.

When extracting the chassis, verify that the safety latch is in its proper (counterclockwise) orientation.

If access to the rear of the chassis is required, the safety stop may be overridden by lifting the latch; however, further extraction must be done very carefully to ensure the chassis does not fall out of its enclosure.

If the instrument is located on top of a table or bench near the edge, and the chassis is extracted, it must be supported to prevent toppling.

Failure to observe these precautions could result in personal injury and/or damage to the product.

### **WARNING**

Disconnect and lock out power before working on any electrical components.

### **CAUTION**

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

This analyzer requires periodic calibration with known zero and standard gases. See Appendix A: Safety Data, "High Pressure Gas Cylinders".

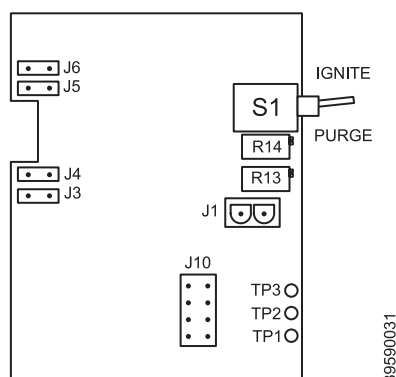
## AMPLIFIER ADJUSTMENTS

### Amplifier Zero Adjustment

Use the following procedures to adjust the amplifier zero level indication and to trim the analyzer signal voltage if needed.

Place POWER switch at ON; RANGE switch at 1000; ZERO and SPAN potentiometers at 1000. With flame extinguished, note reading on front panel indicator, or on potentiometric recorder if used. Reading should be zero; if not, adjust trim potentiometer R13 on preamp board (Figure 5-1). Insert a screwdriver through the lower hole in the preamp shield to access potentiometer R13.

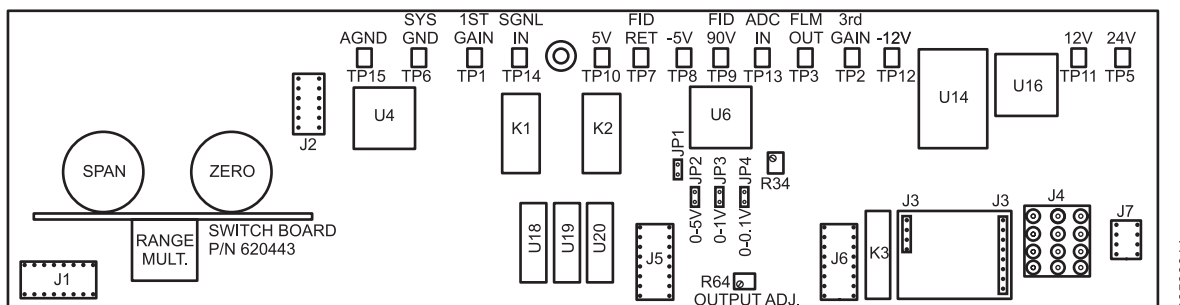
Figure 5-1. Preamp Board



### Signal Voltage Trim Adjustment

Whenever the voltage output is noticeably higher than the corresponding Percentage of Range display, adjust potentiometer R64 on the main electronics board (Figure 5-2). Adjust potentiometer R64 until the voltage output and the Percentage of Range display are the same. Potentiometer R64 can only be used to lower a high signal voltage.

Figure 5-2. Main Electronics Board



## SERVICING FLOW SYSTEM AND BURNER

In preventive maintenance of the flow system, the most important precautions are: 1) provision for continuous removal of all combustion products, including water vapor, and 2) the use of great care to prevent the contamination of any component with hydrocarbons, even in trace amounts.

### CAUTION

Never touch burner tip, Teflon skirt, or combustion chamber with bare hands; always use clean gloves or cloth. If this precaution is not observed, oil from skin will contaminate these components.

## Burner Disassembly and Cleaning

Disassemble the burner only if contaminants must be removed or if parts must be replaced. Combustion products or other contaminants which accumulate inside the burner may form electrical leakage paths between the collector and the burner contact, resulting in noisy readings. If the instrument is to be operated at the highest sensitivity, traces of such contaminants can cause erroneous readings. For best performance it is necessary that the burner be kept free of any contamination.

### WARNING

This analyzer uses a fuel containing hydrogen. Leakage from the fuel containment system can result in an explosion. The fuel supply and containment system, both inside and outside the analyzer, should be carefully checked for leaks upon installation, before initial startup, during routine maintenance or any time the integrity of the system is broken.

When burner requires cleaning, proceed as follows:

1. Place POWER switch at OFF position and disconnect power cord.
2. Shut off fuel gas first, then air and sample gases.
3. See Figure 5-3. Unscrew burner cap nut (1) and remove cap assembly (2).
4. On combustion chamber (5), disconnect polarizing voltage cable and amplifier input cable.
5. Lift chimney (3) from combustion chamber (5). Leave exhaust tubing connected to chimney unless chimney is to be replaced.
6. Loosen clamp (6). Lifting straight up, remove combustion chamber (5) from manifold (12).

### NOTE

If burner tip assembly (7) is to be used again, do not touch it with bare hands or any materials likely to contaminate it with hydrocarbons, salt, etc.

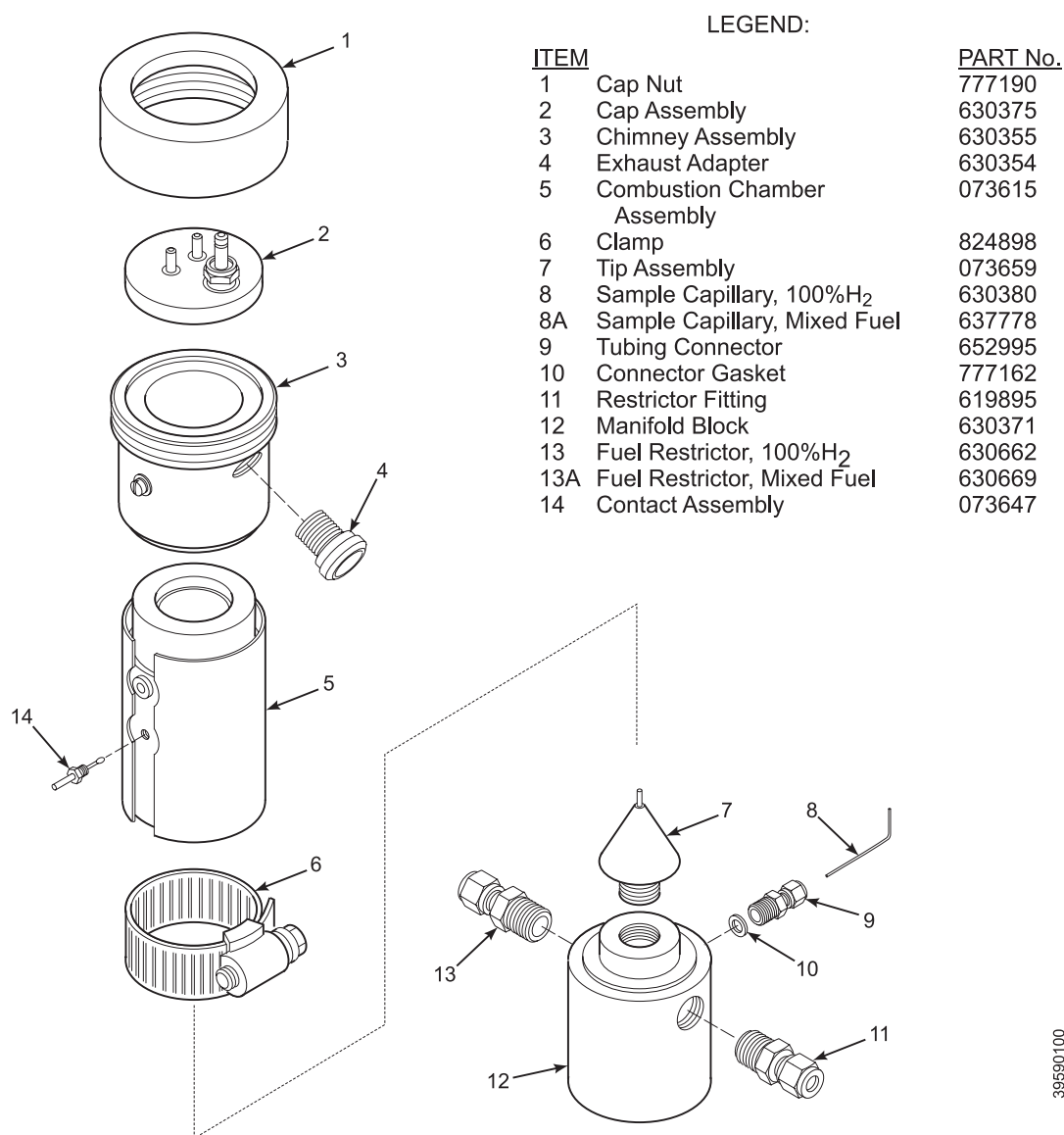
7. Unscrew and remove burner tip assembly (7).

### NOTE

All items used for cleaning (tweezers, swabs, etc.) must be absolutely free of contamination.

8. Clean combustion chamber (5), burner tip assembly (7), and chimney assembly (3) with alcohol followed by a distilled water wash.

Figure 5-3. Burner Assembly - Disassembled View



39590100

## **Burner Reassembly**

Using care not to touch internal parts, reassemble burner according to the following procedure. See Figure 5-3.

1. Holding burner tip assembly (7) with clean tissue, screw the assembly finger-tight into manifold (12).
2. Push combustion chamber (5) down onto manifold (12), taking care not to hit burner tip (7). Tighten clamp (6) on combustion chamber.
3. Install chimney assembly (3) on combustion chamber (5).
4. Install cap assembly (2) and secure with cap nut (1). Hand tighten cap nut.
5. Reconnect all electrical leads.



## Section 6 Replacement Parts

### PARTS INTEGRITY

#### WARNING

Tampering or unauthorized substitution of components may adversely affect safety of this product. Use only factory documented components for repair.

### CIRCUIT BOARD REPLACEMENT POLICY

In most situations involving a malfunction of a circuit board, it is more practical to replace the board than to attempt isolation and replacement of the individual component. The cost of test and replacement will exceed the cost of a rebuilt assembly. Rebuilt boards are available on an exchange basis.

Because of the exchange policy covering circuit boards the following list does not include individual components. If circumstances necessitate replacement of an individual component which can be identified by inspection or from the schematic diagrams, obtain the component from a local source of supply.

### RECOMMENDED SPARE PARTS

Table 6-1. Spare Parts List

Table 6-2 provides a list of recommended spares for the Model 400A Analyzer. See Table 6-3 for the relationship between the original parts and the replacement parts. See Figure 5-3 and Figure 6-1 for the location of parts.

Figure, Item	Part Number	Description
5-3, 11	630661	Air Restrictor, Yellow
not shown	622526	Assembly, Burner Base
5-3, 7	073659	Assembly, Burner Tip
5-3, 2	630375	Assembly, Cap (includes glow plug)
6-1, 22	6A00333G01	Assembly, Splash Guard
6-1, 2	6A00334G01	Board, Flame-Out Relay (with Power Supply)
not shown	6A00302G01	Board, Isolated Current Output, 4 to 20 mA
6-1, 19	6A00324G01	Board, Main Electronics
6-1, 13	620423	Board, Preamp
6-1, 1	6A00339G01	Board, Range ID I/O
6-1, 5	6A00293G01	Board, Temperature Control
not shown	621031	Cable, 16 Conductor
6-1, 4	836482	Fan
not shown	017154	Filter, Sample/Air
6-1, 7	823484	Fuse, 2 Amp, 115 VAC, SloBlo
not shown	617900	Glow Plug (Igniter)
6-1, 3	655305	Heater Assembly
not shown	IM-103-400A	Instruction Manual, Model 400A (S/N 2000001 and up)
6-1, 11	644055	Pressure Gauge, Sample
6-1, 12	888692	Regulator, Fuel/Air Pressure
6-1, 14	815187	Regulator, Sample Pressure
6-1, 15	617902	Solenoid Valve, Fuel Shutoff
not shown	655203	Solenoid Valve, Sample Shutoff (Option)
not shown	861984	Gauge, Air/Fuel

Table 6-2. Accessories

Figure, Item	Part Number	Description
not shown	1101588-002ENG	Tag, SS (engraved)
2-1	621062	Sample Pump for Model 400A
not shown	631118	Kit, Mixed Fuel Accessory
not shown	634004	Kit, H <sub>2</sub> Replacement Capillary
not shown	655400	Kit, Universal Slide Mount
not shown	655401	Kit, Sample Shut-Off
not shown	656840	Kit, High Range CH <sub>4</sub> , Model 400A
not shown	6A00344G01	Kit, Upgrade for Model 400A
not shown	902523	Transformer, 230 VAC

Table 6-3. Relationship between Original and Replacement Parts

Original Part		Replacement Part(s)										
		Part No.	Description	Main Electronics Board	Isolated Current Output Board	Temperature Controller Board	Flame-Out Relay Board	Splash Guard Assembly	Preamplifier Board	I/O Assembly	Flame-Out Relay Board	Field Repair Instructions
Part No.	Description (Comments)	*6A00324G01	*6A00302G01	*6A00293G01	*6A00334G01	*6A00333G01	620423	620451	657545	*6R00097	*6A00339G01	*IM-103-400A
620428	Main Electronics Board (Replaced by kit)	X	X	X	X	X				X	X	X
621023	Isolated Current Output Board (Replaced by kit)	X	X	X	X	X				X	X	X
620438	Remote Range Control Board (Replaced by kit)	X	X	X	X	X				X	X	X
655030	Range Change ID Board (Option, Replaced by kit)	X	X	X	X	X				X	X	X
624006	Temperature Controller Board (Replaced by kit)			X								
620423	Preamplifier Board (Use existing P/N)						X					
620451	I/O Assembly (Use existing P/N)							X				
657545	Flame-Out Relay Board (Use existing P/N); replacement board in kit)								X			

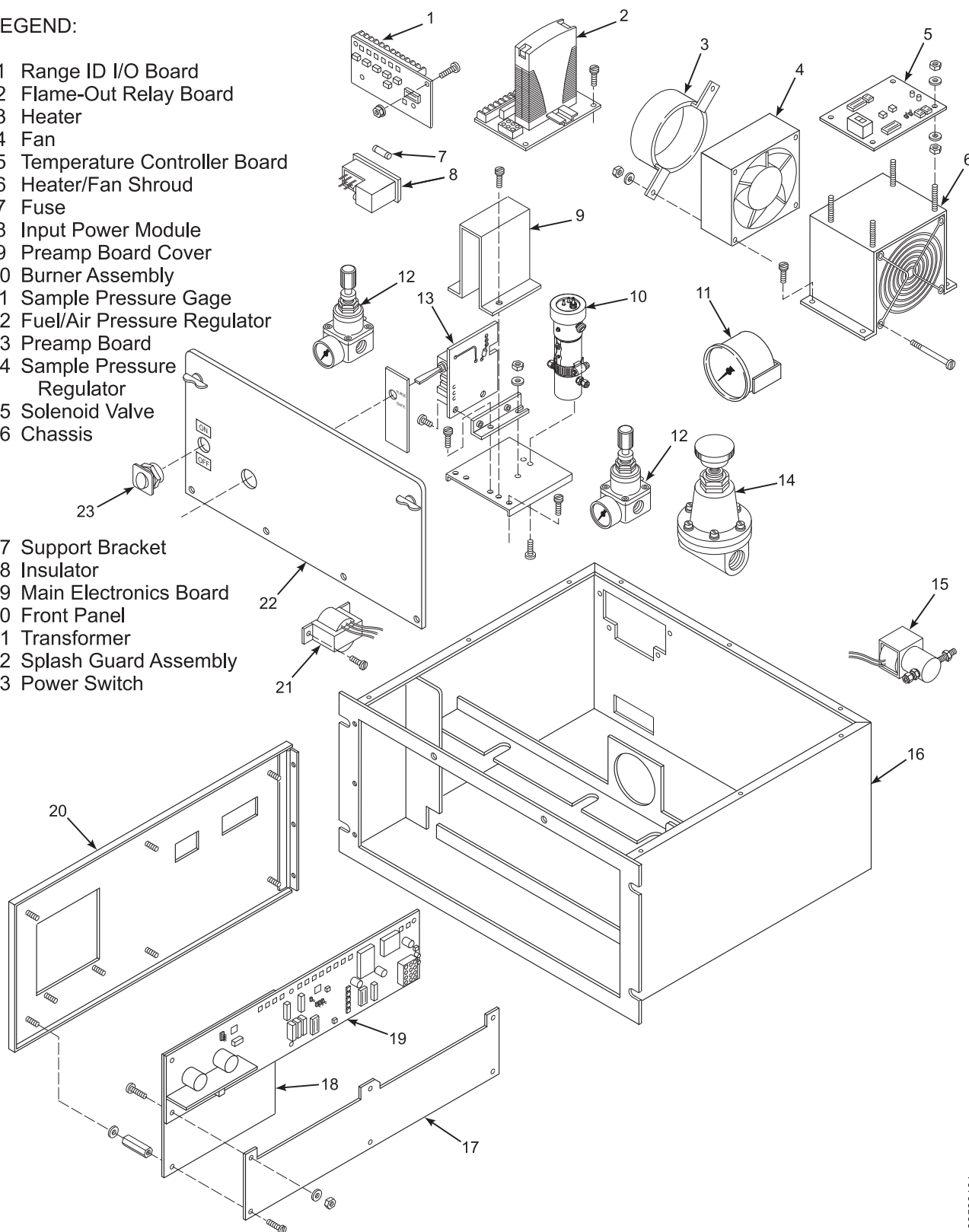
\* Part of Field Upgrade Kit (P/N 6A00344G01)

Figure 6-1. Model 400A Analyzer Assembly - Disassembled View

### LEGEND:

- 1 Range ID I/O Board
- 2 Flame-Out Relay Board
- 3 Heater
- 4 Fan
- 5 Temperature Controller Board
- 6 Heater/Fan Shroud
- 7 Fuse
- 8 Input Power Module
- 9 Preamp Board Cover
- 10 Burner Assembly
- 11 Sample Pressure Gage
- 12 Fuel/Air Pressure Regulator
- 13 Preamp Board
- 14 Sample Pressure Regulator
- 15 Solenoid Valve
- 16 Chassis

- 17 Support Bracket
- 18 Insulator
- 19 Main Electronics Board
- 20 Front Panel
- 21 Transformer
- 22 Splash Guard Assembly
- 23 Power Switch



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# Appendix A      Safety Data

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## SAFETY INSTRUCTIONS

**IMPORTANT****SAFETY INSTRUCTIONS FOR THE WIRING  
AND INSTALLATION OF THIS APPARATUS**

The following safety instructions apply specifically to all EU member states. They should be strictly adhered to in order to assure compliance with the Low Voltage Directive. Non-EU states should also comply with the following unless superseded by local or National Standards.

1. Adequate earth connections should be made to all earthing points, internal and external, where provided.
2. After installation or troubleshooting, all safety covers and safety grounds must be replaced. The integrity of all earth terminals must be maintained at all times.
3. Mains supply cords should comply with the requirements of IEC227 or IEC245.
4. All wiring shall be suitable for use in an ambient temperature of greater than 75°C.
5. All cable glands used should be of such internal dimensions as to provide adequate cable anchorage.
6. To ensure safe operation of this equipment, connection to the mains supply should only be made through a circuit breaker which will disconnect all circuits carrying conductors during a fault situation. The circuit breaker may also include a mechanically operated isolating switch. If not, then another means of disconnecting the equipment from the supply must be provided and clearly marked as such. Circuit breakers or switches must comply with a recognized standard such as IEC947. All wiring must conform with any local standards.
7. Where equipment or covers are marked with the symbol to the right, hazardous voltages are likely to be present beneath. These covers should only be removed when power is removed from the equipment - and then only by trained service personnel.
8. Where equipment or covers are marked with the symbol to the right, there is a danger from hot surfaces beneath. These covers should only be removed by trained service personnel when power is removed from the equipment. Certain surfaces may remain hot to the touch.
9. Where equipment or covers are marked with the symbol to the right, refer to the Operator Manual for instructions.
10. All graphical symbols used in this product are from one or more of the following standards: EN61010-1, IEC417, and ISO3864.
11. Where equipment or labels are marked "Do Not Open While Energized" or similar, there is a danger of ignition in areas where an explosive atmosphere is present. This equipment should only be opened when power is removed and adequate time as specified on the label or in the instruction manual has been allowed for the equipment to cool down - and then only by trained service personnel.



## **DŮLEŽITÉ**

### **Bezpečnostní pokyny pro zapojení a instalaci zařízení**

**Následující bezpečnostní pokyny se speciálně vztahují na všechny členské státy EU. Pokyny by měly být přísně dodržovány, aby se zajistilo splnění Směrnice o nízkém napětí. Pokud nejsou pokyny nahrazeny místními či národními normami, měly by je dodržovat i nečlenské státy EU.**




1. U všech zemnicích bodů, interních a externích, by mělo být vytvořeno odpovídající uzemnění.
2. Po instalaci nebo odstranění problémů musí být vyměněny všechny bezpečnostní kryty a uzemnění. Vždy musí být zajištěna integrita všech zemnicích svorek.
3. Síťové kabely by měly odpovídat požadavkům normy IEC227 nebo IEC245.
4. Všechna zapojení by měla být vhodná pro použití při vnějších teplotách nad 75 °C.
5. Všechna použitá kabelová hrdla by měla mít takové vnitřní rozměry, aby zajistila odpovídající zakotvení kabelu.
6. Správnou činnost zařízení zajistíte, vytvoříte-li připojení k napájecímu zdroji pouze přes jistič, který v případě poruchy odpojí všechny obvody s konduktory. Jistič může také obsahovat mechanický odpojovač. Pokud ho neobsahuje, musí být zajištěn a jasně označen jiný způsob odpojení zařízení od zdroje. Jističe nebo přepínače musí odpovídat uznávaným normám, např. IEC947. Všechna zapojení musí odpovídat místním normám.
7. Je-li zařízení nebo kryt označen symbolem na pravé straně, pravděpodobně se uvnitř nachází nebezpečné napětí. Tyto kryty by měly být sejmuty pouze po odpojení zařízení od zdroje - a to pouze kvalifikovaným zaměstnancem.
8. Je-li zařízení nebo kryt označen symbolem na pravé straně, povrch zařízení může být velmi horký. Tyto kryty by měly být sejmuty pouze kvalifikovaným zaměstnancem po odpojení zařízení od zdroje. Některé povrchy mohou být stále horké.
9. Je-li zařízení nebo kryt označen symbolem na pravé straně, přečtěte si nejprve instrukce v návodu k obsluze.
10. Všechny grafické symboly používané u výrobku pocházejí z následujících norem: EN61010-1, IEC417 a ISO3864.
11. Pokud je zařízení nebo štítky označeno varováním „Je-li zařízení pod napětím, neotvírejte jej“ či podobným, může dojít ve výbušném prostředí ke vznícení. Zařízení lze otevřít pouze po jeho odpojení od zdroje a ponechání dostatečného času na vychladnutí, jak je uvedeno na štítku nebo v návodu k obsluze - a to pouze kvalifikovaným zaměstnancem.



## **VIGTIGT**

**Sikkerhedsinstruktion for tilslutning og installation af dette udstyr.**

**Følgende sikkerhedsinstruktioner gælder specifikt i alle EU-medlemslande. Instruktionerne skal nøje følges for overholdelse af Lavspændingsdirektivet og bør også følges i ikke EU-lande medmindre andet er specificeret af lokale eller nationale standarder.**




1. Passende jordforbindelser skal tilsluttes alle jordklemmer, interne og eksterne, hvor disse forefindes.
2. Efter installation eller fejlfinding skal alle sikkerhedsdæksler og jordforbindelser reetableres.
3. Forsyningskabler skal opfylde krav specificeret i IEC227 eller IEC245.
4. Alle ledningstilslutninger skal være konstrueret til omgivelsestemperatur højere end 75°C.
5. Alle benyttede kabelforskrutninger skal have en intern dimension, så passende kabelafastning kan etableres.
6. For opnåelse af sikker drift og betjening skal der skabes beskyttelse mod indirekte berøring gennem afbryder (min. 10A), som vil afbryde alle kredsløb med elektriske ledere i fejlsituation. Afbryderen skal indholde en mekanisk betjent kontakt. Hvis ikke skal anden form for afbryder mellem forsyning og udstyr benyttes og mærkes som sådan. Afbrydere eller kontakter skal overholde en kendt standard som IEC947.
7. Hvor udstyr eller dæksler er mærket med dette symbol, er farlige spændinger normalt forekom-mende bagved. Disse dæksler bør kun afmonteres, når forsyningsspændingen er frakoblet - og da kun af instrueret servicepersonale. 
8. Hvor udstyr eller dæksler er mærket med dette symbol, forefindes meget varme overflader bagved. Disse dæksler bør kun afmonteres af instrueret servicepersonale, når forsyningsspænding er frakoblet. Visse overflader vil stadig være for varme at berøre i op til 45 minutter efter frakobling. 
9. Hvor udstyr eller dæksler er mærket med dette symbol, se da i betjeningsmanual for instruktion. 
10. Alle benyttede grafiske symboler i dette udstyr findes i én eller flere af følgende standarder:- EN61010-1, IEC417 & ISO3864.
11. Når udstyr eller etiketter er mærket "Må ikke åbnes, mens udstyret tilføres strøm" eller lignende, er der fare for antændelse i områder, hvor der er en eksplosiv atmosfære. Dette udstyr må kun åbnes, når strømkilden er fjernet, og der er gået tilstrækkelig tid til, at udstyret er kølet ned. Den nødvendige tid hertil er angivet på etiketten eller i brugervejledningen. Udstyret må kun åbnes af en faglært person.



## **BELANGRIJK**

**Veiligheidsvoorschriften voor de aansluiting en installatie van dit toestel.**

**De hierna volgende veiligheidsvoorschriften zijn vooral bedoeld voor de EU lidstaten. Hier moet aan gehouden worden om de onderworpenheid aan de Laag Spannings Richtlijn (Low Voltage Directive) te verzekeren. Niet EU staten zouden deze richtlijnen moeten volgen tenzij zij reeds achterhaald zouden zijn door plaatselijke of nationale voorschriften.**

1. Degelijke aardingsaansluitingen moeten gemaakt worden naar alle voorziene aardpunten, intern en extern.
2. Na installatie of controle moeten alle veiligheidsdeksels en -aarding terug geplaatst worden. Ten alle tijde moet de betrouwbaarheid van de aarding behouden blijven.
3. Voedingskabels moeten onderworpen zijn aan de IEC227 of de IEC245 voorschriften.
4. Alle bekabeling moet geschikt zijn voor het gebruik in omgevingstemperaturen, hoger dan 75°C.
5. Alle wartels moeten zo gedimensioneerd zijn dat een degelijke kabel bevestiging verzekerd is.
6. Om de veilige werking van dit toestel te verzekeren, moet de voeding door een stroomonderbreker gevoerd worden (min 10A) welke alle draden van de voeding moet onderbreken. De stroomonderbreker mag een mechanische schakelaar bevatten. Zoniet moet een andere mogelijkheid bestaan om de voedingsspanning van het toestel te halen en ook duidelijk zo zijn aangegeven. Stroomonderbrekers of schakelaars moeten onderworpen zijn aan een erkende standaard zoals IEC947.
7. Waar toestellen of deksels aangegeven staan met het symbool is er meestal hoogspanning aanwezig. Deze deksels mogen enkel verwijderd worden nadat de voedingsspanning werd afgelegd en enkel door getraind onderhoudspersoneel. 
8. Waar toestellen of deksels aangegeven staan met het symbool is er gevaar voor hete oppervlakken. Deze deksels mogen enkel verwijderd worden door getraind onderhoudspersoneel nadat de voedingsspanning verwijderd werd. Sommige oppervlakken kunnen 45 minuten later nog steeds heet aanvoelen. 
9. Waar toestellen of deksels aangegeven staan met het symbool gelieve het handboek te raadplegen. 
10. Alle grafische symbolen gebruikt in dit produkt, zijn afkomstig uit een of meer van devolgende standards: EN61010-1, IEC417 en ISO3864.
11. Op plaatsen waar uitrusting of etiketten zijn voorzien van een melding als "Niet openen bij aanwezigheid van spanning" bestaat er brandgevaar in omgevingen waar een explosieve atmosfeer aanwezig is. Deze uitrusting mag uitsluitend worden geopend wanneer het niet meer onder spanning staat en de uitrusting gedurende de voorgeschreven tijd op het etiket of in de handleiding is afgekoeld - en dan uitsluitend door voldoende opgeleid onderhoudspersoneel.

### **BELANGRIJK**

**Veiligheidsinstructies voor de bedrading en installatie van dit apparaat.**

**Voor alle EU lidstaten zijn de volgende veiligheidsinstructies van toepassing. Om aan de geldende richtlijnen voor laagspanning te voldoen dient men zich hieraan strikt te houden. Ook niet EU lidstaten dienen zich aan het volgende te houden, tenzij de lokale wetgeving anders voorschrijft.**

1. Alle voorziene interne- en externe aardaansluitingen dienen op adequate wijze aangesloten te worden.
2. Na installatie, onderhouds- of reparatie werkzaamheden dienen alle beschermdeksels /kappen en aardingen om reden van veiligheid weer aangebracht te worden.
3. Voedingskabels dienen te voldoen aan de vereisten van de normen IEC 227 of IEC 245.
4. Alle bedrading dient geschikt te zijn voor gebruik bij een omgevings temperatuur boven 75°C.
5. Alle gebruikte kabelwartels dienen dusdanige inwendige afmetingen te hebben dat een adequate verankering van de kabel wordt verkregen.
6. Om een veilige werking van de apparatuur te waarborgen dient de voeding uitsluitend plaats te vinden via een meerpole automatische zekering (min.10A) die alle spanningvoerende geleiders verbreekt indien een foutconditie optreedt. Deze automatische zekering mag ook voorzien zijn van een mechanisch bediende schakelaar. Bij het ontbreken van deze voorziening dient een andere als zodanig duidelijk aangegeven mogelijkheid aanwezig te zijn om de spanning van de apparatuur af te schakelen. Zekeringen en schakelaars dienen te voldoen aan een erkende standaard zoals IEC 947.
7. Waar de apparatuur of de beschermdeksels/kappen gemarkeerd zijn met het volgende symbool, kunnen zich hieronder spanning voerende delen bevinden die gevaar op kunnen leveren. Deze beschermdeksels/kappen mogen uitsluitend verwijderd worden door getraind personeel als de spanning is afgeschakeld. 
8. Waar de apparatuur of de beschermdeksels/kappen gemarkeerd zijn met het volgende symbool, kunnen zich hieronder hete oppervlakken of onderdelen bevinden. Bepaalde delen kunnen mogelijk na 45 min. nog te heet zijn om aan te raken. 
9. Waar de apparatuur of de beschermdeksels/kappen gemarkeerd zijn met het volgende symbool, dient men de bedieningshandleiding te raadplegen. 
10. Alle grafische symbolen gebruikt bij dit produkt zijn volgens een of meer van de volgende standaarden: EN 61010-1, IEC 417 & ISO 3864.
11. Op plaatsen waar uitrusting of etiketten zijn voorzien van een melding als "Niet openen bij aanwezigheid van spanning" bestaat er brandgevaar in omgevingen waar een explosieve atmosfeer aanwezig is. Deze uitrusting mag uitsluitend worden geopend wanneer het niet meer onder spanning staat en de uitrusting gedurende de voorgeschreven tijd op het etiket of in de handleiding is afgekoeld - en dan uitsluitend door voldoende opgeleid onderhoudspersoneel.

## **WICHTIG**

**Sicherheitshinweise für den Anschluß und die Installation dieser Geräte.**

**Die folgenden Sicherheitshinweise sind in allen Mitgliederstaaten der europäischen Gemeinschaft gültig. Sie müssen strikt eingehalten werden, um der Niederspannungsrichtlinie zu genügen.**

**Nichtmitgliedsstaaten der europäischen Gemeinschaft sollten die national gültigen Normen und Richtlinien einhalten.**




1. Alle intern und extern vorgesehenen Erdungen der Geräte müssen ausgeführt werden.
2. Nach Installation, Reparatur oder sonstigen Eingriffen in das Gerät müssen alle Sicherheitsabdeckungen und Erdungen wieder installiert werden. Die Funktion aller Erdverbindungen darf zu keinem Zeitpunkt gestört sein.
3. Die Netzspannungsversorgung muß den Anforderungen der IEC227 oder IEC245 genügen.
4. Alle Verdrahtungen sollten mindestens bis 75°C ihre Funktion dauerhaft erfüllen.
5. Alle Kabeldurchführungen und Kabelverschraubungen sollten in Ihrer Dimensionierung so gewählt werden, daß diese eine sichere Verkabelung des Gerätes ermöglichen.
6. Um eine sichere Funktion des Gerätes zu gewährleisten, muß die Spannungsversorgung über mindestens 10 A abgesichert sein. Im Fehlerfall muß dadurch gewährleistet sein, daß die Spannungsversorgung zum Gerät bzw. zu den Geräten unterbrochen wird. Ein mechanischer Schutzschalter kann in dieses System integriert werden. Falls eine derartige Vorrichtung nicht vorhanden ist, muß eine andere Möglichkeit zur Unterbrechung der Spannungszufuhr gewährleistet werden mit Hinweisen deutlich gekennzeichnet werden. Ein solcher Mechanismus zur Spannungsunterbrechung muß mit den Normen und Richtlinien für die allgemeine Installation von Elektrogeräten, wie zum Beispiel der IEC947, übereinstimmen.
7. Mit dem Symbol sind Geräte oder Abdeckungen gekennzeichnet, die eine gefährliche (Netzspannung) Spannung führen. Die Abdeckungen dürfen nur entfernt werden, wenn die Versorgungsspannung unterbrochen wurde. Nur geschultes Personal darf an diesen Geräten Arbeiten ausführen.
8. Mit dem Symbol sind Geräte oder Abdeckungen gekennzeichnet, in bzw. unter denen heiße Teile vorhanden sind. Die Abdeckungen dürfen nur entfernt werden, wenn die Versorgungsspannung unterbrochen wurde. Nur geschultes Personal darf an diesen Geräten Arbeiten ausführen. Bis 45 Minuten nach dem Unterbrechen der Netzzufuhr können derartig Teile noch über eine erhöhte Temperatur verfügen.
9. Mit dem Symbol sind Geräte oder Abdeckungen gekennzeichnet, bei denen vor dem Eingriff die entsprechenden Kapitel im Handbuch sorgfältig durchgelesen werden müssen.
10. Alle in diesem Gerät verwendeten graphischen Symbole entspringen einem oder mehreren der nachfolgend aufgeführten Standards: EN61010-1, IEC417 & ISO3864.
11. Wenn Geräte oder Etiketten mit dem Hinweis "Nicht unter Spannung öffnen" oder ähnlichen Hinweisen versehen sind, besteht in explosionsgefährdeten Umgebungen Entzündungsgefahr. Das Gerät darf nur geöffnet werden, wenn es nicht ans Stromnetz angeschlossen und entsprechend der Zeitangaben auf dem Etikett bzw. in der Betriebsanleitung ausreichend abgekühlt ist. Das Gerät darf nur von geschultem Service-Personal geöffnet werden.



## **ΣΗΜΑΝΤΙΚΟ**

**Οδηγίες ασφαλείας για την καλωδίωση και εγκατάσταση της συσκευής**




**Οι ακόλουθες οδηγίες ασφαλείας εφαρμόζονται ειδικά για όλες τις χώρες μέλη της Ευρωπαϊκής Κοινότητας. Θα πρέπει να ακολουθούνται αυστηρά ώστε να εξασφαλιστεί η συμβατότητα με τις οδηγίες για τη Χαμηλή Τάση. Χώρες που δεν είναι μέλη της Ευρωπαϊκής Κοινότητας θα πρέπει επίσης να ακολουθούν τις οδηγίες, εκτός εάν αυτές αντικαθίστανται από τα Τοπικά ή Εθνικά πρότυπα.**

1. Επαρκείς συνδέσεις γείωσης θα πρέπει να γίνονται σε όλα τα σημεία γείωσης, εσωτερικά και εξωτερικά, όπου υπάρχουν.
2. Μετά την εγκατάσταση ή την αντιμετώπιση σφαλμάτων, όλα τα καλύμματα ασφαλείας και οι γειώσεις ασφαλείας πρέπει να επανεγκαθίστανται. Η καλή κατάσταση όλων των ακροδεκτών γείωσης πρέπει να συντηρείται διαρκώς.
3. Τα καλώδια τροφοδοσίας πρέπει να πληρούν τις απαιτήσεις των IEC227 ή IEC245.
4. Όλες οι καλωδιώσεις θα πρέπει να είναι κατάλληλες για χρήση σε θερμοκρασία χώρου υψηλότερη από 75°C.
5. Όλοι οι στυπιοθλίπτες θα πρέπει να είναι τέτοιων εσωτερικών διαστάσεων, ώστε να παρέχουν επαρκή στερέωση των καλωδίων.
6. Για τη διασφάλιση ασφαλούς λειτουργίας αυτής της συσκευής, η σύνδεση τροφοδοσίας θα πρέπει να γίνεται μόνο μέσω ασφαλειοδιακόπτη, ο οποίος θα αποσυνδέει όλους τους ηλεκτροφόρους αγωγούς των κυκλωμάτων, στη διάρκεια κατάστασης σφάλματος. Ο ασφαλειοδιακόπτης μπορεί επίσης να περιλαμβάνει μηχανικό διακόπτη απομόνωσης. Εάν δεν περιλαμβάνει, τότε άλλα μέσα αποσύνδεσης της συσκευής από την τροφοδοσία πρέπει να παροχρηθούν και να σημανθούν σαφώς ως τέτοια. Οι ασφαλειοδιακόπτες ή διακόπτες πρέπει να συμμορφώνονται με αναγνωρισμένα πρότυπα όπως το IEC947. Όλες οι καλωδιώσεις πρέπει να συμμορφώνονται με τα τοπικά πρότυπα.
7. Όπου συσκευές ή καλύμματα είναι σημασμένα με το σύμβολο που εικονίζεται δεξιά, επικίνδυνες τάσεις ενυπάρχουν κάτω από αυτά. Αυτά τα καλύμματα θα πρέπει να αφαιρούνται μόνο όταν έχει αφαιρεθεί η τροφοδοσία από τη συσκευή - και στην περίπτωση αυτή, μόνο από ειδικευμένο τεχνικό προσωπικό. 
8. Όπου συσκευές ή καλύμματα είναι σημασμένα με το σύμβολο που εικονίζεται δεξιά, υπάρχει κίνδυνος από καυτές επιφάνειες κάτω από αυτά. Τέτοια καλύμματα θα πρέπει να αφαιρούνται μόνο από ειδικευμένο τεχνικό προσωπικό, όταν έχει αφαιρεθεί η τροφοδοσία από τη συσκευή. Κάποιες επιφάνειες μπορούν να παραμένουν ζεστές στην αφή. 
9. Όπου συσκευές ή καλύμματα είναι σημασμένα με το σύμβολο που εικονίζεται δεξιά, ανατρέξτε στις οδηγίες χρήσης της συσκευής. 
10. Όλα τα γραφικά σύμβολα που χρησιμοποιούνται σε αυτό το προϊόν είναι από ένα ή περισσότερα από τα εξής πρότυπα: EN61010-1, IEC417 και ISO3864.
11. Όπου συσκευή ή ετικέτα είναι σημασμένη με την ένδειξη "Μην ανοίγετε ενώ βρίσκεται σε λειτουργία" ή άλλη παρόμοια, υπάρχει κίνδυνος ανάφλεξης σε περιοχές με εκρηκτική ατμόσφαιρα. Ο παρών εξοπλισμός πρέπει να ανοίγεται μόνο όταν είναι εκτός ρεύματος και αφού παρέλθει ο κατάλληλος χρόνος που αναγράφεται στην ετικέτα ή στο εγχειρίδιο οδηγιών ώστε να ψυχθεί και μόνο από εκπαιδευμένο προσωπικό συντήρησης.

## OLULINE TEAVE

### Juhtmestiku ja seadme paigaldamisega seotud ohutusjuhised




**Alljärgnevad ohutusjuhised rakenduvad eriti kõigi Euroopa Liidu liikmesriikide suhtes. Antud juhiseid tuleb täpselt järgida, et kindlustada vastavus madalpinge direktiiviga. Euroopa Liitu mittekuuluvad riigid peavad samuti alljärgnevaid juhiseid järgima, va juhul, kui on olemas vastavad kohalikud riiklikud standardid.**

1. Ettenähtud maanduspunktide, nii sisemiste kui väliste jaoks tuleb tagada nõuetekohased maaühendused.
2. Pärast paigaldamist või rikketuvastust tuleb kõik turvaümbrised ja turvamaandused uuesti oma kohale seada. Kõigis olukordades tuleb säilitada kõigi maandusklemmide terviklikkus.
3. Toitejuhtmed peavad vastama IEC227 või IEC245 nõuetele.
4. Kogu juhtmestik peab sobima kasutamiseks üle 75°C õhutemperatuuri juures.
5. Kõik juhtmetihendid peavad sisemõõtmete poolest tagama nõuetekohased kaabliühendused.
6. Seadme ohutu töötamise tagamiseks peab ühendus toiteallikaga toimuma vaid läbi automaatkorgi, mis veaolukorras lülitab välja kõik voolukandjad. Automaatkorgil võib olla ka mehhaaniliselt reguleeritav lahklüliti. Vastasel juhul peab seadme toiteallikast lahtiühendamiseks olema teine ja selgelt osutatud moodus. Automaatkorgid või -lülitid peavad vastama tunnustatud standarditele nagu nt IEC947. Kogu juhtmestik peab vastama kohalikele standarditele.
7. Seadmel või ümbristel asuv paremale osutav sümbol tähistab selle all leiduvat ohtlikku pinget. Selliste sümbolitega ümbriseid võib eemaldada vaid juhul, kui seade on toiteallikast lahti ühendatud ning ka siis ainult vastavate oskustega spetsialisti poolt. 
8. Seadmele või ümbristele märgitud paremale osutava sümboli all valitseb kuumadest pindadest tulenev oht. Nimetatud sümbolitega ümbriseid võib eemaldada vaid vastavate oskustega spetsialist, kui seade on toiteallikast lahti ühendatud. Teatud pinnad võivad puudutamise jaoks liiga kuumad olla. 
9. Seadmel või ümbristel leiduva paremale osutava sümboli korral vt juhiste jaoks Toimimisjuhendit. 
10. Kõik selle toote juures kasutatavad graafilised sümbolid lähtuvad ühest või enamast järgmistest standarditest: EN61010-1, IEC417 ja ISO3864.
11. Kui seadmele või siltidele on kirjutatud "Ärge avage voolutarbimine korral" vms, valitseb plahvatusohtlikus keskkonnas süttimise oht. Seadet võib avada ainult siis, kui toide on lahti ühendatud ning seadmel on võimaldatud sildil või kasutusjuhendis osutatud aja jooksul maha jahtuda -- ning ka sellisel juhul ainult vastavate oskustega spetsialisti poolt.

## **TÄRKEÄÄ**

**Turvallisuusohje, jota on noudatettava tämän laitteen asentamisessa ja kaapeloinnissa.**

**Seuraavat ohjeet pätevät erityisesti EU:n jäsenvaltioissa. Niitä täytyy ehdottomasti noudattaa jotta täytettäisiin EU:n matalajännitedirektiivin (Low Voltage Directive) yhteensopivuus. Myös EU:hun kuulumattomien valtioiden tulee nou-dattaa tätä ohjetta, elleivät kansalliset standardit estä sitä.**

1. Riittävät maadoituskytkennät on tehtävä kaikkiin maadoituspisteisiin, sisäisiin ja ulkoisiin.
2. Asennuksen ja vianetsinnän jälkeen on kaikki suojat ja suojamaat asennettava takaisin pai-koilleen. Maadoitusliittimen kunnollinen toiminta täytyy aina ylläpitää.
3. Jännitesyöttöjohtimien täytyy täyttää IEC227 ja IEC245 vaatimukset.
4. Kaikkien johdotuksien tulee toimia >75°C lämpötiloissa.
5. Kaikkien läpivientiholkkien sisähalkaisijan täytyy olla sellainen että kaapeli lukkiutuu kun-nolla kiinni.
6. Turvallisen toiminnan varmistamiseksi täytyy jännitesyöttö varustaa turvakytkimellä (min 10A), joka kytkee irti kaikki jännitesyöttöjohtimet vikatilanteessa. Suojaan täytyy myös sisältyä mekaaninen erotuskytkin. Jos ei, niin jännitesyöttö on pystyttävä katkaisemaan muilla keinoilla ja merkittävä siten että se tunnistetaan sellaiseksi. Turvakytkimien tai kat-kaisimien täytyy täyttää IEC947 standardin vaatimukset näkyvyydestä.
7. Mikäli laite tai kosketussuoja on merkitty tällä merkillä on merkinnän takana tai alla hengenvaarallisen suuruinen jännite. Suojaa ei saa poistaa jänniteen ollessa kytkettynä laitteeseen ja poistamisen saa suorittaa vain alan asian-tuntija. 
8. Mikäli laite tai kosketussuoja on merkitty tällä merkillä on merkinnän takana tai alla kuuma pinta. Suojan saa poistaa vain alan asiantuntija kun jännite-syöttö on katkaistu. Tällainen pinta voi säilyä kosketuskuumana jopa 45 mi-nuuttia. 
9. Mikäli laite tai kosketussuoja on merkitty tällä merkillä katso lisäohjeita käyt-töohjekirjasta. 
10. Kaikki tässä tuotteessa käytetyt graafiset symbolit ovat yhdestä tai useammasta seuraavis-ta standardeista: EN61010-1, IEC417 & ISO3864.
11. Jos laitteessa tai tarrassa on merkintä "Älä avaa, kun virta on kytketty" tai vastaava, räjähdysvaarallisissa tiloissa on syttymisen vaara. Nämä laitteet voidaan avata vain silloin, kun virta ei ole kytkettynä ja laitteen on annettu jäähtyä tarrassa tai oppaassa määritetyn ajan. Tällöinkin laitteet saa avata vain koulutettu huoltohenkilökunta.



## **IMPORTANT**

**Consignes de sécurité concernant le raccordement et l'installation de cet appareil.**

**Les consignes de sécurité ci-dessous s'adressent particulièrement à tous les états membres de la communauté européenne. Elles doivent être strictement appliquées afin de satisfaire aux directives concernant la basse tension. Les états non membres de la communauté européenne doivent également appliquer ces consignes sauf si elles sont en contradiction avec les standards locaux ou nationaux.**




1. Un raccordement adéquat à la terre doit être effectuée à chaque borne de mise à la terre, interne et externe.
2. Après installation ou dépannage, tous les capots de protection et toutes les prises de terre doivent être remis en place, toutes les prises de terre doivent être respectées en permanence.
3. Les câbles d'alimentation électrique doivent être conformes aux normes IEC227 ou IEC245.
4. Tous les raccordements doivent pouvoir supporter une température ambiante supérieure à 75°C.
5. Tous les presse-étoupes utilisés doivent avoir un diamètre interne en rapport avec les câbles afin d'assurer un serrage correct sur ces derniers.
6. Afin de garantir la sécurité du fonctionnement de cet appareil, le raccordement à l'alimentation électrique doit être réalisé exclusivement au travers d'un disjoncteur (minimum 10A.) isolant tous les conducteurs en cas d'anomalie. Ce disjoncteur doit également pouvoir être actionné manuellement, de façon mécanique. Dans le cas contraire, un autre système doit être mis en place afin de pouvoir isoler l'appareil et doit être signalisé comme tel. Disjoncteurs et interrupteurs doivent être conformes à une norme reconnue telle IEC947.
7. Lorsque les équipements ou les capots affichent le symbole suivant, cela signifie que des tensions dangereuses sont présentes. Ces capots ne doivent être démontés que lorsque l'alimentation est coupée, et uniquement par un personnel compétent.
8. Lorsque les équipements ou les capots affichent le symbole suivant, cela signifie que des surfaces dangereusement chaudes sont présentes. Ces capots ne doivent être démontés que lorsque l'alimentation est coupée, et uniquement par un personnel compétent. Certaines surfaces peuvent rester chaudes jusqu'à 45 mn.
9. Lorsque les équipements ou les capots affichent le symbole suivant, se reporter au manuel d'instructions.
10. Tous les symboles graphiques utilisés dans ce produit sont conformes à un ou plusieurs des standards suivants: EN61010-1, IEC417 & ISO3864.
11. Les équipements comportant une étiquette avec la mention " Ne pas ouvrir sous tension " ou toute autre mention similaire peuvent créer un risque d'incendie dans les environnements explosifs. Ces équipements ne doivent être ouverts que lorsqu'ils sont hors tension et que la durée de refroidissement requise indiquée sur l'étiquette ou dans le manuel d'instructions s'est écoulée. En outre ils ne doivent être ouverts que par un personnel qualifié.



## **FONTOS**

### **Biztonsági előírások a készülék vezetékeléséhez és üzembeállításához**

**A következő biztonsági előírások kifejezetten vonatkoznak az összes EU-tagállamra. Ezeket szigorúan be kell tartani a Kisfeszültségű irányelvnek való megfelelés biztosításához. A nem EU-tagállamok szintén tartásuk be a következőket, kivéve ha a helyi és nemzeti szabványok azt másként nem írják elő.**

1. A megfelelő földelést biztosítani kell az összes rendelkezésre álló földelési ponton, legyen az belső vagy külső.
2. Az üzembeállítás vagy hibaelhárítás után az összes biztonsági burkolatot és biztonsági földvezetékét ki kell cserélni. A földelőkapcsok sértetlenségét mindig biztosítani kell.
3. A tápvezetékeknek eleget kell tenniük az IEC227 vagy IEC245 szabványokban megfogalmazott követelményeknek.
4. Az összes vezetéknek alkalmasnak kell lennie a 75 °C-nál magasabb környezeti hőmérséklet melletti használatra.
5. Az összes használt kábelvezető tömszelencének olyan belső méretűnek kell lennie, hogy biztosítsák a kábelek megfelelő lekötését.
6. A berendezés biztonságos működésének biztosításához az elektromos hálózathoz való csatlakozást csak megszakítón keresztül szabad megvalósítani, amely az összes áramot szállító vezeték bontja hibahelyzet esetén. A megszakító magában foglalhat egy mechanikusan működtethető áramtalanító kapcsolót is. Ellenkező esetben biztosítani kell a berendezés elektromos hálózatról történő lekapcsolásának más módját, és ezt világosan jelezni kell. A megszakítóknak vagy kapcsolóknak meg kell felelniük egy elismert szabványnak, például az IEC947 szabványnak. Az összes vezetéknek meg kell felelnie az összes helyi szabványnak.
7. Ha a berendezés vagy a burkolata a jobb oldalon látható szimbólummal jelzett, alatta valószínűleg veszélyes feszültség van jelen. Az ilyen burkolat csak a berendezés áramtalanítása után távolítható el - és csak képzett szervizszakember végezheti el. 
8. Ha a berendezés vagy a burkolata a jobb oldalon látható szimbólummal jelzett, fenn áll a veszélye, hogy alatta forró felületek találhatók. Az ilyen burkolatot csak képzett szervizszakember távolíthatja el a berendezés áramtalanítása után. Bizonyos felületek érintésre forróak maradhatnak. 
9. Ha a berendezés vagy a burkolata a jobb oldalon látható szimbólummal jelzett, tekintse meg az Üzemeltetési útmutató arra vonatkozó utasításait. 
10. A terméken használt grafikus szimbólumok a következő szabványok legalább egyikéből származnak: EN61010-1, IEC417 és ISO3864.
11. Ha a berendezésen vagy a címkén a „Ne nyissa ki bekapcsolt állapotban” vagy hasonló felhívás szerepel, robbanásveszélyes környezetben fennáll a gyulladás veszélye. Ez a berendezés csak áramtalanítás után nyitható ki, a címkén vagy a kezelési útmutatóban szereplő, a berendezés lehűlését biztosító megfelelő idői ráhagyás után - és csak képzett szervizszakember végezheti el.



## **IMPORTANTE**

**Norme di sicurezza per il cablaggio e l'installazione dello strumento.**

**Le seguenti norme di sicurezza si applicano specificatamente agli stati membri dell'Unione Europea, la cui stretta osservanza è richiesta per garantire conformità alla Direttiva del Basso Voltaggio. Esse si applicano anche agli stati non appartenenti all'Unione Europea, salvo quanto disposto dalle vigenti normative locali o nazionali.**




1. Collegamenti di terra idonei devono essere eseguiti per tutti i punti di messa a terra interni ed esterni, dove previsti.
2. Dopo l'installazione o la localizzazione dei guasti, assicurarsi che tutti i coperchi di protezione siano stati collocati e le messa a terra siano collegate. L'integrità di ciascun morsetto di terra deve essere costantemente garantita.
3. I cavi di alimentazione della rete devono essere secondo disposizioni IEC227 o IEC245.
4. L'intero impianto elettrico deve essere adatto per uso in ambiente con temperature superiore a 75°C.
5. Le dimensioni di tutti i connettori dei cavi utilizzati devono essere tali da consentire un adeguato ancoraggio al cavo.
6. Per garantire un sicuro funzionamento dello strumento il collegamento alla rete di alimentazione principale dovrà essere eseguita tramite interruttore automatico (min.10A), in grado di disattivare tutti i conduttori di circuito in caso di guasto. Tale interruttore dovrà inoltre prevedere un sezionatore manuale o altro dispositivo di interruzione dell'alimentazione, chiaramente identificabile. Gli interruttori dovranno essere conformi agli standard riconosciuti, quali IEC947.
7. Il simbolo riportato sullo strumento o sui coperchi di protezione indica probabile presenza di elevati voltaggi. Tali coperchi di protezione devono essere rimossi esclusivamente da personale qualificato, dopo aver tolto alimentazione allo strumento.
8. Il simbolo riportato sullo strumento o sui coperchi di protezione indica rischio di contatto con superfici ad alta temperatura. Tali coperchi di protezione devono essere rimossi esclusivamente da personale qualificato, dopo aver tolto alimentazione allo strumento. Alcune superfici possono mantenere temperature elevate per oltre 45 minuti.
9. Se lo strumento o il coperchio di protezione riportano il simbolo, fare riferimento alle istruzioni del manuale Operatore.
10. Tutti i simboli grafici utilizzati in questo prodotto sono previsti da uno o più dei seguenti standard: EN61010-1, IEC417 e ISO3864.
11. L'indicazione "Non aprire sotto tensione" o simili sull'apparecchiatura o sulle etichette segnala il pericolo di accensione nelle aree in cui è presente un'atmosfera esplosiva. L'apparecchiatura può essere aperta solo quando l'alimentazione è scollegata ed è trascorso il tempo indicato sull'etichetta o nel manuale delle istruzioni per consentirne il raffreddamento. L'operazione può essere effettuata esclusivamente da personale dell'assistenza qualificato.



### **SVARBU**

**Šio prietaiso laidų prijungimo ir instaliacijos saugos instrukcijos**

**Toliau išvardinti saugumo reikalavimai taikomi konkrečiai visoms ES šalims narėms. Jų turi būti griežtai paisoma, kad būtų užtikrintai laikomasi Žemos įtampos direktyvos. Ne ES narės taip pat turi laikytis toliau pateikiamų reikalavimų nebent juos pakeičia vietiniai ar Nacionaliniai standartai.**




1. Turi būti atliktas tinkamas įžeminimas visuose įžeminimo taškuose, vidiniuose ir išoriniuose, kur numatyta.
2. Visos apsauginės dangos ir įžemikliai po instaliacijos ar remonto turi būti pakeisti. Visų įžeminimo terminalų vientisumo priežiūra turi būti atliekama nuolat.
3. Maitinimo tinklo laidai turi atitikti IEC227 ar IEC245 reikalavimus.
4. Visi laidai turi būti tinkami naudojimui aplinkos temperatūroje, aukštesnėje nei 75°C.
5. Visi naudojamų kabelių riebokšliai turi būti tokių vidinių matmenų, kad būtų galimas tinkamas kabelio pritvirtinimas.
6. Saugaus šio prietaiso veikimo užtikrinimui, prijungimas prie maitinimo tinklo turi būti atliekamas tik per automatinį pertraukiklį, kuris atjungs visas grandines nešančius konduktorius linijos gedimo metu. Automatinis pertraukiklis taip pat gali turėti mechanškai veikiantį izoliavimo jungiklį. Jeigu ne, tuomet turi būti nurodytos kitos įrenginio atjungimo priemonės, ir aiškiai pažymėtos, kad jos tokios yra. Automatiniai perjungikliai ar jungikliai turi atitikti pripažintus standartus, tokius kaip IEC947. Visi laidai turi atitikti visus vietinius standartus.
7. Kur įrenginys ar dangos yra pažymėti simboliu dešinėje, žemiau turi būti pavojinga įtampa. Šios dangos turi būti nuimamos tik tada, kai srovė yra pašalinta iš įrenginio - ir tik tuomet tai turi atlikti apmokytas personalas. 
8. Ten kur įrenginys ar dangos yra pažymėti simboliu dešinėje, ten yra pavojus nuo karštų paviršių apačioje. Šios dangos gali būti nuimamos tik apmokyto personalo, kai srovė yra pašalinta iš įrenginio. Tam tikri paviršiai gali išlikti karšti liečiant. 
9. Ten kur įrenginys ar dangos yra pažymėti simboliu dešinėje, žr. nurodymus Valdymo instrukcijose. 
10. Visi grafiniai simboliai naudojami šiam produktui yra iš vieno ar daugiau toliau išvardintų standartų: EN61010-1, IEC417, ir ISO3864.
11. Ten, kur įrenginys ar etiketės yra pažymėti "Neatidaryti esant srovei" ar panašiai, yra užsidegimo pavojus tose vietose, kur yra sprogstamoji atmosfera. Šis įrenginys gali būti atidarytas tuomet, kai yra pašalinta srovė, ir praėjęs atitinkamas laikas, nurodytas etiketėje ar valdymo instrukcijoje, pakankamas įrenginio ataušimui - ir tai tik apmokyto personalo.

## **SVARĪGI**

**Drošības norādījumi šīs iekārtas pievienošanai un uzstādīšanai**

**Turpmākie drošības norādījumi attiecas uz visām ES dalībvalstīm. Tie ir stingri jāievēro, lai nodrošinātu atbilstību Zemsprieguma direktīvai.**

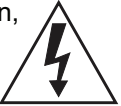


**Turpmāk norādītais jāievēro arī valstīs, kas nav ES dalībvalstis, ja vien šos norādījumus neaizstāj vietējie vai valsts standarti.**

1. Visi pieejamie iekšējie un ārējie zemējuma punkti ir atbilstoši jāiezemē.
2. Pēc uzstādīšanas vai problēmu risināšanas visi drošības pārsegi un drošības zemējuma savienojumi ir jāpievieno atpakaļ. Visiem zemējuma savienojumiem vienmēr jābūt iezemētiem.
3. Elektropadeves vadiem jāatbilst IEC227 vai IEC245 prasībām.
4. Visai elektroinstalācijai jābūt piemērotai lietošanai apkārtējā temperatūrā, kas pārsniedz 75°C.
5. Visu izmantoto kabeļu blīvju iekšējiem izmēriem jābūt tādiem, lai atbilstoši nostiprinātu kabeli.
6. Lai nodrošinātu šīs iekārtas drošu darbību, savienojums ar elektropadeves tīklu jāizveido, izmantojot slēdzi, kas kļūmes gadījumā atvienos visas ķēdes, kurās ir vadītāji. Slēdzī var būt iestrādāts arī mehānisks pārtraucējslēdzis. Ja tāda nav, tad ir jāuzstāda cita veida ierīce iekārtas atvienošanai no strāvas padeves un tā atbilstoši un skaidri jāmarkē. Slēdžiem jāatbilst kādam vispārāztītam standartam, piemēram, IEC947. Visai elektroinstalācijai jāatbilst vietējiem standartiem.
7. Vietās, kur iekārta vai tās pārsegi ir marķēti ar labajā pusē norādīto simbolu, visticamāk, zem tiem ir bīstams spriegums. Šos pārsegus drīkst noņemt tikai tad, ja iekārta ir atvienota no strāvas padeves, – un šos darbus drīkst veikt tikai atbilstoši apmācīti remontdarbu darbinieki. 
8. Vietās, kur iekārta vai tās pārsegi ir marķēti ar labajā pusē norādīto simbolu, apdraudējumu izraisa zem tiem esošās karstās virsmas. Šos pārsegus drīkst noņemt tikai atbilstoši apmācīti remontdarbu darbinieki, kad iekārta ir atvienota no strāvas padeves. Iespējams, dažas virsmas arī pēc iekārtas atvienošanas paliks karstas. 
9. Ja iekārta vai pārsegi ir marķēti ar labajā pusē esošo simbolu, skatiet operatora rokasgrāmatā ietvertos norādījumus. 
10. Visi šajā izstrādājumā izmantotie grafiskie simboli atbilst vienam vai vairākiem no šiem standartiem: EN61010-1, IEC417 un ISO3864.
11. Ja iekārtai vai uzlīmēm ir marķējums "Neatvērt, kamēr pieslēgta strāvai" vai tamlīdzīga norāde, tas nozīmē, ka sprādzienbīstamā vidē ir uzliesmošanas bīstamība. Šo iekārtu drīkst atvērt tikai tad, ja ir atvienota strāva un ir nogaidīts iekārtas atdzišanai nepieciešamais laiks, kas norādīts uzlīmē vai ekspluatācijas rokasgrāmatā, – un šos darbus drīkst veikt tikai atbilstoši apmācīti remontdarbu darbinieki.

## IMPORTANTI

### **STRUZZJONIJIET TAS-SIGURTÀ GĦALL-WIRING U L-INSTALLAZZJONI TAT-TAGĦMIR**




**L-istruzzjonijiet tas-sigurtà japplikaw speċifikament għall-Istati Membri ta' I-UE. Dawn għandhom jiġu osservati b'mod strett biex tkun żgurata l-konformità mad-Direttiva dwar il-Vultaġġ Baxx. Stati li mhumiex membri ta' I-UE għandhom ukoll ikunu konformi ma' dan li ġej f'lejl jekk dawn ikunu sostituti mill-Istandards lokali jew Nazzjonali.**

1. Konnessjonijiet adegwati ta' l-ert għandhom isiru għall-punti kollha ta' l-ert, interni u esterni, fejn ikun ipprovdut.
2. Wara l-installazzjoni jew meta tipprova ssolvi xi problema, l-għatjen kollha tas-sigurtà u l-erts tas-sigurtà għandhom jitpoġġew lura f'pothom. L-integrità tat-terminali kollha ta' l-ert għandha tinżamm f'kull ħin.
3. Il-wajers tal-provvista tad-dawl għandhom ikunu konformi ml-ħtiġijiet ta' IEC227 jew IEC245.
4. Il-*wiring* kollu għandu jkun adattat għall-użu f'temperatura ta' l-ambjent ta' iktar minn 75°C.
5. Il-*glands* tal-kejbils kollha li jintużw iridu jkunu ta' daqs intern tali li jipprovdut ankoraġġ adegwat lill-kejbil.
6. Biex tiżgura t-tħaddim sigur ta' dan it-tagħmir, il-konnessjoni mal-provvista tad-dawl għandha ssir biss permezz ta' *circuit breaker* li jiskonnetta l-kondutturi kollha li jkunu jgħorru ċ-ċirkuwiti f'sitwazzjoni meta jkun hemm il-ħsara. Is-*circuit breaker* jista' wkoll jinkludi swiċċ li jiżola li jaħdem b'mod mekkaniku. Jekk dan ma jkunx il-każ, mezz ieħor ta' kif it-tagħmir jiġi skonnettjat minn mal-provvista tad-dawl għandu jkun ipprovdut, u jkun immrkat b'mod ċar li hu hekk. Is-*circuit breakers* jew swiċċijiet iridu jkunu konformi ma' standard rikonoxxut bħal IEC947. Il-*wiring* kollu jrid ikun konformi ma' l-istandards lokali, jekk ikun hemm.
7. Meta t-tagħmir jew l-għatjen ikunu mmarkati bis-simbolu fuq il-lemin, x'aktarx li jkun hemm vultaġġi perikolużi taħthom. Dawn l-għatjen għandhom jitneħħew biss meta titneħħa l-provvista tad-dawl mit-tagħmir - u minn ħaddiema tal-manutenzjoni mħarrġa biss. 
8. Meta t-tagħmir jew l-għatjen ikunu mmarkati bis-simbolu fuq il-lemin, ikun hemm periklu mill-uċuħ jaħarqu li jkun hemm taħthom. Dawn l-għatjen għandhom jitneħħew biss minn ħaddiema tal-manutenzjoni mħarrġa meta titneħħa l-provvista tad-dawl mit-tagħmir. Ċerti wċuħ jistgħu jibqgħu jaħarqu meta tmisshom. 
9. Meta t-tagħmir jew l-għatjen ikunu mmarkati bis-simbolu fuq il-lemin, irreferi għall-Manwal ta' l-Operatur għall-istruzzjonijiet.
10. Is-simboli grafiċi kollha użati f'dan il-prodott huma minn wieħed jew iktar mill-istandards li ġejjin: EN61010-1, IEC417, u ISO3864. 
11. Fejn it-tagħmir u t-tikketti huma mmarkati bil-kliem "Tiftaħx Meta Jkun Energizzat" jew kliem simili, hemm periklu ta' nar f'żoni fejn atmosfera esplosiva hi preżenti. It-tagħmir għandu jinfetaħ biss meta l-provvista tad-dawl tkun mitfija u jkun għadda ħin biżżejjed, kif speċifikat fuq it-tikketta jew fil-manwal ta' l-istruzzjonijiet, biex it-tagħmir ikun kesaħ – u t-tagħmir għandu jinfetaħ biss minn staff li jkun imħarreg.

## **VIKTIG**

### **Sikkerhetsinstruks for tilkobling og installasjon av dette utstyret.**




**Følgende sikkerhetsinstruksjoner gjelder spesifikt alle EU medlemsland og land med i EØS-avtalen. Instruksjonene skal følges nøye slik at installasjonen blir i henhold til lavspenningsdirektivet. Den bør også følges i andre land, med mindre annet er spesifisert av lokale- eller nasjonale standarder.**

1. Passende jordforbindelser må tilkobles alle jordingspunkter, interne og eksterne hvor disse forefinnes.
2. Etter installasjon eller feilsøking skal alle sikkerhetsdeksler og jordforbindelser reetableres. Jordingsforbindelsene må alltid holdes i god stand.
3. Kabler fra spenningsforsyning skal oppfylle kravene spesifisert i IEC227 eller IEC245.
4. Alle ledningsforbindelser skal være konstruert for en omgivelsestemperatur høyere en 75°C.
5. Alle kabelforskrutninger som benyttes skal ha en indre dimensjon slik at tilstrekkelig avlastning oppnåes.
6. For å oppnå sikker drift og betjening skal forbindelsen til spenningsforsyningen bare skje gjennom en strømbryter (minimum 10A) som vil bryte spenningsforsyningen til alle elektriske kretser ved en feilsituasjon. Strømbryteren kan også inneholde en mekanisk operert bryter for å isolere instrumentet fra spenningsforsyningen. Dersom det ikke er en mekanisk operert bryter installert, må det være en annen måte å isolere utstyret fra spenningsforsyningen, og denne måten må være tydelig merket. Kretsbytere eller kontakter skal oppfylle kravene i en annerkjent standard av typen IEC947 eller tilsvarende.
7. Der hvor utstyr eller deksler er merket med symbol for farlig spenning, er det sannsynlig at disse er tilstede bak dekslet. Disse dekslene må bare fjernes når spenningsforsyning er frakoblet utstyret, og da bare av trenet servicepersonell. 
8. Der hvor utstyr eller deksler er merket med symbol for meget varm overflate, er det sannsynlig at disse er tilstede bak dekslet. Disse dekslene må bare fjernes når spenningsforsyning er frakoblet utstyret, og da bare av trenet servicepersonell. Noen overflater kan være for varme til å berøres i opp til 45 minutter etter spenningsforsyning frakoblet. 
9. Der hvor utstyret eller deksler er merket med symbol, vennligst referer til instruksjonsmanualen for instruks. 
10. Alle grafiske symboler brukt i dette produktet er fra en eller flere av følgende standarder: EN61010-1, IEC417 & ISO3864.
11. Når utstyr eller merkelapper bærer advarselen "Må ikke åpnes under spenning" eller lignende, innbærer det fare for eksplosjon i områder med en eksplosiv atmosfære. Utstyret skal bare åpnes når det ikke er noen strømtilførsel, og etter at det har hatt tilstrekkelig tid til å kjøle ned, som spesifisert på merkelappen eller i håndboken. Selv da skal utstyret bare åpnes av erfarne serviceteknikere.

## **WAŻNE!**

### **Zalecenia dotyczące bezpieczeństwa w zakresie podłączania i instalacji tego urządzenia**

**Następujące zalecenia dotyczą zwłaszcza stosowania urządzenia we wszystkich krajach Unii Europejskiej. Należy się ściśle do nich stosować w celu zapewnienia zgodności z dyrektywą niskonapięciową. W przypadku instalacji urządzenia w krajach nienależących do Unii Europejskiej należy również przestrzegać poniższych zaleceń, chyba że są one zastąpione lokalnymi lub ogólnokrajowymi standardami.**




1. Urządzenie należy podłączyć kablem uziemiającym do wszystkich punktów uziemienia (wewnętrznych i zewnętrznych).
2. Po instalacji lub czynnościach serwisowych należy zamknąć wszystkie pokrywy zabezpieczające i ponownie podłączyć uziemienie. Należy pilnować, by nie doszło do przerwania uziemienia.
3. Przewody zasilające powinny być zgodne z wymaganiami normy IEC227 lub IEC245.
4. Wszystkie przewody powinny być odpowiednie do użytku w środowisku o temperaturze wyższej niż 75°C.
5. Wszystkie dławnice powinny mieć wymiary wewnętrzne zapewniające pewne umocowanie przewodów.
6. W celu zapewnienia bezpiecznej pracy urządzenie należy podłączyć do sieci tylko za pośrednictwem wyłącznika automatycznego, który w razie awarii odłączy wszystkie obwody, w których przepływa prąd. Wyłącznik automatyczny może być również wyposażony w mechaniczny odłącznik napięcia. W przeciwnym razie należy zapewnić i jasno oznaczyć inną możliwość odłączenia urządzenia od zasilania. Wyłączniki automatyczne oraz odłączniki powinny być zgodne z uznawanymi standardami, takimi jak norma IEC947. Wszystkie przewody muszą być zgodne z lokalnymi przepisami.
7. Pod pokrywami lub elementami urządzenia oznaczonymi symbolem pokazanym na rysunku po prawej stronie może występować niebezpieczne napięcie elektryczne. Te pokrywy mogą być zdejmowane tylko po odłączeniu zasilania, wyłącznie przez odpowiednio przeszkolonych pracowników serwisu. 
8. Pod pokrywami lub elementami urządzenia oznaczonymi symbolem pokazanym na rysunku po prawej stronie znajdują się gorące powierzchnie. Te pokrywy mogą być zdejmowane tylko po odłączeniu zasilania, wyłącznie przez odpowiednio przeszkolonych pracowników serwisu. Niektóre powierzchnie mogą pozostać nagrzane przez pewien czas po odłączeniu zasilania. 
9. W przypadku sprzętu oraz pokryw oznaczonych symbolem pokazanym na rysunku po prawej stronie należy zapoznać się ze wskazówkami w Instrukcji operatora i stosować się do nich. 
10. Wszystkie symbole graficzne zastosowane do oznaczenia produktu pochodzą z następujących norm: EN61010-1, IEC417 lub ISO3864.
11. Oznaczenie „Nie otwierać, gdy urządzenie jest pod napięciem” lub podobne oznaczenia informują o ryzyku zapłonu w miejscach, gdzie występuje zagrożenie wybuchem. Urządzenie należy otwierać tylko po odłączeniu zasilania i po upływie czasu na ostygnięcie urządzenia oznaczonego na etykiecie lub w instrukcji obsługi. Urządzenie mogą otwierać wyłącznie odpowiednio przeszkoleni pracownicy serwisu.



## **IMPORTANTE**

**Instruções de segurança para ligação e instalação deste aparelho.**

**As seguintes instruções de segurança aplicam-se especificamente a todos os estados membros da UE. Devem ser observadas rigidamente por forma a garantir o cumprimento da Directiva sobre Baixa Tensão. Relativamente aos estados que não pertençam à UE, deverão cumprir igualmente a referida directiva, exceptuando os casos em que a legislação local a tiver substituído.**

1. Devem ser feitas ligações de terra apropriadas a todos os pontos de terra, internos ou externos.
2. Após a instalação ou eventual reparação, devem ser recolocadas todas as tampas de segurança e terras de protecção. Deve manter-se sempre a integridade de todos os terminais de terra.
3. Os cabos de alimentação eléctrica devem obedecer às exigências das normas IEC227 ou IEC245.
4. Os cabos e fios utilizados nas ligações eléctricas devem ser adequados para utilização a uma temperatura ambiente até 75°C.
5. As dimensões internas dos buçins dos cabos devem ser adequadas a uma boa fixação dos cabos.
6. Para assegurar um funcionamento seguro deste equipamento, a ligação ao cabo de alimentação eléctrica deve ser feita através de um disjuntor (min. 10A) que desligará todos os condutores de circuitos durante uma avaria. O disjuntor poderá também conter um interruptor de isolamento accionado manualmente. Caso contrário, deverá ser instalado qualquer outro meio para desligar o equipamento da energia eléctrica, devendo ser assinalado convenientemente. Os disjuntores ou interruptores devem obedecer a uma norma reconhecida, tipo IEC947.
7. Sempre que o equipamento ou as tampas contiverem o símbolo, é provável a existência de tensões perigosas. Estas tampas só devem ser retiradas quando a energia eléctrica tiver sido desligada e por Pessoal da Assistência devidamente treinado. 
8. Sempre que o equipamento ou as tampas contiverem o símbolo, há perigo de existência de superfícies quentes. Estas tampas só devem ser retiradas por Pessoal da Assistência devidamente treinado e depois de a energia eléctrica ter sido desligada. Algumas superfícies permanecem quentes até 45 minutos depois. 
9. Sempre que o equipamento ou as tampas contiverem o símbolo, o Manual de Funcionamento deve ser consultado para obtenção das necessárias instruções. 
10. Todos os símbolos gráficos utilizados neste produto baseiam-se em uma ou mais das seguintes normas: EN61010-1, IEC417 e ISO3864.
11. Sempre que o equipamento ou as etiquetas apresentarem o aviso "Não abrir quando ligado à corrente" ou semelhante, existe um risco de ignição em atmosferas explosivas. Este equipamento só deve ser aberto depois de desligado da corrente eléctrica e o tempo de arrefecimento adequado especificado na etiqueta ou no manual de instruções ter decorrido. O equipamento só pode ser aberto por técnicos qualificados.

## **DÔLEŽITÉ**

### **Bezpečnostné pokyny pre zapojenie káblov a inštaláciu tohto prístroja**

**Nasledovné bezpečnostné pokyny sa vzťahujú konkrétne na všetky členské štáty EÚ. Musia byť striktne dodržané, aby sa zaistila zhoda so Smernicou o nízkom napätí. Štáty, ktoré nie sú členskými štátmi EÚ by mali nasledovné pokyny taktiež dodržiavať, pokiaľ nie sú nahradené miestnymi alebo národnými normami.**

1. Adekvátne uzemnenia musia byť vykonané na všetkých bodoch uzemnenia, interných aj externých, tam, kde sú poskytnuté.
2. Po inštalácii alebo riešení problémov musia byť všetky bezpečnostné kryty a bezpečnostné uzemnenia vymenené. Integrita všetkých uzemňovacích terminálov musí byť vždy zachovaná.
3. Káble sieťového napájania musia byť v zhode s požiadavkami IEC227 alebo IEC245.
4. Všetky káblové pripojenia by mali byť vhodné pre používanie v teplote okolia vyššej, ako 75°C.
5. Všetky použité káblové priechodky musia mať také vnútorné rozmery, aby poskytovali adekvátne uchopenie kábla.
6. Pre zaistenie bezpečnej prevádzky tohto zariadenia musí byť pripojenie k sieťovému napájaniu zapojené len cez prerušovač obvodu, ktorý počas poruchovej situácie odpojí všetky obvody elektrických vodičov. Prerušovač obvodu by mal obsahovať aj mechanicky ovládaný úsekový vypínač. Ak nie, musí byť poskytnutý iný spôsob odpojenia zariadenia od sieťového napájania a tento spôsob musí byť zreteľne označený. Prerušovače obvodu alebo spínače musia byť v zhode s uznanou normou, ako napr. IEC947. Všetky káblové pripojenia musia vyhovovať akýmkoľvek miestnym normám.
7. Tam, kde je zariadenie alebo kryty označené symbolom na pravej strane, sa pravdepodobne nachádza nebezpečné napätie. Tieto kryty by sa mali odoberať len vtedy, keď je zariadenie odpojené od elektrickej energie a len vyškoleným servisným personálom.
8. Tam, kde je zariadenie alebo kryty označené symbolom na pravej strane, existuje nebezpečenstvo horúcich povrchov. Tieto kryty by mali byť odstraňované len vyškoleným servisným personálom, pričom je zariadenie odpojené od elektrickej energie. Určité povrchy môžu ostať horúce na dotyk.
9. V miestach, kde je zariadenie alebo kryty označené symbolom na pravej strane, si kvôli pokynom pozrite Operátorskú príručku.
10. Všetky obrázkové symboly použité pri tomto produkte zodpovedajú jednej alebo viacerým nasledujúcim normám: EN61010-1, IEC417 a ISO3864.
11. V miestach, kde je zariadenie alebo značky označené nápisom "Neotvárať pod elektrickým prúdom" alebo podobné, existuje nebezpečenstvo vznietenia v oblastiach s prítomnosťou výbušného ovzdušia. Toto zariadenie sa smie otvárať len v prípade odpojenia od elektrického napájania a ponechania zariadenia vychladnúť po dobu uplynutia dostatočného času tak, ako je to uvedené na štítku alebo v návode na použitie - a len vyškoleným servisným personálom.








## **POMEMBNO**

### **Varnostna navodila za povezavo in vgradnjo naprave**

**Naslednja varnostna navodila veljajo za vse države članice EU. Zaradi zagotovitve skladnosti z nizkonapetostno direktivo morate navodila strogo upoštevati. V državah, ki niso članice EU, je treba upoštevati tudi naslednje smernice, razen če jih ne zamenjujejo lokalni ali nacionalnimi standardi.**

1. Do vseh ozemljitvenih točk, notranjih in zunanjih, ki so na voljo, morajo biti speljane ustrezne ozemljitvene povezave.
2. Po vgradnji ali odpravljanju težav je treba namestiti vse varnostne pokrove in zaščitne ozemljitve. Brezhibnost vseh ozemljitvenih priključkov je treba nenehno preverjati.
3. Omrežni napajalni kabli morajo biti skladni z zahtevami standarda IEC227 ali IEC245.
4. Vsa napeljava mora biti primerna za uporabi pri temperaturi okolja, višji od 75 °C.
5. Notranje dimenzije kabelskih tesnilk morajo zagotavljati ustrezno pritrditev kablov.
6. Za zagotovitev varnega delovanja opreme mora biti povezava z omrežnim napajanjem vzpostavljena prek odklopnega stikala, ki v primeru napake izklopi vse tokokroge s prevodniki. Odklopno stikalo lahko vključuje tudi mehansko izolacijsko stikalo. V nasprotnem primeru morajo biti zagotovljeni in jasno označeni drugi načini za izklop opreme iz napajanja. Odklopna in druga stikala morajo biti skladna z uveljavljenimi standardi, kot je IEC947. Vsa napeljava mora biti skladna z lokalnimi standardi.
7. V opremi ali pod pokrovi, ki so označeni s simbolom na desni, je prisotna nevarna napetost. Te pokrove je dovoljeno odstraniti samo, če je napajanje opreme izklopljeno. To lahko izvaja samo usposobljeno servisno osebje. 
8. Pri opremi ali pod pokrovi, ki so označeni s simbolom na desni, so prisotne nevarne vroče površine. Te pokrove lahko odstranjuje samo usposobljeno servisno osebje. Napajanje opreme mora biti izklopljeno. Določene površine so lahko vroče. 
9. Pri opremi ali pokrovih, ki so označeni s simbolom na desni, si za navodila oglejte priročnik za upravljanje. 
10. Vsi uporabljeni grafični simboli so iz enega ali več naslednjih standardov: EN61010-1, IEC417 in ISO3864.
11. Če je na opremi ali oznakah navedeno "Ne odpirajte, če je pod napetostjo" ali podobno opozorilo, je na območjih z eksplozivnim ozračjem prisotna nevarnost vžiga. To opremo je dovoljeno odpirati samo, če je napajanje izklopljeno in je poteklo dovolj časa, da se oprema ohladi, kot je navedeno na oznaki ali v priročniku z navodili. Opremo lahko odpira samo usposobljeno servisno osebje.

### **IMPORTANTE**

**Instrucciones de seguridad para el montaje y cableado de este aparato.**

**Las siguientes instrucciones de seguridad, son de aplicacion especifica a todos los miembros de la UE y se adjuntaran para cumplir la normativa europea de baja tension.**




1. Se deben preveer conexiones a tierra del equipo, tanto externa como internamente, en aquellos terminales previstos al efecto.
2. Una vez finalizada las operaciones de mantenimiento del equipo, se deben volver a colocar las cubiertas de seguridad aasi como los terminales de tierra. Se debe comprobar la integridad de cada terminal.
3. Los cables de alimentacion electrica cumplan con las normas IEC 227 o IEC 245.
4. Todo el cableado sera adecuado para una temperatura ambiental de 75°C.
5. Todos los prensaestopas seran adecuados para una fijacion adecuada de los cables.
6. Para un manejo seguro del equipo, la alimentacion electrica se realizara a traves de un interruptor magnetotermico ( min 10 A ), el cual desconectara la alimentacion electrica al equipo en todas sus fases durante un fallo. Los interruptores estaran de acuerdo a la norma IEC 947 u otra de reconocido prestigio.
7. Cuando las tapas o el equipo lleve impreso el simbolo de tension electrica peligrosa, dicho alojamiento solamente se abra una vez que se haya interrumpido la alimentacion electrica al equipo asimismo la intervencion sera llevada a cabo por personal entrenado para estas labores.
8. Cuando las tapas o el equipo lleve impreso el simbolo, hay superficies con alta temperatura, por tanto se abra una vez que se haya interrumpido la alimentacion electrica al equipo por personal entrenado para estas labores, y al menos se esperara unos 45 minutos para enfriar las superficies calientes.
9. Cuando el equipo o la tapa lleve impreso el simbolo, se consultara el manual de instrucciones.
10. Todos los simbolos graficos usados en esta hoja, estan de acuerdo a las siguientes normas EN61010-1, IEC417 & ISO 3864.
11. Cuando el equipo o las etiquetas tienen la indicación " No abrir mientras reciba energía" u otra similar, existe el peligro de ignición en zonas donde haya un ambiente explosivo. Este equipo sólo debe ser abierto por personal de servicio cualificado después de apagarlo y dejar pasar el intervalo de tiempo correspondiente indicado en la etiqueta o el manual de instrucciones para que el equipo se enfríe.



## **VIKTIGT**

**Säkerhetsföreskrifter för kablage och installation av denna apparat.**

**Följande säkerhetsföreskrifter är tillämpliga för samtliga EU-medlemsländer. De skall följas i varje avseende för att överensstämma med Lågspännings direktivet. Icke EU medlemsländer skall också följa nedanstående punkter, såvida de inte övergrips av lokala eller nationella föreskrifter.**

1. Tillämplig jordkontakt skall utföras till alla jordade punkter, såväl internt som externt där så erfordras.
2. Efter installation eller felsökning skall samtliga säkerhetshöljen och säkerhetsjord återplaceras. Samtliga jordterminaler måste hållas obrutna hela tiden.
3. Matningsspänningens kabel måste överensstämma med föreskrifterna i IEC227 eller IEC245.
4. Allt kablage skall vara lämpligt för användning i en omgivningstemperatur högre än 75°C.
5. Alla kabelförskruvningar som används skall ha inre dimensioner som motsvarar adekvat kabelförankring.
6. För att säkerställa säker drift av denna utrustning skall anslutning till huvudströmmen endast göras genom en säkring (min 10A) som skall fränkoppla alla strömförande kretsar när något fel uppstår. Säkringen kan även ha en mekanisk frånskiljare. Om så inte är fallet, måste ett annat förfarande för att frånskilja utrustningen från strömförsörjning tillhandahållas och klart framgå genom markering. Säkring eller omkopplare måste överensstämma med en gällande standard såsom t ex IEC947.
7. Där utrustning eller hölje är markerad med vidstående symbol föreligger risk för livsfarlig spänning i närheten. Dessa höljen får endast avlägsnas när strömmen ej är ansluten till utrustningen - och då endast av utbildad servicepersonal. 
8. När utrustning eller hölje är markerad med vidstående symbol föreligger risk för brännskada vid kontakt med uppvärmd yta. Dessa höljen får endast avlägsnas av utbildad servicepersonal, när strömmen kopplats från utrustningen. Vissa ytor kan vara mycket varma att vidröra även upp till 45 minuter efter avstängning av strömmen. 
9. När utrustning eller hölje markerats med vidstående symbol bör instruktionsmanualen studeras för information. 
10. Samtliga grafiska symboler som förekommer i denna produkt finns angivna i en eller flera av följande föreskrifter:- EN61010-1, IEC417 & ISO3864.
11. För utrustning som markerats med föreskrifter som "Öppna inte när strömmen är på", eller liknande, råder explosionsrisk när det förekommer explosiva ångor. Utrustningen får endast öppnas efter att strömmen stängts av och efter att utrustningen fått svalna under så lång tid som anges i instruktionsboken. Öppnandet får endast utföras av utbildad servicepersonal.

## **HIGH PRESSURE GAS CYLINDERS**

## **GENERAL PRECAUTIONS FOR HANDLING AND STORING HIGH PRESSURE GAS CYLINDERS**

Edited from selected paragraphs of the  
Compressed Gas Association's  
"Handbook of Compressed Gases"  
published in 1981

Compressed Gas Association  
1235 Jefferson Davis Highway  
Arlington, Virginia 22202  
Used by Permission

1. Never drop cylinders or permit them to strike each other violently.
2. Cylinders may be stored in the open, but in such cases, should be protected against extremes of weather and, to prevent rusting, from the dampness of the ground. Cylinders should be stored in the shade when located in areas where extreme temperatures are prevalent.
3. The valve protection cap should be left on each cylinder until it has been secured against a wall or bench, or placed in a cylinder stand, and is ready to be used.
4. Avoid dragging, rolling, or sliding cylinders, even for a short distance; they should be moved by using a suitable hand-truck.
5. Never tamper with safety devices in valves or cylinders.
6. Do not store full and empty cylinders together. Serious suckback can occur when an empty cylinder is attached to a pressurized system.
7. No part of cylinder should be subjected to a temperature higher than 52°C (125°F). A flame should never be permitted to come in contact with any part of a compressed gas cylinder.
8. Do not place cylinders where they may become part of an electric circuit. When electric arc welding, precautions must be taken to prevent striking an arc against the cylinder.

## Appendix B Return of Material

### RETURNING MATERIAL

If factory repair of defective equipment is required, proceed as follows:

1. Secure a return authorization number from an Emerson Process Management Sales Office or representative before returning the equipment. Equipment must be returned with complete identification in accordance with Emerson Process Management instructions or it will not be accepted.

In no event will Emerson Process Management be responsible for equipment returned without proper authorization and identification.

2. Carefully pack defective unit in a sturdy box with sufficient shock absorbing material to ensure that no additional damage will occur during shipping.
3. In a cover letter, describe completely:
  - a. The symptoms from which it was determined that the equipment is faulty.
  - b. The environment in which the equipment has been operating (housing, weather, vibration, dust, etc.).
  - c. Site from which equipment was removed.
  - d. Whether warranty or nonwarranty service is requested.
  - e. Complete shipping instructions for return of equipment.
  - f. Reference the return authorization number.
4. Enclose a cover letter and purchase order and ship the defective equipment according to instructions provided in Emerson Process Management Return Authorization, prepaid, to:

Emerson Process Management  
RMR Department  
Daniel Headquarters  
11100 Britmore Park Drive  
Houston, TX 77041

If warranty service is requested, the defective unit will be carefully inspected and tested at the factory. If failure was due to conditions listed in the standard Rosemount Analytical warranty, the defective unit will be repaired or replaced at Emerson Process Management's option, and an operating unit will be returned to the customer in accordance with shipping instructions furnished in the cover letter.

For equipment no longer under warranty, the equipment will be repaired at the factory and returned as directed by the purchase order and shipping instructions.



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## **WARRANTY**

Rosemount Analytical warrants that the equipment manufactured and sold by it will, upon shipment, be free of defects in workmanship or material. Should any failure to conform to this warranty become apparent during a period of one year after the date of shipment, Rosemount Analytical shall, upon prompt written notice from the purchaser, correct such nonconformity by repair or replacement, F.O.B. factory of the defective part or parts. Correction in the manner provided above shall constitute a fulfillment of all liabilities of Rosemount Analytical with respect to the quality of the equipment.

**THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES OF QUALITY WHETHER WRITTEN, ORAL, OR IMPLIED (INCLUDING ANY WARRANTY OF MERCHANTABILITY OF FITNESS FOR PURPOSE).**

The remedy(ies) provided above shall be purchaser's sole remedy(ies) for any failure of Rosemount Analytical to comply with the warranty provisions, whether claims by the purchaser are based in contract or in tort (including negligence).

Rosemount Analytical does not warrant equipment against normal deterioration due to environment. Factors such as corrosive gases and solid particulates can be detrimental and can create the need for repair or replacement as part of normal wear and tear during the warranty period.

Equipment supplied by Rosemount Analytical Inc. but not manufactured by it will be subject to the same warranty as is extended to Rosemount Analytical by the original manufacturer.

At the time of installation it is important that the required services are supplied to the system and that the electronic controller is set up at least to the point where it is controlling the sensor heater. This will ensure, that should there be a delay between installation and full commissioning that the sensor being supplied with ac power and reference air will not be subjected to component deterioration.

### Model 400A Hydrocarbon Analyzer

Part no. \_\_\_\_\_

Serial no. \_\_\_\_\_

Order no. \_\_\_\_\_

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