Instruction Manual
IM-106-5500, Rev 1.0
June 2009

CCO 5500

Carbon Monoxide (CO) Analyzer

ROSEMOUNT® Analytical

http://www.raihome.com

EMERSON™ Process Management

HIGHLIGHTS OF CHANGES

Effective June 1, 2009 Rev 1.0

Page	Summary
General	Changed "transmitter" to "source" and "signal processor" to "control unit" throughout the manual.
Cover	Added the cover photo.
Page 1-1	Added Component Checklist discussion and note to the Overview discussion.
Page 1-2	Added Figure 1-1 Typical System Package.
Page 1-12	Updated Flue Gas Temperature specifications. Added the second note to Specifications.
Page 1-13	Added Table 1-1, Product Matrix.
Page 2-1	Moved Unpacking the Equipment forward from page 2-3 and added step 3 (Interconnect cable).
Page 2-2	Revised step 3 under Selecting Location and added the note.
Page 2-3	Changed 662^{o}F to 572^{o}F under Flue Gas Temperature and added the note.
Page 2-3 thru 2-9	Combined the previous headings under Mechanical Installation and formatted the information into procedural steps.
Page 2-4	Revised Figure 2-1.
Page 2-5	Added Figure 2-2.
Page 2-6	Revised callouts in Figure 2-3.
Page 2-7	Added Figure 2-4. Revised callouts in Figure 2-5.
Page 2-8	Added Figure 2-6.
Page 2-9	Relocated Electrical Data descriptive text from previous page 2-2. Revised Plant Status Input descriptive text.
Page 2-11	Added cable connections procedure.
Page 2-12	Revised Figure 2-7.
Page 2-13	Added Figure 2-8.
Page 3-1	Revised all descriptive texts.
Page 3-2	Revised alignment procedure and added Figure 3-1.
Page 3-3	Revised Figure 3-2 and Figure 3-3.
Page 3-5 through 3-8	Revised all procedures, descriptive texts, and illustrations.
Page 3-11	Revised Fault Condition display.
Page 4-3	Revised Figure 4-1.
Page 4-4 and 4-5	Replaced Figure 4-2.
Page 4-6 through 4-20	Revised descriptions of CCO 5500 operating parameters and deleted related illustrations.
Page 4-9	Revised Fault Condition display.

HIGHLIGHTS OF CHANGES (CONTINUED)

Effective June 1, 2009 Rev 1.0 (Continued)

Page	Summary
Page 5-1	Added Figure 5-1. Revised Replacement of the Heater Element procedure.
Page 5-2	Added Corrective Maintenance descriptive text.
Page 5-2 through 5-8	Revised all procedures and added new Figures 5-2 through 5-8.
Page 6-2	Revised Troubleshooting Tables descriptive text.
Page 6-3 through 6-5	Revised Tables 6-2 and 6-3.
Page 7-1	Revised list of recommended spare parts.
Page A-2 thru A-23	Added paragraphs number 11 to all safety data pages.
Page B-1	Moved previous Section 7, Returning Material to Appendix B and revised the return of materials address.
Back cover	Revised facility addresses.

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SECTION 3 Configuration and Startup

SECTION 4 Operation

CCO 5500 Carbon Monoxide (CO) Analyzer

ESSENTIAL INSTRUCTIONS

READ THIS PAGE BEFORE PROCEEDING!

Rosemount Analytical 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 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 Rosemount Analytical 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 Rosemount. 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.

PREFACE

The purpose of this manual is to provide information concerning the components, functions, installation and maintenance of the CCO 5500.

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 CONDUCTOR TERMINAL

⚠ : RISK OF ELECTRICAL SHOCK

⚠ : WARNING: REFER TO INSTRUCTION MANUAL

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.

Section 1 Description and Specifications

COMPONENT CHECKLIST

A typical Rosemount Analytical CCO 5500 Carbon Monoxide Analyzer should contian the items shown in Figure 1-1. Record the part number, serial number, and order number for your system in the table located on the back cover of this manual.

Also use the product matrix in Table 1-1 at the end of this section to compare your order number against your unit. Ensure the features and optuon specified by your order number are on or included with the unit.

OVERVIEW

Rapid advances in design of across the duct infrared gas analyzers have led to the general acceptance of this technique for monitoring gas levels in flue gases of power generation boilers and large industrial process steam boilers.

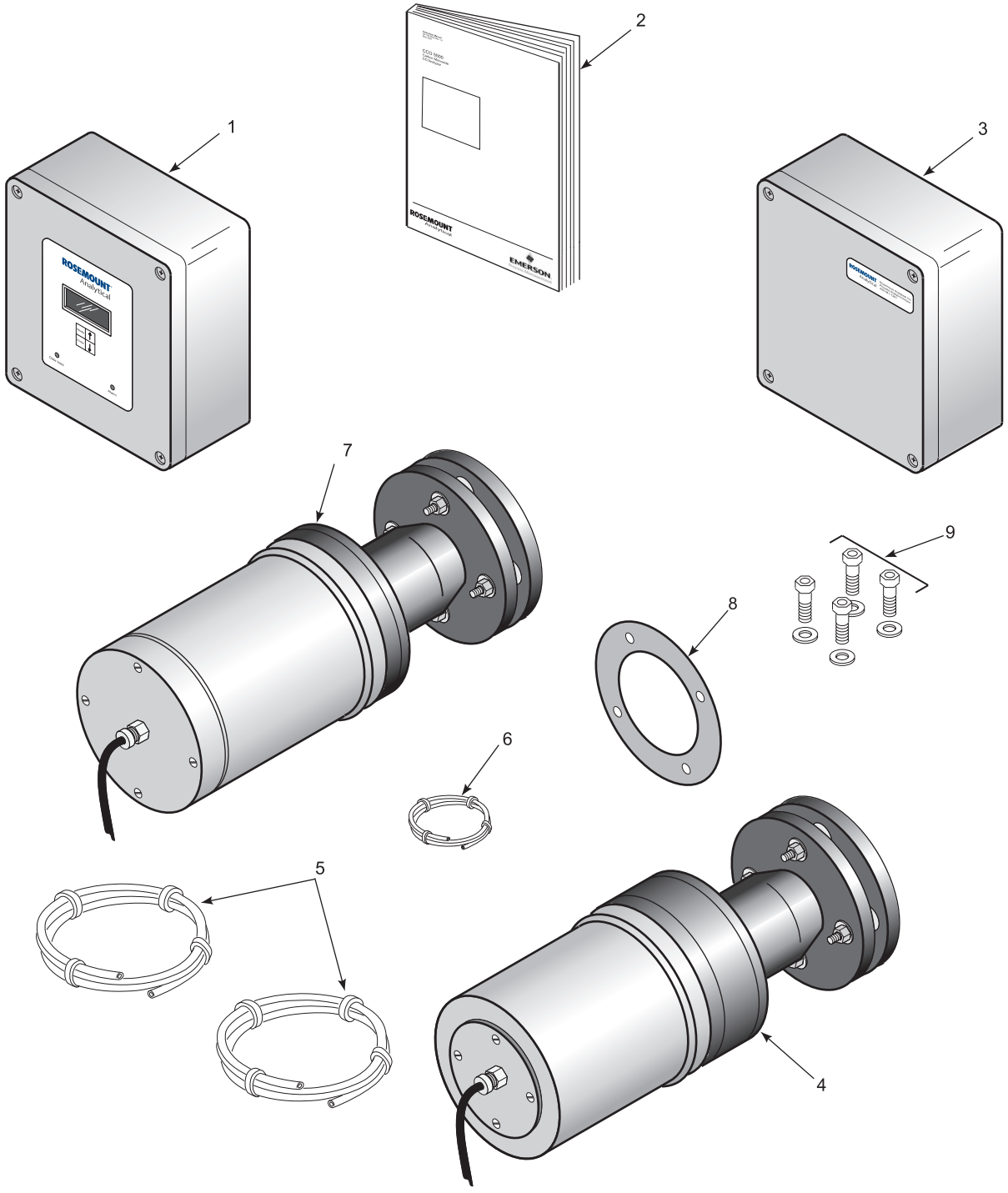
The CCO 5500 Carbon Monoxide (CO) Analyzer is designed to operate on duct widths of less than 26 ft (8 m) at flue gas temperatures up to 572ºF (300ºC).

NOTE
Temperatures up to 1112ºF (600ºC) are achievable but degradation in instrument accuracy will occur.

The rugged construction makes installation extremely simple, and through the use of microprocessor technology they have many advanced features:

- Serial data facility to allow communication between analyzers and a central data logging station.
- User-definable output in either mg/m^3, mg/Nm^3 or ppm.
- Four rolling averages are held; selectable from 10 seconds to 30 days.
- Integral, back lit 32 character LCD provides diagnostic and measurement information.
- Plant status input to prevent emissions dilution during plant off periods.

Figure 1-1. Typical System Package



1. Control Unit
2. Instruction Manual
3. Power Supply
4. Receiver
5. 33 ft (10 m) Cables
6. Interconnect Cable
7. Source
8. Gaskets (4)
9. Hardware

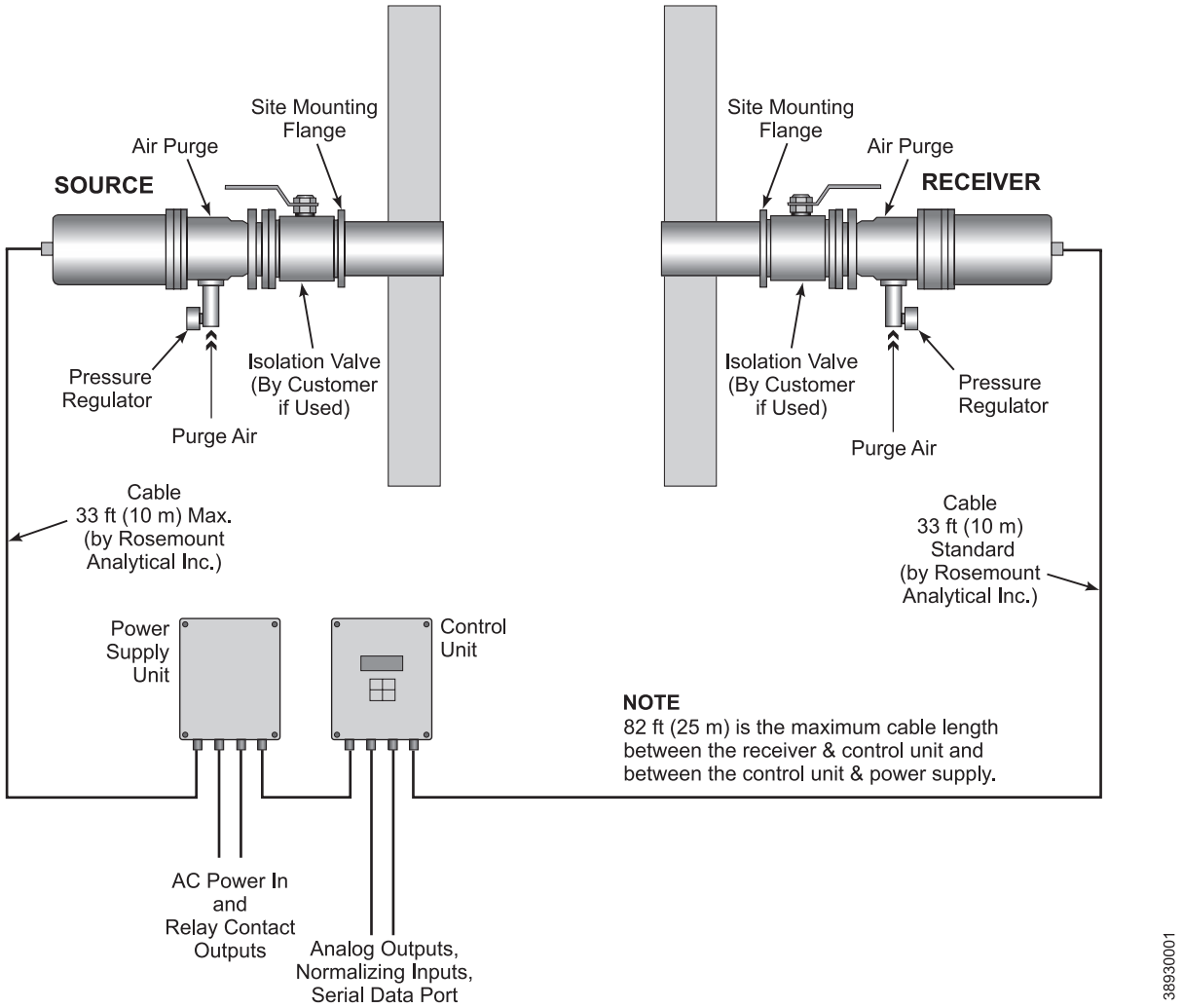
SYSTEM DESCRIPTION

The CCO 5500 Analyzer consists of four items (Figure 1-2):

- An infrared source unit to project a beam of infrared radiation across the duct.
- A receiver to measure the radiation.
- A power supply unit to provide the necessary power rails.
- A control unit to compute the gas concentration from the signals provided by the receiver unit.

Each of these units is designed to be rugged and durable. They are all fully sealed to IP65 standards and are suitable for outside mounting, without the need for further weatherproof enclosures.

Figure 1-2. Typical System Layout



Infrared Source Unit

At the heart of this unit is a small heater assembly designed to give a high intensity uniform source of infrared energy. The heater assembly can provide in excess of two years of continuous operation with a power consumption of only 26 watts. The heater has a stainless steel cylindrical core, plasma coated with refractory, and around which is a 'Kanthal' heating element. This is then enclosed within refractory fibers and encapsulated in an aluminum cartridge. In the infrequent event of failure the complete heater assembly can be replaced on site within ten minutes.

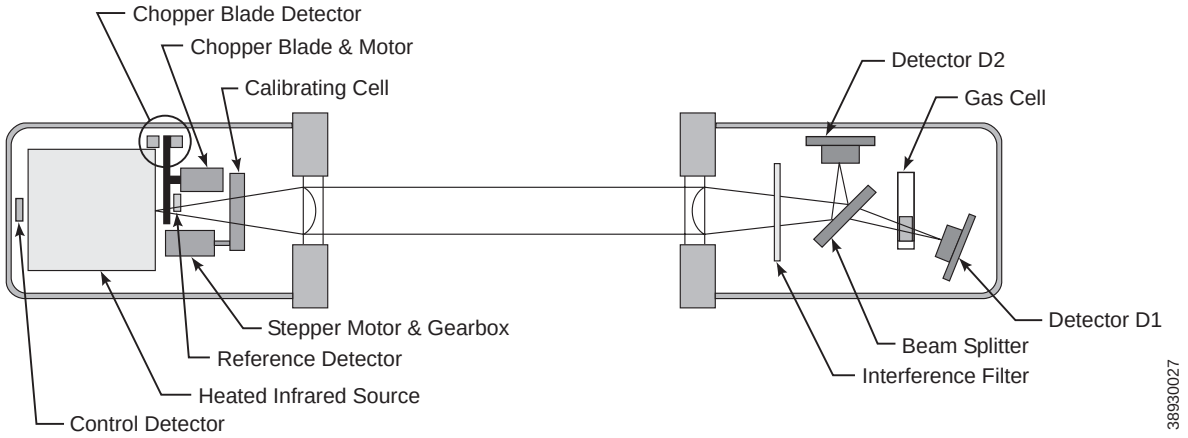
The radiation emitted by the heater is then 'chopped' by a motor-driven disc and focused across the duct by a lens. The chopper disc is driven by a small DC motor. The phase and frequency of the chopper disc are monitored by a radiation detector to provide a reference signal that is used by the control unit.

System calibration is achieved by a small calibration cell containing pure reference gas (CO) that can be swung into the sight path by means of a stepper motor and gearbox assembly to enable continuous calibration updates to be maintained. The chopper motor and stepper motor represent the only moving components in the entire system.

A printed circuit board mounted at the front of the unit provides control circuitry for the heater, the motors, and the reference wave detector.

Figure 1-3 illustrates the operation of the source and receiver units.

Figure 1-3. Source and Receiver Diagram



Infrared Receiver Unit

The precision and reliability with which the CO concentration levels are measured governs the performance of the instrument. For this reason design efforts have been concentrated in producing an extremely simple and robust receiver unit. It contains no moving parts, is fully sealed, and is designed to give many years of trouble-free and maintenance-free operation.

The unit includes a lens to focus radiation received from across the duct, followed by a precision interference filter to limit the wave band of energy used. This filter's tolerance is strictly controlled since it alone determines the instrument scale shape and calibration. The radiation then passes to an optical beam-splitter where approximately half the radiation is reflected at right angles directly onto a radiation detector. The other half of the radiation is transmitted, by the beam-splitter, through a gas cell containing pure reference gas (CO) and onto a second radiation detector.

The detectors used are lithium tantalate pyro-electric detectors, renowned for their sensitivity, stability and ability to operate at ambient temperatures, without the need for cooling. They respond only to changing levels of radiation and thus to the chopped radiation from the infrared source unit and not to background radiation from the flue or flue gas. The detector signals are amplified and fed to the control unit.

Control Unit

The control unit is housed in a fully-sealed cast-aluminum enclosure. It houses the microprocessor to monitor the data from the receiver and produces a 4-20 mA output signal for gas levels within the flue.

A non-volatile RAM section, requiring no battery back-up, enables all of its operation data to be retained during a power down condition. The instrument can resume operation immediately when power is restored without having to be recalibrated.

All operation data is entered via a surface-mounted keypad. A 32-character LCD provides the operator with measurement details and diagnostic information.

If required, inputs are available to receive the 4-20 mA outputs from the normalizing measurement transducers: (oxygen, temperature and pressure). This data can also be entered via the keypad or via the serial data port.

A serial communication facility within the processor allows the instrument to communicate with other Rosemount analyzers and a central data logging unit.

Power Supply Unit

The power supply unit is housed in a fully-sealed cast-aluminium enclosure. A supply voltage switch allows the operator to select from either 110 or 220V. This provides an extremely stable power source able to cope with large fluctuations in the supply voltage. Also, the data valid and high gas alarm contact outputs are located in this unit.

Air Purge

The air purge unit has an integral adjustable mount and provides the interface between the site mounting flange and the source/receiver units. The air purge is designed to provide a steady laminar flow of air away from the instrument lens to prevent optical contamination.

A supply of air to the purge is essential. See the specifications at the end of this section for details.

Isolating Valves

Isolating valves, if required, may be attached between the air purge units and the site mounting flanges. The customer supplied isolating valves are used to provide protection for personnel servicing instruments on high pressure ducts.

PRINCIPLES AND MODES OF OPERATION

Calculation of Gas Concentration

Gas levels are determined by measuring the absorption of infrared radiation transmitted through the flue gas. The wave bands from the infared radiation are sensitive to absorption by the measurement gas. The CCO 5500 Analyzer has two detectors: one measures the radiation directly to provide a live output, sensitive to the measurement gas. The second detector measures the radiation after passing through a gas cell filled with pure reference gas (CO). This provides a reference measurement completely unaffected by the measurement gas.

The basic expression from which the gas concentration in the gas is determined is:

$$Y = G - K(D2/D1)$$

Where
- $D1$ = the reference output from the detector
- $D2$ = the live output from the detector
- G = a scaling factor (16000)
- K = a constant, known as the zero correction factor, set so that when there is zero measurement gas in the duct, Y = 0

thereby, $K = G(D1_0/D2_0)$

This parameter Y is then smoothed, linearized and compensated for effects of path length and flue gas temperature, to produce a measurement of CO gas concentration in the flue gas.

Error Compensation

The accurate determination of gas concentration depends on the measurement of the radiation levels received by the detectors. Any error in the measurement caused by detector drift will produce errors in the calculation of the gas level. In order to maintain accuracy it is necessary to compensate for such drifts. In the CCO 5500 Analyzer a technique of repeated calibration adjustments is used.

The operating cycle of the instrument is in two parts. First, measurements are obtained from the two detector outputs D1 and D2. The calibration cell containing pure CO is then positioned in the sight path and the two detector outputs are measured again to give readings E1 and E2. This routine is repeated for each operating cycle to provide a continuous calibration update to maintain the accuracy of the concentration reading.

From the basic scale shape equation:

$$Y = G - K(D2/D1)$$

and from the calibration equation:

$$Y_0 = G - K(E2/E1)$$

or

$$K = (G - Y_0)(E1/E2)$$

When substituting the value of K into the scale shape equation:

$$Y = G - (G - Y_0)(E1/E2)(D2/D1)$$

The two ratios E1/D1 and E2/D2, being derived each from one detector, are independent of any detector drift. This makes the instrument output independent of any drift or change in detector gain characteristic.

Calculation Sequence

The calculations performed during each operating cycle of the instrument are given below:

- measure D1 & D2
- measure E1 & E2
- compute Y
- smooth Y
- linearize and correct for path length
- normalize the measurement
- smooth the result to produce a final %CO output

Normalization Equations

Normalization of data collected by the analyzer is essential to compare emission levels of pollutants into the atmosphere. Software in the CCO 5500 Analyzer performs all calculations and provides results in various units, vpm, mg/m^3 and mg/Nm^3. The derivation of these results is described in the following paragraphs.

The CCO 5500 Analyzer is a cross-duct type that measures the quantity (number of molecules) of gas within its sight path. This measurement is converted into a concentration that fully compensates for the expansion effects of temperature, while assuming constant atmospheric pressure. The basic measurement is referred to as ppm (parts per million). However, to achieve a true concentration vpm (ppm by volume) the 'ppm' value must be normalized for pressure using the following expression.

Correction to standard pressure

$$\text{vpm} = \text{ppm} \times \frac{\text{standard pressure (abs)}}{\text{measured pressure (abs)}}$$

where standard pressure is taken as 101 kPa.

Conversion to mass concentration

The next stage in the process is to determine the mass concentration. The conversion at STP uses conversion factors determined as follows:

$$mg/Nm^3 = \frac{100 \times mg/m^3}{100 - \%H_2O} \times \frac{20.9\% - \%O_2 \text{ standard}}{20.9\% - \%O_2 \text{ measured dry}}$$

where: N = conversion factor
RMM = Relative Molecular Mass of the gas
V = 22.4 (the standard volume of an ideal gas)

Conversion factors (N)

The conversion factors (N) for the analyzer are as follows:

Relative Molecular Mass (RMM) = 12 + 16 = 28

1 vpm = 28/22.4 = 1.25 mg/m^3

The mass concentration of the gas at STP is calculated as:

mg/m^3 @ STP = N (vpm)

Correction for oxygen and water vapor

Since the vpm measurement is already normalized for temperature and pressure, further normalization is required only for the dilution effects of water vapor and oxygen. These are straight forward calculations:

$$mg/Nm^3 = \frac{100 \times mg/m^3}{100 - \%H_2O} \times \frac{20.9\% - \%O_2 \text{ standard}}{20.9\% - \%O_2 \text{ measured dry}}$$

20.9% is taken as the level of free oxygen in dry air.

When the measured $\%O_2$ is a wet measurement, it must be corrected to a dry measurement. When the measured O_2 concentration is defined as a wet measurement in the analyzer software, this correction is performed automatically using the equation:

$$\%O_2 \text{ measured dry} = \%O_2 \text{ measured wet} \times \frac{100}{100 - \%H_2O}$$

When no correction for a wet measurement is required:
standard $\%O_2$ = $\%O_2$ measured.

When no correction is required for water vapor:
$\%H_2O = 0$.

After all calculations are performed the resulting measurement is the effective mass concentration (mg/Nm^3) of the pollutant normalized to standard conditions.

Measured conditions

Where measured values are required (e.g. to calculate rates of emissions) they need to be recalculated for measured temperature and pressure using the equation:

$$mg/m^3 = Nvpm \times \frac{273}{T} \times \frac{\text{measured pressure (abs)}}{\text{standard pressure (abs)}}$$

by substituting the correction for standard pressure:

$$vpm = ppm \times \frac{\text{standard pressure (abs)}}{\text{measured pressure (abs)}}$$

the measured mass concentration of the CO gas is:

$$mg/m^3 = Nppm \times \frac{273}{T}$$

Principles of Cross-Duct Gas Analyzers

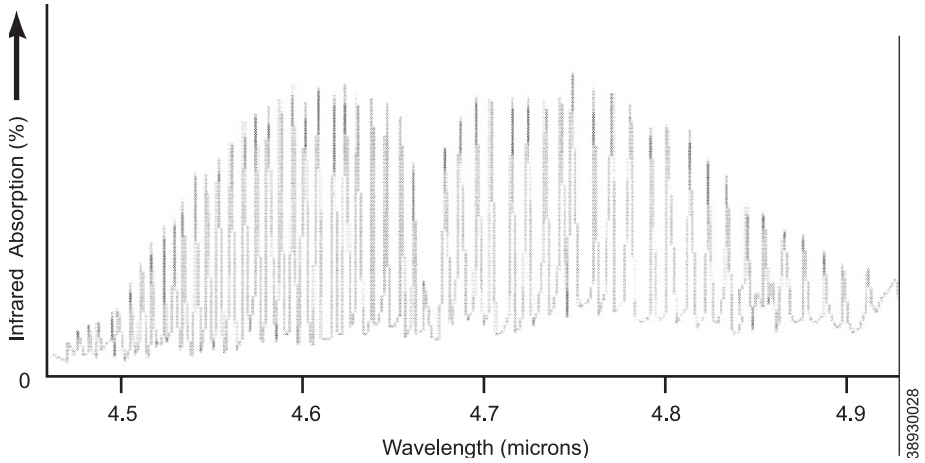
Cross-duct analyzers work on the basic principle that infrared (IR) energy is absorbed by particular gases in a manner very specific to that gas.

Although cross-duct analysis will differ from gas to gas the basic principles are similar for all measured gases. This section examines the analysis of carbon monoxide in detail.

Carbon Monoxide Infrared Absorption Spectrum

Carbon monoxide absorbs infrared energy in a band between wavelengths of approximately 4.5 and 4.9 μm. The absorption spectrum is complex and is illustrated in Figure 1-4 below.

Figure 1-4. CO Infrared Absorption Spectrum

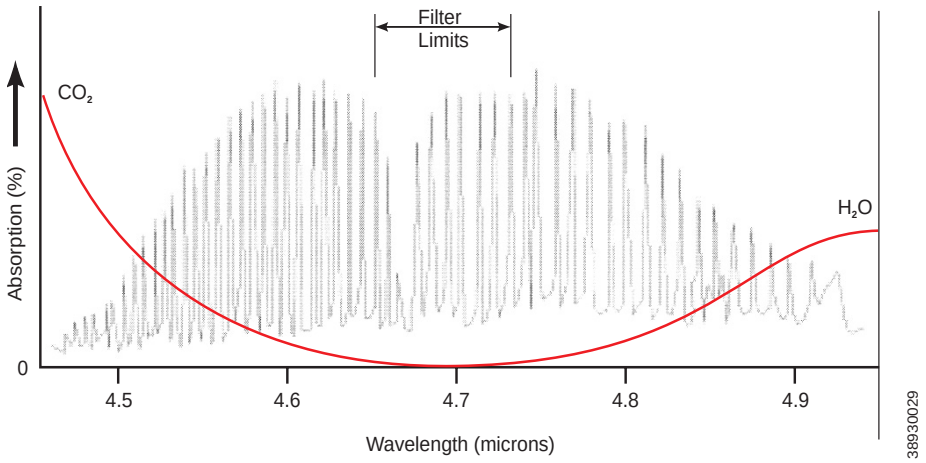


However, carbon dioxide and water vapor also absorb energy within this wave band. Fortunately, at 4.7μm, IR absorption by each of these gases is at a minimum. Figure 1-5 demonstrates how the absorption spectra of CO_2, CO, and water vapor affect wavelengths between 4.5 and 4.9 μm.

Absorption Spectra of CO, CO_2 and Water Vapor

A narrow band pass filter only passes IR energy at wavelengths around 4.7μm. By using this filter, correctly designed CO analyzers are able to ignore the effects of water vapor and CO_2. No other flue gases absorb IR energy in this band. The filter characteristics are shown in Figure 1-5.

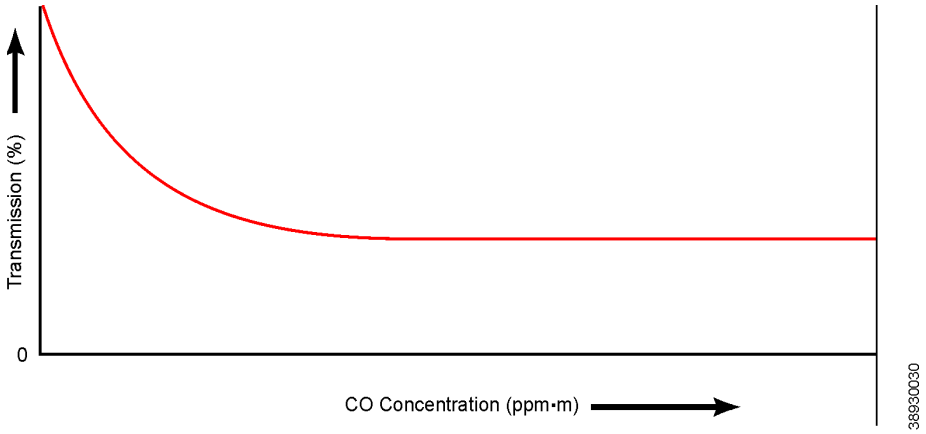
Figure 1-5. Comparison of Spectra



Transmissivity of CO within the 4.7μm Band

The transmission through the gas of the IR energy at about 4.7μm is affected by the concentration of CO. Figure 1-6 illustrates how the energy within the selected band varies with CO concentration.

Figure 1-6. Transmissivity of CO



The shape of this curve is fixed by the characteristics of the 4.7μm filter and cannot change. The curve is practically flat at CO concentrations above 10,000 ppm·meters. A cross-duct monitor effectively measures CO molecules in its optical path so the same concentration of CO will have a greater effect across a large measurement path than a small measurement path. The term ppm·meters is the concentration of CO within the duct multiplied by the gas path length (in meters) over which it has been measured.

Carbon Monoxide Calculation

The CCO 5500 Analyzer takes two measurements of IR energy in the narrow band around 4.7μm. Both measurements are made after the beam has passed through the gas to be measured. One, however, also passes through a cell containing pure CO (the gas cell shown in Figure 1-3). This absorbs all the energy capable of being absorbed by CO and provides a reference that is unaffected by any CO in the duct. However; it will be affected by any other material (e.g. dust) which reduces the energy received from the source unit.

The second beam does not pass through the cell and is very sensitive to changes in CO within the duct.

The measurement of CO is calculated from a parameter Y, where:

$$Y = G\text{-}K(D2/D1)$$

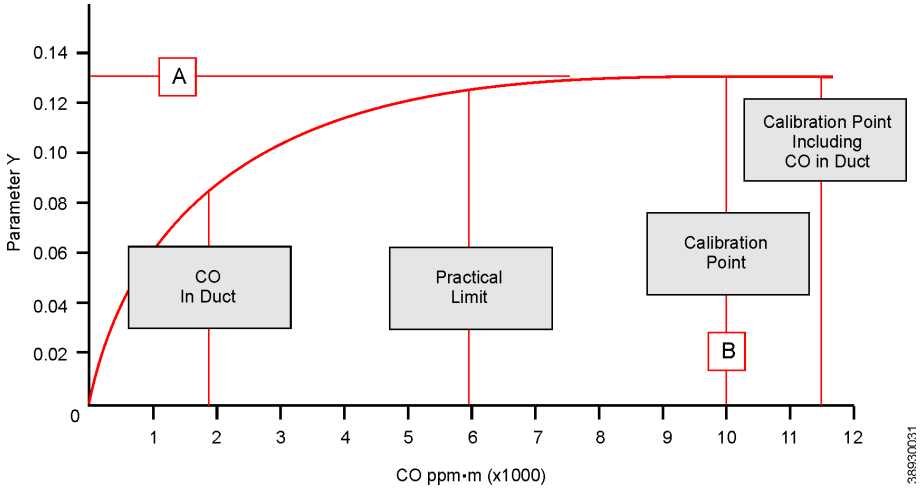
and

D2 = the live detector output
D1 = the reference detector output
K = a composite gain factor which takes account of all optical and electronic gains
G = scaling factor

Calibration

Figure 1-7 shows the parameter Y plotted for the change in CO concentration.

Figure 1-7. Calibration Curve



This is the calibration curve for the instrument; opposite in shape to the transmissivity curve shown in Figure 1-6. Each is fixed by the characteristics of the 4.7μm filter and cannot change. Rosemount Analytical analyzers make full use of this scale shape to provide an easily attainable calibration point.

It is not necessary to calculate K because we know that when the constant K is correct (Y = 0 when the CO level = 0) any drift in the measurement can only be due to a change in some optical or electronic gain. The drift can always be corrected by setting Y to zero when the CO level is zero.

In practice, however, it is not always possible to produce a zero CO level. But if we consider the calibration curve, we can see that:

if Y = 0 when CO = 0
then Y = a when CO = b

We can also see from Figure 1-7 that at high CO levels the parameter Y becomes completely insensitive to changing CO levels in the duct, such that:

Y = a when the CO > b

By making Y = a when CO > b, and Y = 0 when CO = 0, all errors are eliminated.

A gas cell containing pure carbon monoxide can be introduced into the IR beam at the source. This cell represents a value of 10,000 ppm·meters and provides a reference point for the calibration of the instrument. Any further CO in the duct will have negligible effect on the reference point because the calibration curve is flat at these high concentrations of CO. Well designed cross-duct analyzers introduce this gas cell every few seconds to continuously check and (if necessary) modify the zero position.

SPECIFICATIONS

CCO 5500 Analyzer Specifications	
Span*	Selectable from 0-100 ppm to 0-10,000 ppm, within the range 200 to 6000 ppm·meters at STP
Display Units	ppm mg/m^3 (measured concentration) mg/Nm^3 (normalized concentration)
Averaging	Four averages selectable from 10 seconds to 30 days
Accuracy	±2% of measurement or ±5 ppm whichever is greater
Outputs	
Analog	4-20 mA isolated, 500 Ohms max.
High Alarm	Volt-free contact, 10A @ 250V
Data Valid	Volt-free contact, 10A @ 250V
Inputs	
Oxygen	4-20 mA
Temperature	4-20 mA
Pressure	4-20 mA
Plant Status Contact	Volt-free Contact
Serial Port	For remote instrument operation, normalizing inputs and outputs
Path Length	1.6 to 26 ft (0.5 to 8 m)
Flue Gas Temperature**	572^oF (0 to 300^oC)
Construction	Cast aluminium, fully sealed to IP65
Source	Electrically heated silicon nitride cylinder
Detector	Lithium tantalate pyro-electric detector
Ambient Temperature Limits	-4^oF to 158^oF (-20^oC to 70^oC)
Power Requirements	85-132/170-264V AC, 50/60 Hz, 50VA
Air Purge Consumption	2.2 cfm @ 14.9 psi (1 liter/sec @ 1 bar) (compressed air) 11 cfm (5 liter/sec) (blower air)

* *The range of the output span is quoted in ppm·meters. To obtain the minimum and maximum span for your application, divide these figures by the path length in meters.*

** *Temperatures up to 1112^oF (600^oC) are achievable, but degradation in instrument accuracy will occur.*

Table 1-1. Product Matrix

CCO 5500 CARBON MONOXIDE (CO) ANALYZER-ORDERING INFORMATION
Select complete model number from the Product Matrix

CCO5500	Carbon Monoxide (CO) Analyzer

Code	Power Supply
01	110/220 VAC, 50/60 Hz

Code	Control Module Display/Keypad
01	English

Code	Calibration Options
01	None
02	Calibration Check Cell and Holder

CCO5500	01	01	02	Example

Section 2 Installation

⚠WARNING

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

⚠WARNING

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

⚠WARNING

Before making any electrical connections make sure the AC power supply is first switched off. Failure to do so could cause personal injury or even death. Make sure that the voltage and frequency of the AC supply match the designations on the analyzer component tags.

UNPACKING THE EQUIPMENT

A typical Rosemount Analytical CCO 5500 Carbon Monoxide (CO) Analyzer should contain the following items. Refer to Figure 1-1 for an illustration of these components. Record the part number, serial number, and order number for each major component of your system.

1. Source with 33 ft (10 m) of cable and air purge.
2. Receiver with 33 ft (10 m) of cable and air purge.
3. Interconnect cable 3 ft (0.91 m).
4. Control unit.
5. Power supply.
6. Gaskets (4).
7. Selected screws and washers.

SAFETY CONSIDERATIONS

Power is supplied to the whole system via the power supply unit. During installation DO NOT connect the system to the facility power source until all units are in place and fully wired. If used, keep the isolating valves CLOSED. The compressed air supplied to the air purges must be turned OFF until the full installation is complete. If any servicing or rewiring is to be performed ensure that the power supply is isolated. During configuration the system requires electrical power, compressed air, and open isolating valves.

CABLE REQUIREMENTS

1. Power supply to control unit – 8 conductor, shielded, multi-stranded, AWG 30.

NOTE
Although sheilded cable is specified for the interconnecting cable it is not necessary that the cable be grounded.

2. Current loop output – any suitable 2-conductor cable, maximum length depends on keeping output load within the 500 ohm maximum load requirement.
3. Contact outputs – any 2-conductor cable capable of supplying the power to the warning device/relay etc. 250V, 10A maximum.
4. A.C. power – any suitable 3-conductor power cable capable of transmitting 50VA.
5. Serial data link (if required) – twin twisted pair shielded cable.
6. Analog inputs – any suitable 2-conductor cable, Rosemount Analytical instruments have an internal impedance of 240 ohms for these inputs.

SELECTING LOCATION

The equipment is designed for mounting on boiler ducting or stacks open to the weather. It is fully sealed and requires no further enclosures or protection. The specific location of the instrument will depend on the application and user requirements. The following considerations should be made when choosing a site. Refer to Figure 1-2 for a typical system arrangement.

1. The site must be accessible at both sides of the duct for servicing the source and receiver.
2. The site should be as free from extremes of temperature and vibration as possible. Permissible ambient temperature range is -4^{o}F to 158^{o}F (-20^{o}C to +70^{o}C).
3. Flue gas temperatures should not exceed 572^{o}F (300^{o}C) at the point of measurement.

NOTE
Temperatures up to 1112^{o}F (600^{o}C) are achievable but degradation in instrument accuracy will occur.

4. There must be an uninterrupted sight path available between the source and receiver.
5. The maximum cable length allowed between the power supply and the source is 33 ft (10 m).
6. The maximum total cable length between the power supply and the receiver is 82 ft (25 m).

Points to Consider

Path Length

1. Too long [>26 ft (8 m)] - low energy available.
2. Too short [<1.6 ft (0.5 m)] - optical problems.

Flue Gas Temperature

1. Too low (<dewpoint) - potential water droplets.
2. Too high [>572^{o}F (>300^{o}C)] - reduced sensitivity.

NOTE
Temperatures up to 1112^{o}F (600^{o}C) are achievable but degradation in instrument accuracy will occur.

Ambient Temperature

1. Too low [< -4^{o}F (< -20^{o}C)] - condensation on lenses.
2. Too high [>158^{o}F (+70^{o}C)] - potential instrument problems.

Measurement Range

1. Minimum range depends on acceptable measurement uncertainty which is 10 ppm·meters. For the level of uncertainty to be below 2% of range the minimum range would be 500 ppm·meters.

   Note: 10 ppm CO = 12.5 mg/m^{3}
2. For increased sensitivity (reduced uncertainty of measurement) the path length must be maximized.
3. Maximum range is 6000 ppm·meters.

NOTE
To correct ppm·meters to effective ppm divide by the path length (in meters).

MECHANICAL INSTALLATION

The source and receiver units are mounted on site mounting flanges on opposite sides of the stack. Stand-off pipes [nominal bore 3 in. (75 mm) - not supplied] should be used between the duct and the site mounting flanges (Figure 2-1). The pipe should be long enough to clear the equipment from any duct lagging; it also helps to insulate the equipment from any high duct temperatures.

Mounting Flange Assemblies

1. Form two mounting holes on opposite sides of the stack according to the considerations in "Selecting Location". These holes should accept a 'slip fit' with the stand-off pipe.
2. Weld the stand-off pipes to the site mounting flanges as shown in Figure 2-1.
3. With the stand-off pipes and site mounting flanges welded together insert the mounting flange assemblies into their mounting holes.

4. Position the mounting flange assemblies so the four threaded mounting holes are located as shown in Figure 2-1.

NOTE
It is suggested that the stand-off pipe be tack welded to the duct and the alignment checked visually before a complete weld is made.

5. Look through one of the mounting flange assemblies. If the orifice across the stack can be clearly seen, the alignment is satisfactory. The alignment of these holes is not critical; an integral adjustable mount can compensate for up to 4^{o} of misalignment.
6. Weld the assemblies in place. To avoid vibration and movement it may be necessary to fit spreader plates or bracing fillets on the mounting flange assembly as shown in Figure 2-1.

Figure 2-1. Site Mounting Flange Assembly

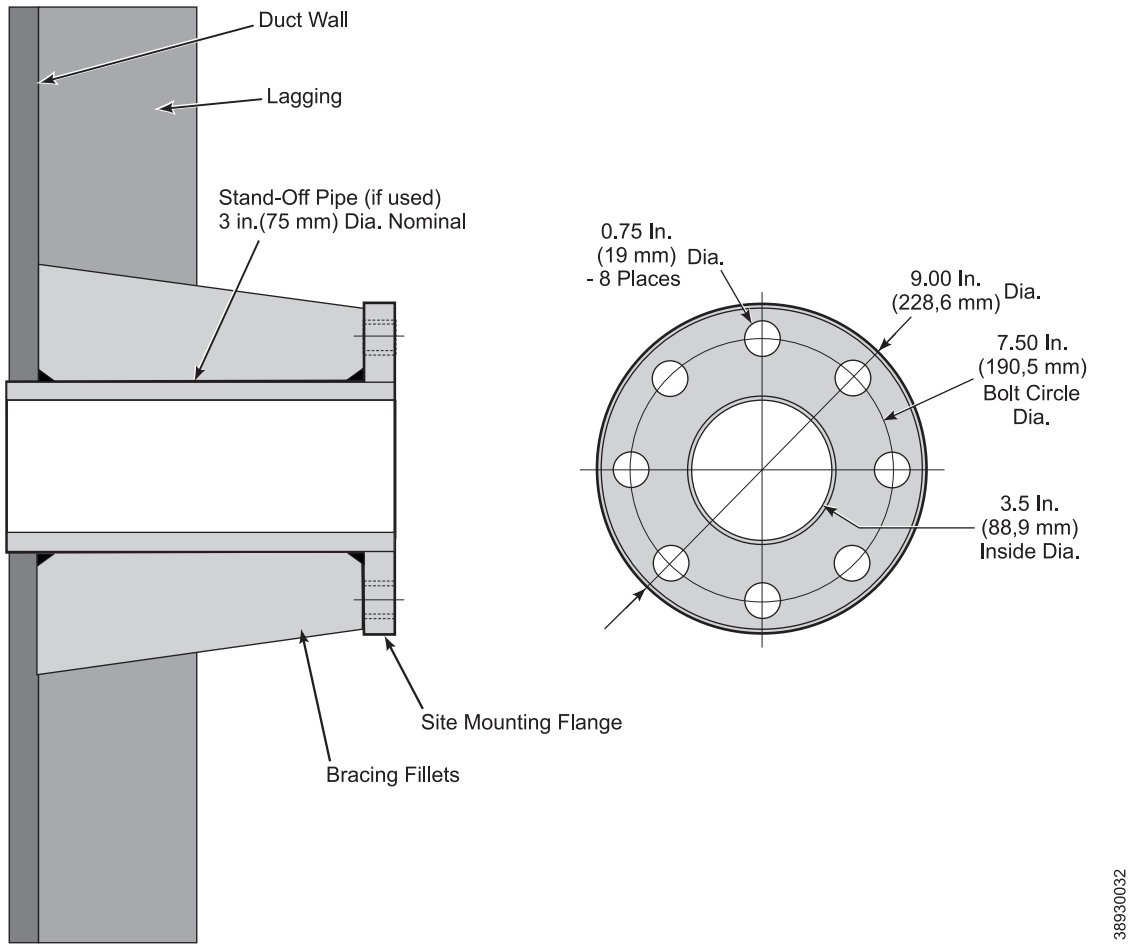
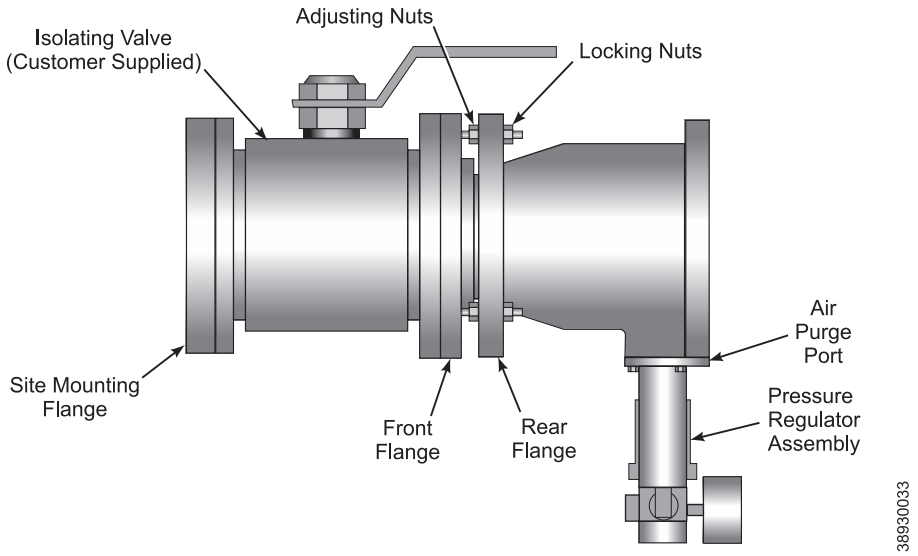


Figure 2-2. Isolating Valve and Air Purge Arrangement



Isolating Valves

To protect operators it is recommended that customer supplied isolating valves (Figure 2-2) be used for ducts that operate at higher than atmospheric pressure. Valve selection and installation is the responsibility of the customer.

After the isolating valves are installed on the site mounting flanges, connect the purge air supply and install air purge units according to the instructions that follow.

Purge Air Supply

The purpose of the purge air is to keep the windows of the source and the receiver clean. Always connect the purge air supply to the air purge units before you install the air purge units on the process duct. Purge air may be supplied by one of the following three methods:

Negative Pressure Duct

If the duct operates at a negative pressure under all firing conditions the air purge inlets may be simply left open and the negative draft in the duct can be allowed to draw in ambient air.

The air purge units for positive pressure ducts must be supplied with compressed air or blower air to prevent contamination of the source and receiver units.

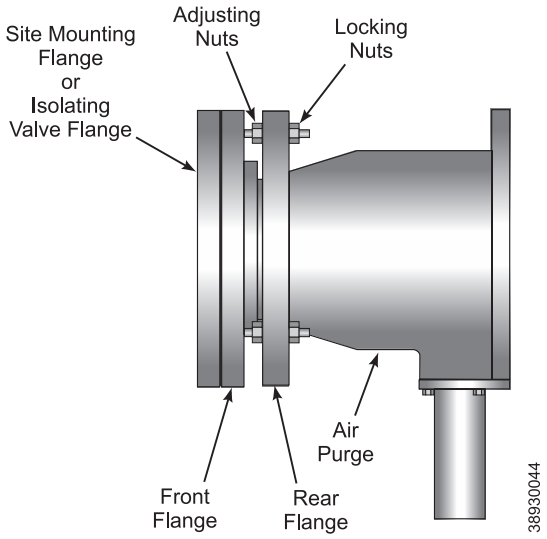
Compressed air

Compressed air may be used to provide the air flow required. An air supply of 14.7 psi (1 bar) is required and the consumption is 2.2 cfm (1 liter/second) per purge. Use a fine control flow regulator and filter.

Blower air

A blower may be used to provide the air to the air purge. Customers may specify their own blower. The blower should deliver 11 cfm (5 liters/second) per purge against the working pressure of the duct.

Figure 2-3. Air Purge Mounting



Air Purge Units

Use the general procedure that follows to install the air purge units on the site mounting flanges or on the exposed flanges of the customer supplied isolating valves, if used.

⚠CAUTION

Always connect and turn on the purge air supply to both air purge units before mounting the air purge units. Failure to flow purge air may allow the optical surfaces of the source and receiver units to become severely contaminated.

1. Remove the four locking nuts holding the front flange to the rear flange (Figure 2-3).
2. Carefully work and pull the front flange from the air purge unit.
3. Align the four holes on the front flange with the four holes on the site mounting flange.
4. Fasten the front flange to the site mounting flange with the four countersunk screws and gasket provided.
5. Connect and turn on a compressed air or blower air supply to the purge unit. Always flow purge air before installing an air purge unit on the duct.
6. Install the air purge unit on the front flange as shown.
7. Install and tighten the four locking nuts removed in step 1.

Source and Receiver Units

Use the following procedure to install the source and receiver units on the air purge units.

1. Insert a flexible gasket between the air purge unit and the source or receiver unit.
2. Dowel pins (Figure 2-4) ensure that the source and receiver units and the air purge units mount in a fixed rotary position. Align the dowel pin and dowel pin hole.
3. Attach the source or receiver to the rear face of the air purge and install the four screws provided (Figure 2-5).

Figure 2-4. Air Purge and Source Unit Mounting Features

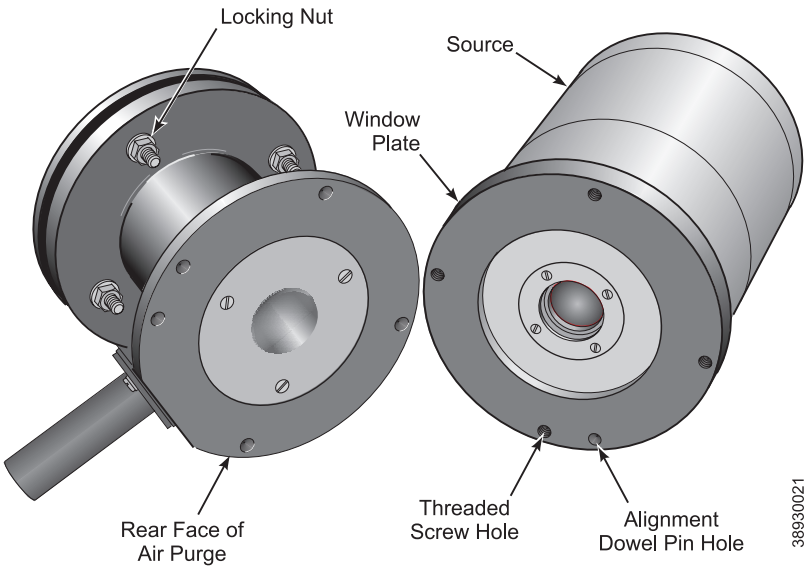
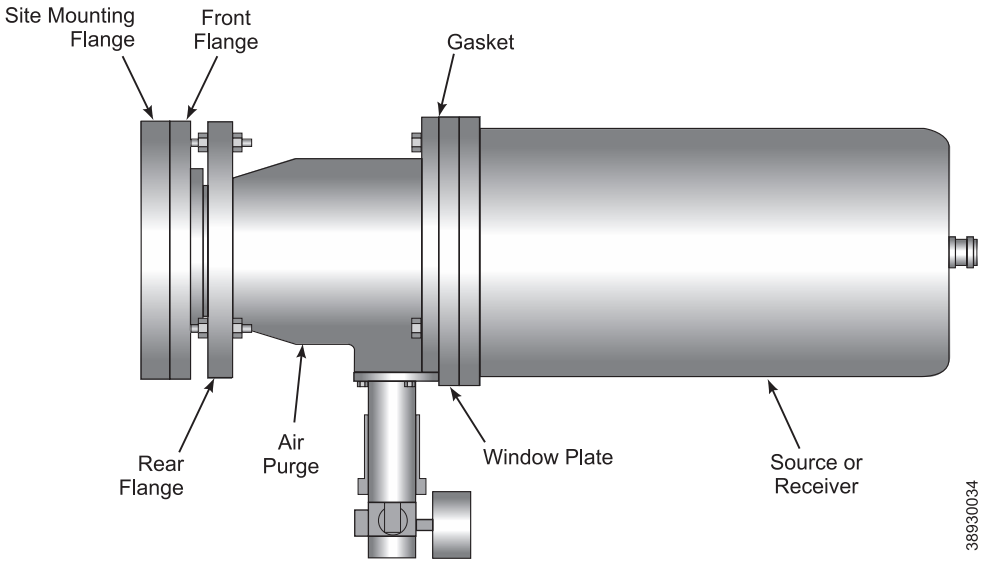


Figure 2-5. Air Purge and Source Units (Installed)



Control Unit

Adequate cable is supplied to locate the control unit up to 33 ft (10 m) from the receiver. The 33 ft (10 m) cable length must not be exceeded.

1. Loosen the four captive cover screws and remove the cover.
2. Unplug the ribbon cable connector on the cover side.
3. Fasten the control unit to a firm vertical support. Install four mounting screws into the mounting holes provided. Refer to Figure 2-6 for mounting dimensions.

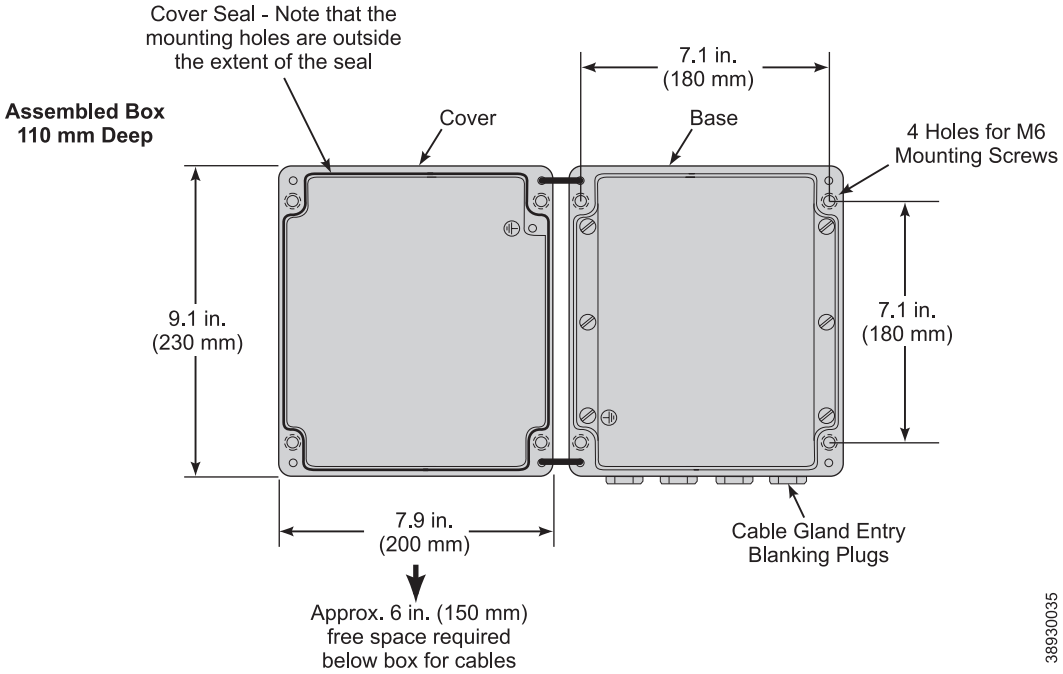
NOTE
The unit mounting holes are located outside the seal. It is not necessary to seal the mounting holes after installation or to remove circuit boards from the unit prior to mounting.

Power Supply Unit

Adequate cable is supplied to locate the power supply unit up to 33 ft (10 m) from the source unit. A maximum cable length of 82 ft (25 m) may be used to connect the power supply unit to the receiver. The 82 ft (25 m) maximum cable length must not be exceeded.

Dimensions and mounting hole locations are identical to the control unit and are shown in Figure 2-6.

Figure 2-6. Mounting Dimensions for the Control and Power Supply Units



ELECTRICAL DATA

AC Supplies

The CCO 5500 Analyzer can be powered from either 85-132 VAC or 170-264 VAC at 50/60 Hz. A switch within the power supply unit selects the input voltage and an internal 2A fuse protects the instrument. Voltage fluctuations within these ranges are tolerated without loss of performance. The total power requirement for the analyzer is less than 50VA.

Outputs

Three analyzer outputs are available:

1. Selectable, fully isolated 4-20 mA or 0-20 mA %CO concentration; 500 ohms maximum load.
2. Single pole, switching relays (rated 250V, 10A) for the following outputs:
   - Alarm trigger at a selectable gas threshold.
   - Data-valid indication active during power failure and any equipment fault condition. See Section 6, Troubleshooting, for further details.
3. 4-wire serial data link for 2-way communication between the control unit and a Distributed Control System or other process control system.

Normalizing Inputs

Pressure, temperature, and oxygen values can be held to normalize the calculated gas value to standard conditions. These values may be read by the instrument using the following methods:

1. Fixed value from the keypad.
2. 4-20 mA outputs from measurement transducers. The ranges represented by these inputs are set from within the processor. These are analog process inputs to the control unit.
3. When the analyzer is part of an integrated system, the serial data line can carry the normalizing values.

Plant Status Input

The plant status input parameter is available to prevent the rolling average data from being diluted by measurements made while the plant is shut down. The parameter is governed by one of three choices:

1. Serial input (from an integrated system)
2. Logic input (terminals PS1 and PS2 in the control unit)
3. Multiple (five variables)
   a. temperature
   b. oxygen
   c. pressure
   d. water vapor
   e. logic input

These parameters are set in Mode 5. Each of these parameters are described in Section 4, Operation.

During normal operation the plant status will register as ON. However, if the plant status input is lost, the status will change to OFF and the averaging data (seconds, minutes, hours, days) will not be updated.

NOTE
During normal operation terminals PS1 and PS2 must not be linked together.

ELECTRICAL CONNECTIONS

All equipment wiring must conform to local and national codes. Read and observe the following instructions before making electrical connections.

⚠WARNING

Disconnect and lock out power before connecting the power supply to the analyzer.

⚠WARNING

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

⚠WARNING

To meet the Safety Requirements of IEC 1010 (EC requirement), and ensure safe operation of this equipment, connection to the main electrical power supply must be made through a circuit breaker (min 10A) which will disconnect all current-carrying conductors during a fault situation. This circuit breaker should also include a mechanically operated isolating switch. If not, then another external means of disconnecting the supply from the equipment should be located close by. Circuit breakers or switches must comply with a recognized standard such as IEC 947.

NOTE
To maintain proper earth grounding ensure a positive connection exists between the transmitter housing and earth. The connecting ground wire must be 14 AWG minimum.

NOTE
Line voltage, signal, and relay wiring must be rated for at least 105ºC (221ºF). Make sure that the voltage and frequency of the AC power supply match the required power specifications.

NOTE
If metal conduit is used with the power supply unit and/or the source unit the conduit should be reliably bonded to protective earth. Grounding points inside the units are not bonded to PE and do not provide adequate grounding.

Installation of Cables

Decide routing for all non-power cables (both those supplied by Rosemount Analytical and those sourced locally). Use common routing wherever possible and install leaving sufficient free-end length to make final connections.

Power cables should be installed separately using different routes if possible to reduce the risk of cross interference. Leave sufficient free-end length to make final connections.

Rosemount supplied cables are provided with ferrite beads fitted to all cores to protect against interference and should not be modified without consulting Rosemount.

Cable Connections

A system wiring diagram is shown in Figure 2-7. The location of power supply and control unit connectors, etc. are shown in Figure 2-8. Use the following procedure to make cable connections between the source, receiver, power supply unit, and control unit.

1. Install the receiver cable in the center rear cable port of the control unit enclosure. Provide adequate free wire length for making connections to the control board terminals 16 through 22. Tighten the cable gland nut.
2. Connect the receiver cable wires to the control board terminals 16 through 22 according to the wiring diagram, Figure 2-7. Do not connect the receiver cable shield wire at the control unit.
3. Install the source cable in the right front cable port of the control unit enclosure. Provide adequate free wire length for making connections to the control board terminals 8 through 12. Tighten the cable gland nut.
4. Connect the source cable wires to the control board terminals 8 through 12 according to the wiring diagram, Figure 2-7. Do not connect the source cable shield wire at the control unit.
5. Install one end of the power supply to control unit interconnect cable in the center front cable port of the control unit enclosure. Provide adequate free wire length for making connections to the control board terminals 1 through 7. Tighten the cable gland nut.
6. Connect the cable wires to the control board terminals 1 through 7 according to the wiring diagram, Figure 2-7. Do not connect the cable shield wire at the control unit.
7. Install the opposite end of the power supply to control unit interconnect cable in one of the right hand cable ports of the power supply unit enclosure. Provide adequate free wire length for making connections to the power supply board terminals 1 through 7. Tighten the cable gland nut.
8. Connect the cable wires to the power supply board terminals 1 through 7 according to the wiring diagram, Figure 2-7. Do not connect the cable shield wire at the power supply unit.
9. Install the 110/220 VAC power cable in one of the left hand cable ports of the power supply unit enclosure. Provide adequate free wire length for making connections to the power supply board terminals L, N, and E. Tighten the cable gland nut.
10. Connect the cable wires to the power supply board terminals L, N, and E according to the wiring diagram, Figure 2-7. Do not connect the power cable to the facility power source at this time.
11. Verify that the power switch is in the correct position. **The voltage position selected must match the voltage supplied to the CCO 5500 Analyzer at your facility.**
12. Connect two seperate earth ground leads to the ground screws located on the left hand side of the power supply unit and control unit enclosures.

NOTE
To maintain proper earth grounding ensure a positive connection exists between the enclosures and earth. The connecting ground wires must be 14 AWG minimum.

Figure 2-7. System Wiring Diagram

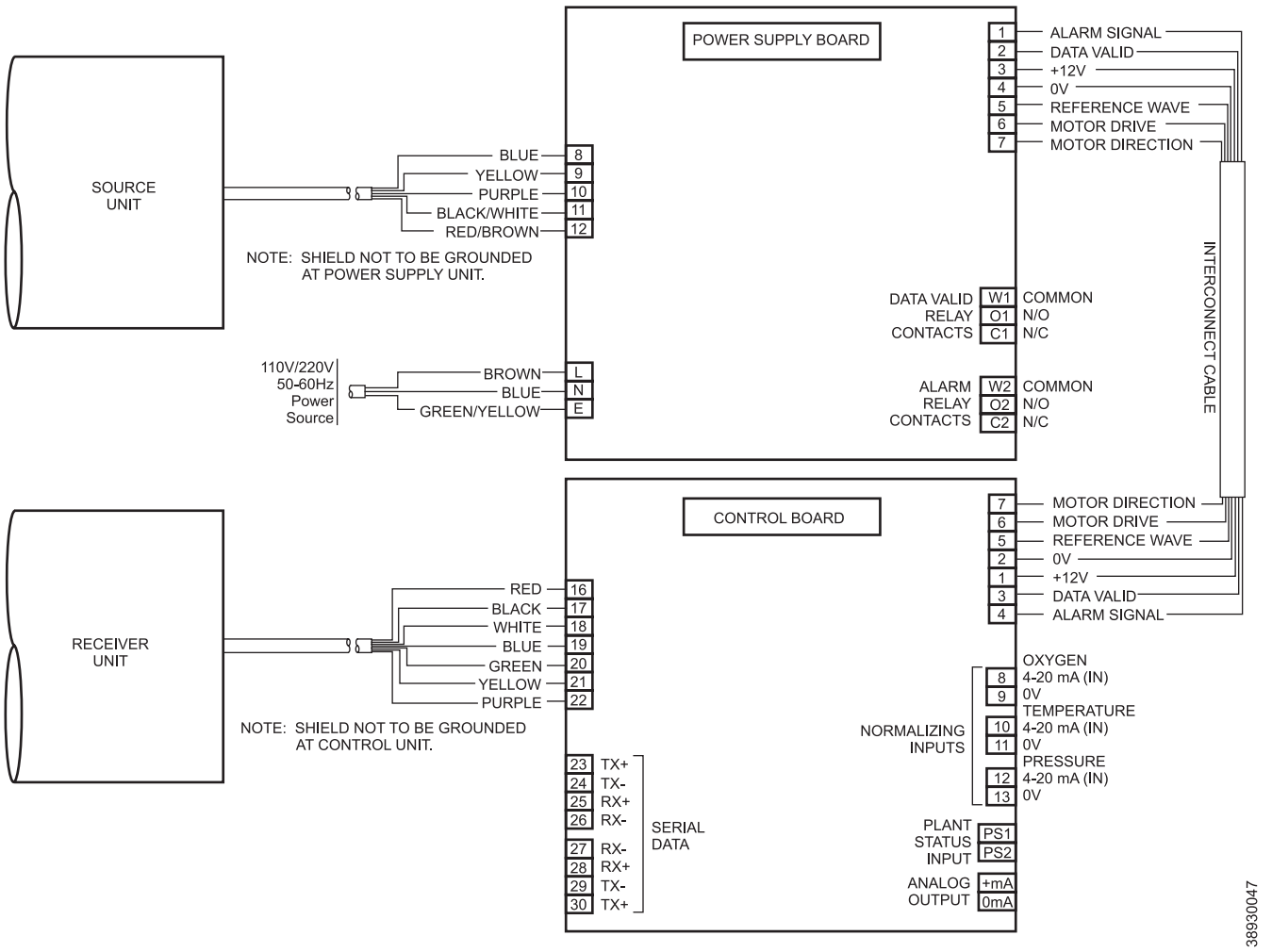
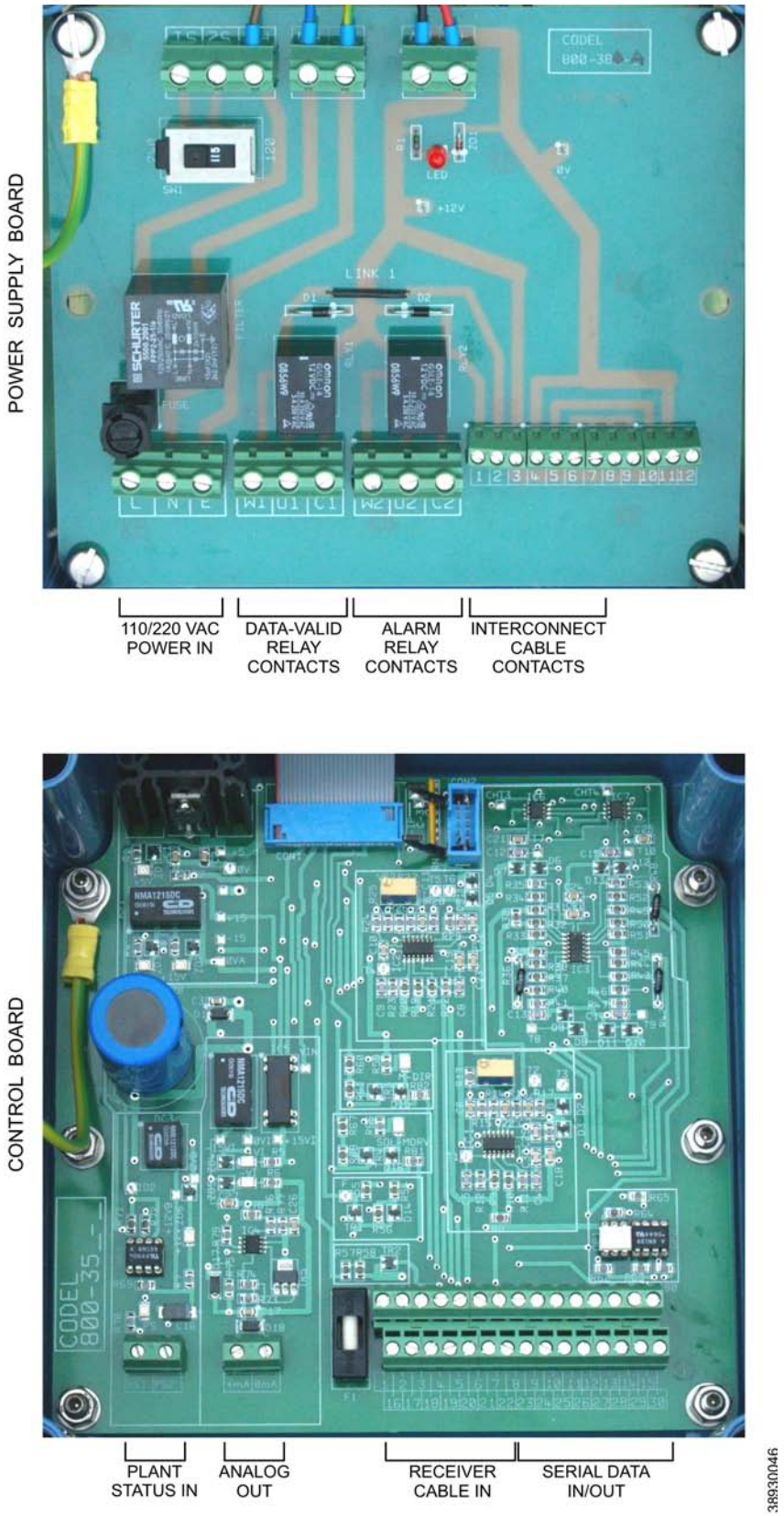


Figure 2-8. Wiring Connector Locations



Section 3 Configuration and Startup

INTRODUCTION

Configuring the instrument may require two hours or more and includes the following operations:

- Power up
- Alignment*
- Gain adjustment*
- Set operating parameters
- Calibration*

NOTE
*These operations should be performed when a clean stack condition exists.

SAFETY CONSIDERATIONS

The power is supplied to the analyzer system via the power supply unit. Before removing any equipment covers lock out and tag out power to the power supply unit.

⚠WARNING

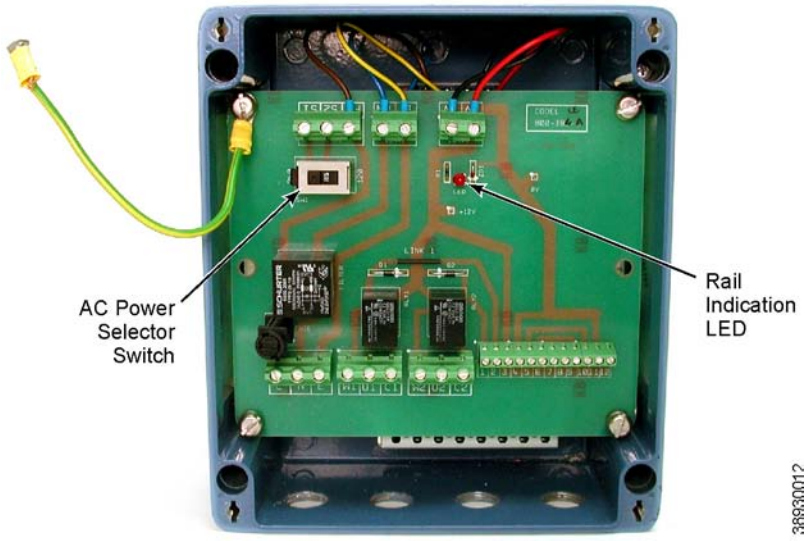
Disconnect and lock out power before connecting power to the analyzer.

POWER UP THE CCO 5500 ANALYZER

Use the following procedure to power up the CCO 5500 Analyzer.

1. Make sure that the voltage and frequency of the AC power supply match the required power specifications.
2. With the AC power supply locked out and tagged off, unscrew and remove the power supply unit cover.
3. Select the correct power supply voltage using the AC power selector switch shown in Figure 3-1.

Figure 3-1. Power Supply



4. Power up the CCO 5500 Analyzer and verify that the power supply rail indication LED (Figure 3-1) lights up.
5. Install and fasten the power supply unit cover.
6. Check that the LCD display is functioning at the control unit.

While the source unit is warming up, the LCD display will show WAITING FOR REFERENCE. When the source unit reaches an adequate temperature for the reference to be detected, the message STABILIZING REF will be displayed, along with the frequency and mark/space ratio. See Diagnostic Mode in Section 4, Operation for further details.

The reference frequency will take some time to stabilize (about 5 minutes from cold startup). When the reference frequency is within tolerance for 10 consecutive measurement cycles the instrument will automatically change to the OPERATING MODE. This is Mode 1 and is indicated by a number 1 appearing in the top left hand corner of the LCD display. The display will show a reading in ppm; this will not be an accurate reading until all configuration and startup procedures are completed.

Before conducting the alignment procedure allow 30 minutes for the source temperature to become stable.

ALIGNMENT

For the instrument to operate properly the source and receiver units must be aligned. A degree of optical redundancy is built-in; normal duct movements do not affect the operation of the instrument. Read and understand this entire procedure before starting the alignment.

1. See Figure 2-5. Unscrew the four screws that secure the receiver to the air purge. Remove and place the receiver in a safe location.
2. Go to the source unit location. To align the source turn the adjusting nuts (Figure 3-2). Use opposing adjusting nuts to align the source unit in one plane, then the other.

NOTE
Receiver alignment can be achieved by monitoring the output of the detector directly. Use a voltmeter set to AC volts (10V max.) to measure across test points S0V and S2 for D3, and S0V and S1 for D1 on the receiver control board (Figure 3-3). This alignment method is useful when the receiver is not located near the control unit.

Figure 3-2. Alignment Features

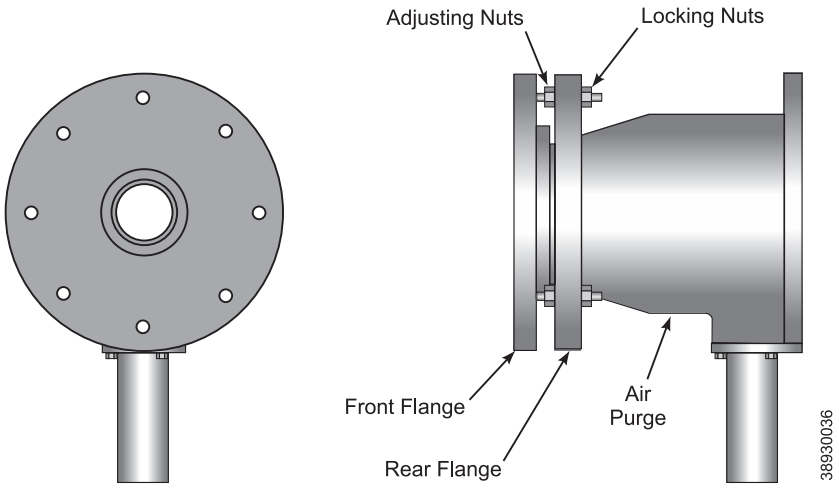
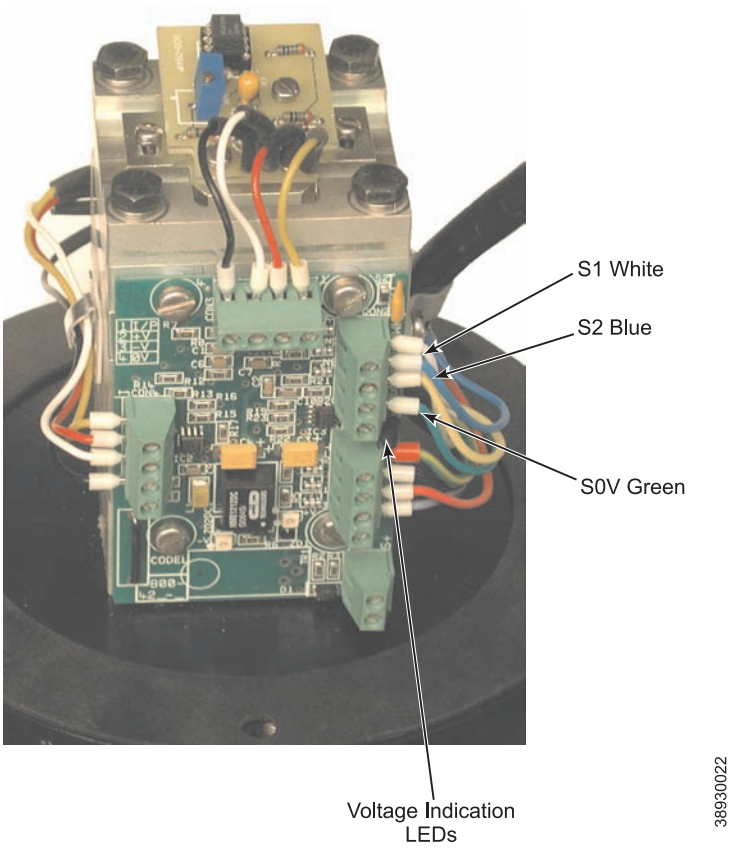


Figure 3-3. Receiver Test Points



3. Adjust the alignment until the bright red disc of the source is located centrally in the field of view when viewed from the receiver air purge. When the source unit is aligned, tighten the locking nuts.
4. Install and tighten the receiver on its air purge using the four screws removed in step 1.
5. At the control unit keypad press the MODE key four times to select the SET UP MODE (Mode 5). When (5 SET UP) is displayed on the LCD press ENTER to access the setup mode.

NOTE
A security code is used to prevent unauthorized alteration of settings. The default code set at the factory is 0000.

6. The keypad cursor will flash over the first digit of the security code. Use the arrow keys to select the desired value for this digit. Press ENTER to select the displayed value; the cursor will move to the second digit. Select the value for the second digit and press ENTER. Continue this process for each digit of the security code. When the fourth digit is correctly entered the processor will enter Mode 5.
7. When in Mode 5, select the Calibrate menu item using the keypad arrow keys; press ENTER to access the Calibrate menu.
8. Use the arrow keys to select the SET DETECTORS option; press ENTER. The D1 and D2 detector levels are displayed.

⚠CAUTION

If the analyzer is not in the SET UP MODE the gas cell at the source unit will periodically interrupt the IR beam and make alignment difficult.

9. Adjust the receiver alignment using the adjusting nuts, Figure 3-2. Adjust in one plane, then in the other. As a rule the D2 detector level will be affected to a greater extent by adjustment in one particular plane. The D1 detector level will be affected more by adjustment in the other plane.
10. If the displayed detector level is below 5000 increase the gain at the control unit to about 10,000. If the detector level is above 15,000 reduce the gain to 10,000. Refer to Detector Levels for details.
11. Make sure that the maximum possible values of both D1 and D2 are reached. After alignment is achieved, tighten the locking nuts.

NOTE
The alignment of the receiver unit is important. Make sure the maximum values of D1 and D2 are obtained.

12. To fine tune the alignment repeat adjustments of step 9 at the source unit. Again, observe the values of D1 and D2 as appropriate. Lock the source unit in place when the maximum values are achieved.
13. When the alignment is properly completed, there is rarely any need for further alignment adjustments.

DETECTOR LEVELS

The gain of the detector signals is set in two locations:

1. In the receiver two potentiometers set the gain. Refer to Receiver Gain Adjustment.
2. In the control unit trim potentiometers adjust the level of the D1 and D2 signals before they enter the microprocessor. Refer to Receiver Gain Adjustment.

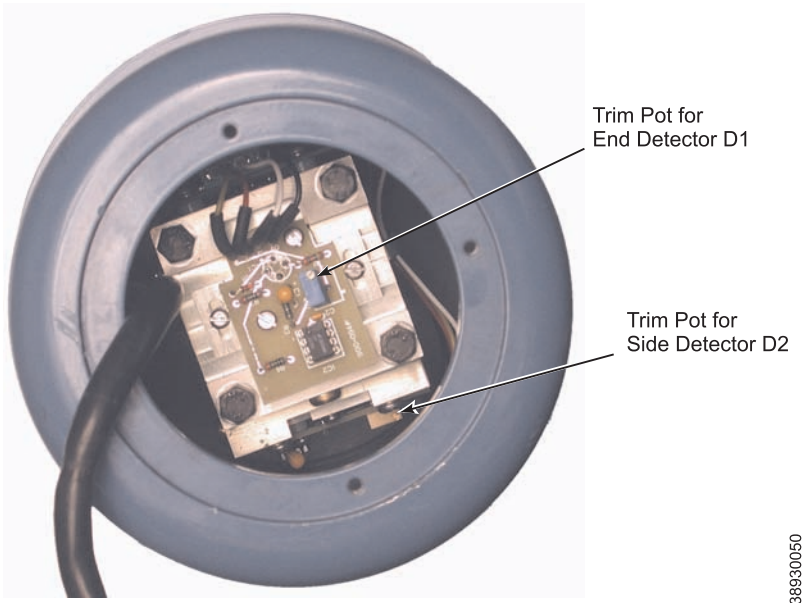
It is essential that the alignment procedure is properly conducted and a maximum detector signal obtained before attempting to optimize the detector levels.

Receiver Gain Adjustment

To give an optimum signal-to-noise ratio the detector levels must be maximized. For the best signal-to-noise ratio the gain of the detector signals in the receiver must be set to a maximum without saturating. The gains will have been set by Rosemount Analytical Inc. at a path length of 6.5 ft (2 m). If the path length is above 13 ft (4 m) or below 5 ft (1.5 m) adjustment may be necessary to optimize the detector levels.

1. Enter the Mode 5 ⇨ Calibrate ⇨ Set Detectors and display the value of D2/D1.
2. Unscrew and remove the receiver from its air purge.
3. Loosen the receiver cable gland so the receiver cable can slip when the window plate is removed.
4. Pull the window plate (Figure 3-4) from the receiver to access the detectors.
5. Trim potentiometer(s) set the gain. The gain levels are measured with an AC voltmeter.
6. Connect the voltmeter to the S0V and S1 test points. Increase the gain using the trim pot at the End Detector D2 until the voltage is a maximum of 4V rms.
7. Repeat step 6 for the Side Detector D1 measuring across the S0V and S2 test points.

Figure 3-4. Receiver Trim Pots



8. When the detector levels are satisfactory replace the cover.

NOTE
If the duct is operating and a high opacity may be in the path, reduce the set voltages to 2V rms maximum. This should prevent saturation should the opacity level drop off.

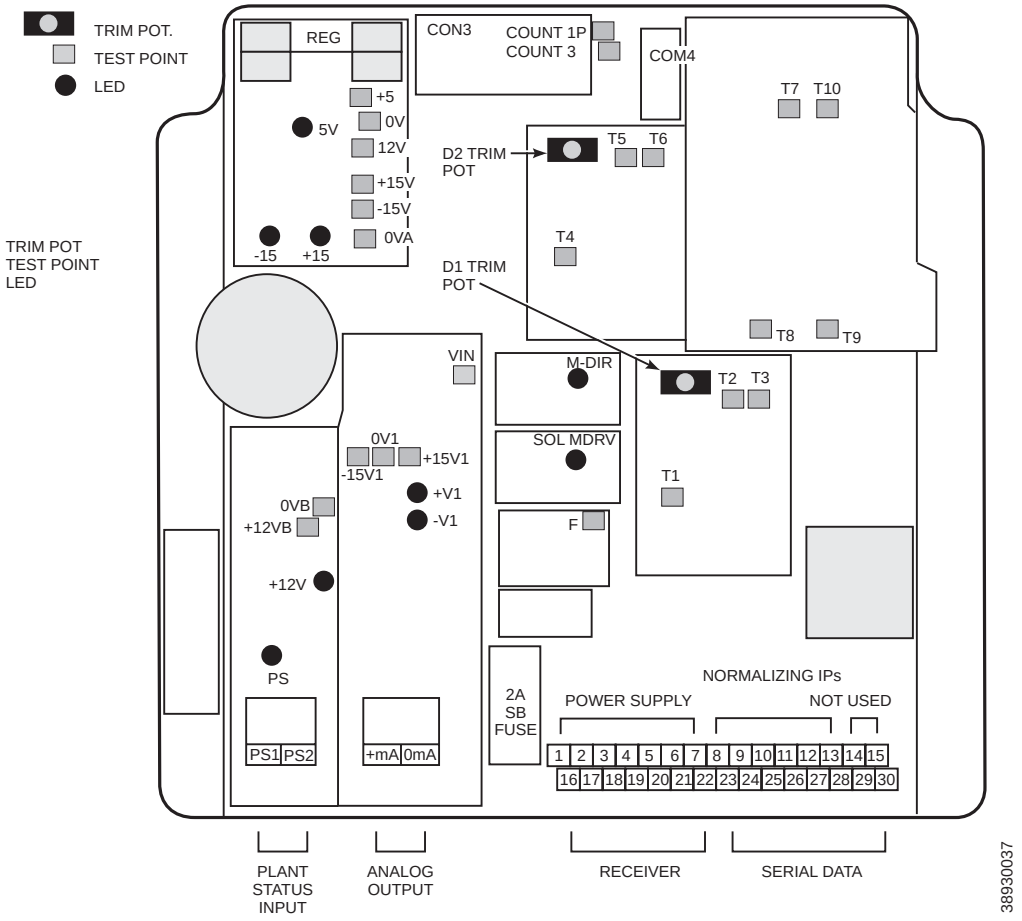
Control Unit Gain Adjustment

After the detector level(s) at the receiver are optimized the levels within the microprocessor should be adjusted. This adjustment is made with two trim potentiometers in the control unit.

1. Set the gain to a minimum by turning the D2 detector trim pot (Figure 3-5) fully clockwise. D2 is a 20-turn potentiometer.
2. Enter Mode 4 ⇨ Detector Outputs and display the values of D2 and D1. Turn the trim pot counterclockwise until the D2 level is between 12,000 and 15,000. Allow time between adjustments for the readings to settle.

NOTE
If the duct is operating and the opacity levels are high, reduce the D2 level to about 8,500. This should prevent saturation should the opacity level drop off.

Figure 3-5. Gain Adjust Potentiometers



3. To ensure that the detector signal is not saturating observe the saturation count signal displayed next to the detector levels. If a SAT # of more than 0 is displayed turn the trim pot slightly to reduce the gain. Reduce the gain until a SAT # of 0 is displayed.
4. Should saturation be indicated with the trim pot turned fully clockwise reduce the gain in the receiver and repeat the procedure.
5. Repeat steps 1 through 4 for the D1 level using the D1 trim pot.

NOTE
The circuits are designed so that wherever saturation occurs (receiver or control unit), it will always be detected by the microprocessor. If the displayed detector levels cannot be set to within this band, or saturation cannot be avoided, the detector levels should be optimized at the receiver. Refer to Receiver Gain Adjustment.

SOURCE ADJUSTMENTS

Two trim potentiometers within the source unit allow adjustments to be made to the intensity of the source and to the frequency of the chopper motor. These are set at the factory and rarely need adjustment. It is recommended that Rosemount Analytical Inc. be consulted before making any adjustments within the source unit.

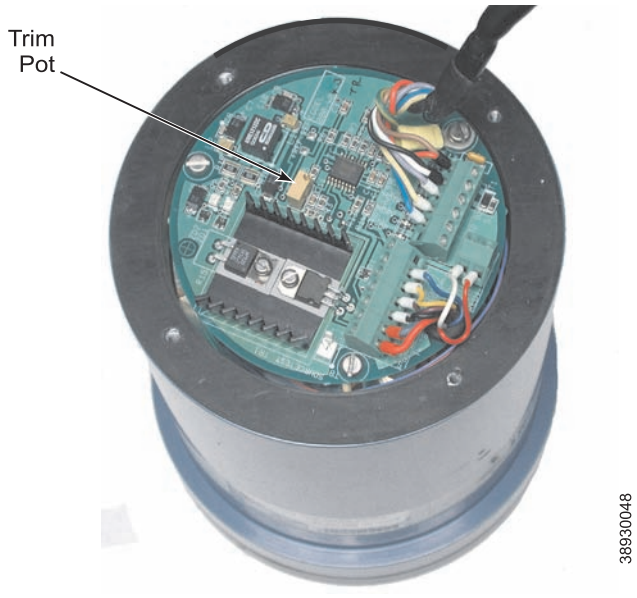
⚠CAUTION

Increasing source intensity may severely reduce the source life.

Source Intensity

1. Loosen and slide the source unit cable gland so the cable can slip when the rear cover plate is removed.
2. Unscrew and remove the rear cover plate.
3. A trim pot (Figure 3-6) allows adjustment to the intensity of the source. Turn the trim pot clockwise to increase the source intensity.

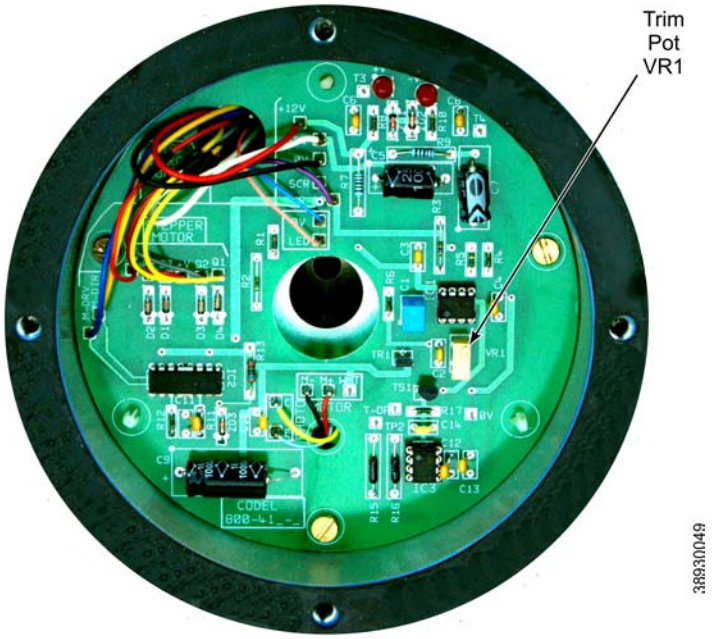
Figure 3-6. Source Intensity Trim Pot



Chopper Frequency

1. Unscrew and remove the source from the air purge.
2. Unscrew and pull the window plate from the front of the source unit.
3. See Figure 3-7. A trim pot (VR1) allows adjustments to be made to the frequency of the chopper motor.
4. To increase the chopper frequency turn the trim pot counterclockwise.

Figure 3-7. Chopper Frequency Trim Pot



SET UP MODE

To prevent any unauthorized changes the user must enter a four number security code before the setup mode can be entered.

Operating parameters must be set in the instrument for proper analyzer operation. All operating parameters are set within the control unit using the SET UP MODE. In the SET UP MODE parameters are held in non-volatile memory and retained in the event of a power loss.

Even if the measured data is not going to be normalized the normalizing parameters must be set to ensure proper analyzer operation.

NOTE
When the SET UP MODE is selected the instrument suspends monitor operations and the Data Valid LED goes dim. If no key is pressed within five seconds after selecting SET UP MODE the instrument control reverts to OPERATING MODE.

Section 4, Operation, lists all parameters in full. Basic details are given here for configuration purposes.

To aid configuration and to record any subsequent changes to the operating parameters it is recommended that Table 3-1. Instrument Settings, be completed to provide a record of the instrument setup.

Press the MODE key until the number 5 is displayed in the top left-hand corner. After the security code has been correctly entered there are six submodes of operation from which the set up parameters may be changed. These six submodes are:

1. Set Averages - The four averaging stack times (seconds, minutes, hours and days) may be set as required.
2. Configure O/P - Analog output setup - origin, units, span, rolling average and fault condition.
3. Parameters - The following are set from this mode: security code, identity number, path length, alarm level, cal factor and plant status.
4. Normalization - All normalization parameters may be set up from this mode.
5. Reset Average - Selecting this submode allows the four averaging stacks to be reset.
6. Calibrate - The outputs of the detectors and the basic calibration of the instrument can be set.

Use the ARROW keys to toggle between these six options and press ENTER when the desired option is displayed.

Security Code Entry

Once the display is as shown here press the ENTER key to gain access to the SET UP MODE. The cursor will now flash over the first digit of the security code number; select the required first digit with the arrow keys and press ENTER. Repeat this procedure for the remaining three numbers. If the code is correct after the ENTER key is pressed on the last digit then the sequence will be continued. If it is not correct the instrument will return to the OPERATING MODE. Refer to Parameters for further details.

5 SET UP MODE
Security # 0000

NOTE
The code number will be set to 0000 at the factory and should be changed by the user from within the SET UP MODE.

Set Averages

Four separate averages are calculated within the instrument. These are defined in units of seconds, minutes, hours and days. Any of the four averaging stacks can be used to provide the analog output of the instrument. Each averaging time can be set within predefined limits.

1. Press the ENTER key when this display is shown; the display will now show one of the averages. Use the ARROW keys to select the average time that requires changing and press the ENTER key to change it. The value can now be changed using the ARROW keys and confirmed by pressing the ENTER key.

5 SET AVERAGES

2. Set the seconds averaging stack to the required value. This is limited to within 10 to 60 seconds in 10-second intervals.

5 SET AVERAGES
secs 60

3. Set the minutes averaging stack to the required value. This is limited to within 1 to 60 minutes in 1-minute intervals.

5 SET AVERAGES
mins 60

4. Set the hours averaging stack to the required value. This is limited to within 1 to 24 hours in 1-hour intervals.

5 SET AVERAGES
hours 24

5. Set the days averaging stack to the required value. This is limited to within 1 to 30 days in 1-day intervals.

5 SET AVERAGES
days 30

Configure O/P

5 CONFIGURE O/P

The analog current loop output is set up from this mode. Press the ENTER key while this display is shown to access it then press the ARROW keys to step through the available options. Press the ENTER key to access and change the displayed parameters of each of the six available options listed below:

1. Output
2. Averages
3. Units
4. Set Span
5. Fault Condition
6. Set mA Output

Output

An origin of 0 or 4 mA can be set for the current loop output. The ARROW keys will toggle between these two options. Press the ENTER key to enter the new value.

5 CONFIGURE O/P
OUTPUT = 4 to 20mA

Average

Any of the four averaging stacks (seconds, minutes, hours and days) may be used for the analog output. They are selected by the ARROW keys and entered using the ENTER key.

5 CONFIGURE O/P	
Average	**0.1m**

Units

The analog output can represent the gas concentration in units of mg/m^3, mg/Nm^3 or vpm. The ARROW keys will toggle between these three options. Press the ENTER key to enter the new value.

5 CONFIGURE O/P	
Units	**mg/m3**

Set Span

Select the required span using the ARROW keys for each digit. The ENTER key is pressed to enter the value of each digit. The units will be displayed in vpm, mg/m^3 or mg/Nm^3, depending on what has been selected beforehand.

5 CONFIGURE O/P	
Span	**0000mg/m3**

NOTE
Once Set Span is selected the current value will be displayed for 1 second. The first digit of the display then defaults to zero; thus the span value must be re-entered for the unit to function correctly.

Fault Condition

Should a fault condition occur the current output of the instrument may be set to one of the following options:

5 CONFIGURE O/P	
Set MA	**O/P**

1. Set the output at 0 mA - ZERO.
2. Adjust the output to the calculated gas concentration even though a fault condition exists - MEAS.
3. Hold the last calculated gas concentration - HOLD.
4. Set the output to full scale (20 mA) - F.S.

One of these options can be selected by pressing the ARROW keys; when the desired option is displayed press the ENTER key to confirm.

Set mA Output

NOTE
This is set at the factory and should not be altered.

From this option the current levels of the analog output are set up. Press the ENTER key to select this parameter and the following Set Zero option appears.

5 CONFIGURE O/P	
Set Zero	**(007)**

With a calibrated current meter across the analog current loop terminals adjust the Set Zero value so the current meter level reads 0 mA. Nothing else should be connected to these terminals when the output is being set up. Adjust the Set Zero value using the two arrow keys until the reading on the current meter is 0 mA. Press the ENTER key when the correct output current is displayed on the ammeter.

NOTE
Zero mA should be set up no matter what has been selected as the base of the current output. This is factory set by Rosemount Analytical Inc.

Once the Set Zero value has been entered the following Set Span option appears.

5 CONFIGURE O/P	
Set Span	**(247)**

With a calibrated DC ammeter across the analog current loop terminals adjust the Set Span value so the current meter level reads 20 mA. Nothing else should be connected to these terminals when the output is being set up. Adjust the Set Span value using the two arrow keys until the reading on the current meter is 20 mA. Press the ENTER key when the correct output current is displayed on the ammeter.

Parameters

5 PARAMETERS

With this option displayed press ENTER to access the list of six available options. The ARROW keys will cycle through these options. When the option that requires changing is displayed press ENTER. When all required changes have been made select the EXIT option and press ENTER. The six available options are:

1. Security Number
2. Identity Number
3. Path Length
4. Alarm
5. Cal. Factor
6. Plant Status Input

Security Number

5 PARAMETERS	
Security #	**0000**

To prevent any unauthorized tampering with the set up information it is important that the security code be changed from the factory setting. Each digit is selected with the ENTER key and changed with the ARROW keys.

NOTE
It is important to make a note of this number otherwise it will not be possible to change the instrument set up.

Identity Number

5 PARAMETERS	
Identity #	**30**

If the system is being used as part of an integral monitoring system and the serial input and outputs are being used, the central processor requires a 'Device Identity' to identify each instrument. This number must be unique for each equipment item and can be set from 1 to 30 as required.

Path Length

NOTE
Once path length is selected the current value will be displayed for 1 second. The first value of the display then defaults to zero; therefore, the value must be re-entered to calculate the gas concentrations correctly.

The transmissivity of a sample of any gas depends both on the concentration and on the path length through which the radiation is transmitted. Similarly, the output of the CCO 5500 Analyzer gas monitor also depends on the path length of the flue gas through which the radiation is transmitted.

5 PARAMETERS	
Pathlength	**0000mm**

Refer to Points to Consider in Section 2, Installation.

The CCO 5500 Analyzer is sensitive to the product of concentration and path length. In order to obtain a true value of concentration of gas it is necessary to input the correct path length into the processor. This value is then used to produce a final value of gas concentration.

NOTE
The path length entered must represent the length of the actual gas pass not the flange to flange dimension between the source and receiver.

Alarm

A contact output is available to warn of a high gas concentration. This contact output may be triggered from any of the four averaging stacks. Select the source with the ARROW key and enter it with the ENTER key.

5 PARAMETERS	
Alarm source	**15m**

Select the units for the alarm; these may be different than the units selected for the analog output.

5 PARAMETERS	
Alarm	**mg/Nm3**

After the source has been selected the instrument requires a level that will trigger the output. Set the desired level with the ARROW keys.

5 PARAMETERS	
Alarm	**0000mg/Nm3**

Cal Factor

NOTE
First record the original cal factor before entering this mode as displayed in Mode 4 ⇨ Calibration Data. The Cal factor will be lost when this menu option is entered.

During the calibration routine the instrument calculates a 'Cal Factor' which sets the basic calibration of the instrument. This value may be changed from this mode.

5 PARAMETERS
Cal Factor

NOTE
Since this value controls the calibration of the instrument, only change if necessary.

Plant Status Input

Used to determine whether the plant is operating under correct conditions. If it is not, plant status will be OFF and the minutes, hours, and days averaging stacks will not be updated. If data is stored while the plant status is OFF diluted overall readings will be registered.

There is a choice of three controls for plant status: Logic Input, Serial Input and Multiple. Only one can be used to control plant status at any one time.

5 PARAMETERS
Plant Status I/P

- **Logic Input**

  If the PS1 and PS2 terminals are linked in the control unit the logic contact is made and the plant status is OFF. These terminals may be linked manually during a plant shut down, or they may be wired to a switch/contact outside the unit (e.g. a value that opens and closes the duct). Select this option by pressing ENTER when the Plant Status I/P ⇨ Logic Input option is displayed.

- **Serial Input**

  If this option is selected the criteria controlling plant status are transmitted via the serial data link. Select this option by pressing ENTER when the Plant Status I/P ⇨ Serial Input option is displayed.

- **Multiple**

  Five options are available here. Press ENTER when the Plant Status I/P ⇨ Multiple option is displayed and the first option ‘Temperature’ will be displayed. Use the arrow keys to toggle YES or NO. NO will mean that the temperature threshold is not used to determine plant status. If YES is selected the display will enter the display below. Configure the instrument for temperature threshold. Press ENTER when correctly configured and the display will move to the next option ‘Oxygen’. After the last option has been set the ‘Logic Input’ display will return to the PARAMETERS ⇨ Plant Status I/P option. Use the down arrow to scroll down to EXIT and press ENTER. The plant status is now fully configured.

  Plant status will only be OFF if all options selected are registering plant status OFF. If any one of them is not fulfilling plant status OFF conditions then the instrument will register plant status ON.

  - **Temperature**

    A value is set here for the temperature threshold. While the temperature (taken from the normalizing temperature) is above the threshold value, plant status is ON. If the temperature drops below the threshold plant status is OFF and only the seconds averaging stack will update.

5 Plant Status I/P	
Temp. th’d	**262^{o}F**

  - **Oxygen**

    Set and used in a similar manner to the temperature threshold. However, if the normalizing oxygen level rises above the threshold plant status is OFF. For plant status ON the oxygen level must be below the threshold.

- **Water Vapor**

  Set and used in a similar manner to the temperature threshold. If the normalizing water vapor level falls below the threshold plant status is OFF. For plant status ON the water vapor level must be above the threshold.

- **Detector Level**

  Set and used in a similar manner to the temperature threshold. However, if the detector level rises above the threshold plant status is OFF. For plant status ON the detector level must be below the threshold set. Only used for the NO_X analyzer.

- **Logic Input**

  Select YES or NO and press ENTER. For plant status to be ON the logic input (PS1 and PS2) must be open circuit; for plant status to be OFF the logic input must be closed circuit. After this option has been configured the menu will exit to the Multiple option. Use the down arrow to select EXIT and press ENTER.

Normalization

Press ENTER to access one of the four normalizing parameters listed below. Use the ARROW keys to cycle through the four options and press ENTER once the desired option is selected.

5 NORMALIZATION

1. Temperature
2. Oxygen
3. Pressure
4. Water Vapor

Once selected each of the above normalizing parameters have the same suboptions: Set Standard Levels and Set Values. Under set values are three more suboptions that determine how the instrument reads the data: Analog Input, Serial Input and Keypad Input.

Temperature

An analog input should always be used for temperature correction; this ensures that the flue gas temperature is being measured continuously and accurately. Connect the analog output of the temperature transducer into the Rosemount Analytical analyzer and select the analog input option. This value is used to normalize the gas concentration measurement and to correct for the effects of temperature on the IR absorption spectrum.

If the Keypad Input is used and the gas temperature is higher than 572^{o}F (300^{o}C), the compensation algorithm will become less precise and instrument accuracy will deteriorate accordingly. This is not recommended.

NOTE
If normalization is not required the instrument must hold the temperature of the gas in the duct using the Analog Input option.

Press ENTER with the temperature option selected to access Set Standard Levels and Set Values. Use the ARROW keys to toggle between these two options and Exit.

- **Set Standard Levels**

  Each normalizing parameter normalizes the measured gas concentration to standard conditions of temperature, oxygen, pressure and water vapor. These levels are set from within this option. Use the ARROW keys to change each displayed normalizing standard value.

  5 TEMP DegF
  std level = 000

- **Set Values**

  The normalizing data can be brought into the instrument in one of 3 ways:

  - **Analog Input**

    Using the 4-20 mA inputs within the processor to receive the measured transducer data. The values at 4 mA and at 20 mA will be requested should this option be selected.

    5 TEMP DegF
    Analog Input

  - **Serial Input**

    If an input unit is being used all normalizing data can be transmitted via the serial data line.

    5 TEMP DegF
    Serial Input

  - **Keypad Input**

    By entering a fixed value via the keypad. This is suitable where the value is stable to about ±5%.

    5 TEMP DegF
    Keypad Input

  With an integrated system the lead analyzer should have its normalizing parameters set to the 4-20 mA inputs. All the other analyzers must then be set to serial and the normalization parameters will be transmitted down the serial data highway.

Oxygen

To correct the data to standard levels of oxygen an estimate of the oxygen at the point of measurement is required. If the oxygen level is being continuously measured connect the analog output of the oxygen analyzer into the CCO 5500 Analyzer and select Analog Input. This input must be defined as either WET or DRY depending on how the measurement is made. After the wet or dry has been defined the Analog Input values need defining; set the 4 mA and 20 mA values. If the oxygen level is relatively constant through all firing conditions then a fixed keypad input may be used.

With an integrated system the oxygen data can be taken to the instrument via the serial data line.

NOTE
If normalization is not required the instrument must have the normalizing parameters for oxygen set.

Pressure

To correct the data to a standard pressure, normally 14.7 psi (101 kPa), the pressure at the point of measurement needs to be determined. If the flue pressure is relatively constant through all firing conditions then a fixed Keypad Input may be used. If the pressure is not constant it should be measured and brought into the instrument via the 4-20 mA Analog Input within the processor.

NOTE
If normalization is not required the instrument must have the normalizing parameters for pressure set to 14.7 psi (101 kPa)(Standard Level and Keypad Input).

With an integrated system the pressure data can be taken to the instrument via the serial data line.

Water Vapor

An across the duct monitor measures the gas concentration under wet conditions. Unlike a sampling system the gas has not been preconditioned in any way before the measurement is made.

When the water vapor is at a relatively fixed level set the standard level to DRY to normalize it to dry conditions. Use a fixed value in the keypad option representing the expected water vapor produced for the fuel type. If the measurement is not to be normalized for water vapor set the standard level to WET.

With an integrated system the water vapor data can be taken to the instrument via the serial data line.

Reset Averages

NOTE
Resetting averages will cause the rolling average data to be cleared from memory.

The average values that are currently held in the four averaging stacks can be reset using this option; this will erase the current average that is held in all of the averaging stacks. Select this option by pressing the ENTER key and using the ARROW keys. Confirmation is requested before the averages are reset.

5 RESET AVERAGES

NOTE
If this option is selected all data in the averaging stacks is reset and the data for as much as the last 30 days will be lost.

Calibrate

5 CALIBRATE

From this option the two detector levels may be displayed and a basic calibration conducted. While in this mode the gas cell is not moved; this gives an immediate response for setting up the detector levels. The basic calibration of the instrument is set by a Cal Factor that is calculated during a calibration routine. Press the ENTER key while this is displayed and the following options are available:

1. Set Detectors
2. Span Adjust
3. Calibrate

Set Detectors

5 D2 = 10534 # = 00000
D1 = 15000 # = 00000

Both the D1 and D2 levels can be displayed; saturation counts are also displayed. To give an immediate response to any alterations that are required the filters and gas cells are not moved during this operation.

Refer to Detector Levels for a discussion of the detector level and saturation count.

Span Adjust

NOTE
The Span Factor is initially set at the factory; do not adjust it unless the instrument sensitivity is suspected. In any case it is recommended that before adjustments are made the original value is recorded.

5 Val = 250 –> 250ppm
Span Factor 1000

Instrument sensitivity can be adjusted if a known concentration of measurement gas exists between the source and receiver units and instrument sensitivity is suspected. If a problem arises with this consult Rosemount Analytical Inc.

The Span Factor may need adjusting if new gas cells or filters have been fitted.

Calibrate

5 CALIBRATE
Calibrate

Re-enter the Mode 5 CALIBRATE menu and proceed to the calibrate option. The basic calibration of the instrument can be calculated from this routine. It is preferable to conduct this operation with the plant shut down to ensure a zero gas concentration within the duct. If this is not possible the instrument can calibrate to a known value of the gas concentration - the calibration target.

5 CALIBRATE
Target 0000ppm

Set the calibration target either to a known value of the gas concentration or to zero. Then set the desired number of cycles over which the calibration factor is determined (a minimum of 30 is recommended). The calibration should now be run and the display will show a count down during its execution. When the calibration is complete the new "Cal Factor" will be displayed for about 5 seconds and the instrument will exit the calibration routine.

5 CALIBRATE
Set # cycles = 30

5 cycle # 30
CAL IN PROGRESS

5 CAL COMPLETE
Cal FACT K = 9054

NOTE
The calibration routine must be run during commissioning otherwise the instrument will not be able to calculate the true level of gas within the duct.

Do not run the calibration routine unless reasonable conditions exist in the duct. If it is not the initial calibration, record the Cal Factor from the parameters option before running the calibration.

To aid configuration, and to record any subsequent changes to the operating parameters, Table 3-1 lists all of the options available and can be used as a record of the operating parameters.

Table 3-1. Instrument Settings

Parameter		Config.	
Averages	Seconds		
	Minutes		
	Hours		
	Days		
Output	0 or 4 mA base		
	Units		
	Average		
	Fault condition		
Parameters	Path length		
	Alarm source		
	Alarm units		
	Alarm levels		
Normalization	**Temperature**		
	Standard level ^{o}F (^{o}C)		
	I/P ^{o}F (^{o}C) @ 4 mA		
	I/P ^{o}F (^{o}C) @ 20 mA		
	Keypad input ^{o}C (not ideal)		
	Serial input		
	Oxygen		
	Standard level%		
	Wet or dry gas		
	I/P % @ 4 mA		
	I/P % @ 20 mA		
	Keypad input %		
	Serial input		
	Pressure		
	Standard level psi (kPa)		
	I/P psi (kPa) @ 4 mA		
	I/P psi (kPa) @ 20 mA		
	Keypad input		
	Serial input		
	Water vapor		
	Standard level (wet %/dry)		
	Keypad input %		
	Measured value		

After the calibration has been conducted a Cal Factor will be calculated; this determines the calibration of the instrument. The cal factor will be displayed for a few seconds after a calibration has been conducted and it can also be interrogated from Mode 4 (DIAGNOSTIC MODE). Enter the cal factor into the table below as a record of instrument operation.

Table 3-2. Calibration Data

Calibration Data		
Detector Outputs	**Factory**	**Config**
D2		
D1		
E1		
E2		
Calibration Data		
Cal factor		
Span factor		
Output Calibration		
Set zero		
Set span		

CURRENT OUTPUT CALIBRATION

NOTE
This is set at the factory and should not be altered.

The current output should now be set up using a calibrated millimeter set to DC current, 20 mA max. Conduct this procedure as follows:

1. Connect the millimeter to the output terminals within the control unit terminals +mA and -mA.
2. Enter Mode 5 ⇨ Configure Output ⇨ Fault Condition ⇨ Set Zero and adjust the level using the ARROW keys until 0mA is recorded. Record the value in brackets on the display in Table 3-2.
3. Enter the Mode 5 ⇨ Configure Output ⇨ Fault Condition ⇨ Set Span and adjust the level using the ARROW keys until 20 mA is recorded. Record the value in brackets on the display in Table 3-2.

Section 4 Operation

INTRODUCTION

After the CCO 5500 Analyzer has been configured it will measure the gas levels between the source and receiver and produce an output proportional to the gas levels. An integral 32-character LCD display also shows the calculated levels.

The CCO 5500 Analyzer allows the operator to interrogate the microprocessor to observe the system parameters and to change them if required.

A menu-based program is used and access is gained by the key panel mounted on the lid of the control unit (Figure 4-1).

Measurement

Once configuration has been completed the absorption of IR radiation is measured and a parameter 'Y' is calculated. Refer to Principles and Modes of Operation in Section 1, Description and Specifications. This value is used to produce a final concentration of gas that can be normalized to standard conditions and averaged over a time ranging from 10 seconds to 30 days.

The instrument computes four averages any of which can be used to drive the analog output, or displayed on the integral 32-character LCD.

Calibration

During the configuration procedure a calibration is conducted that sets the system gains to produce a zero or known gas level. Once the routine has been conducted the calibration of the instrument is fixed by precision filters which do not change.

STARTUP AND OPERATION

Power up the system and wait for 30 minutes. This allows time for the infrared source to heat up. Once the receiver is detecting a signal a reading will be seen on the control unit display. This should be in normal OPERATING MODE, Mode 1 (shown by a number 1 at the top left corner of the LCD); a reading in vpm, mg/m^3 or Nmg/m^3 will be shown. If this appears the system is functioning properly.

MODES OF OPERATION

The instrument has six modes of operation identified by a number in the top left corner of the display:

Mode 1 - Operating Mode
Displays average gas concentration.

Mode 2 - Parameters
Displays operating parameters.

Mode 3 - Normalization
Displays normalization data.

Mode 4 - Diagnostics
Investigates instrument operation. Self checks are continually made by the instrument; should a complication exist this mode will automatically be selected and the fault displayed on the display.

Mode 5 - Set Up Mode
Sets operating parameters. The opening parameters must be entered for the instrument to function correctly. This mode can only be accessed using a security code.

Mode 6 - Check Cell Mode
Used to verify the instruments' operation and calibration.

NOTE
The outputs of the instrument are unaffected by key operation in all modes except the SET UP MODE.

KEYPAD OPERATION

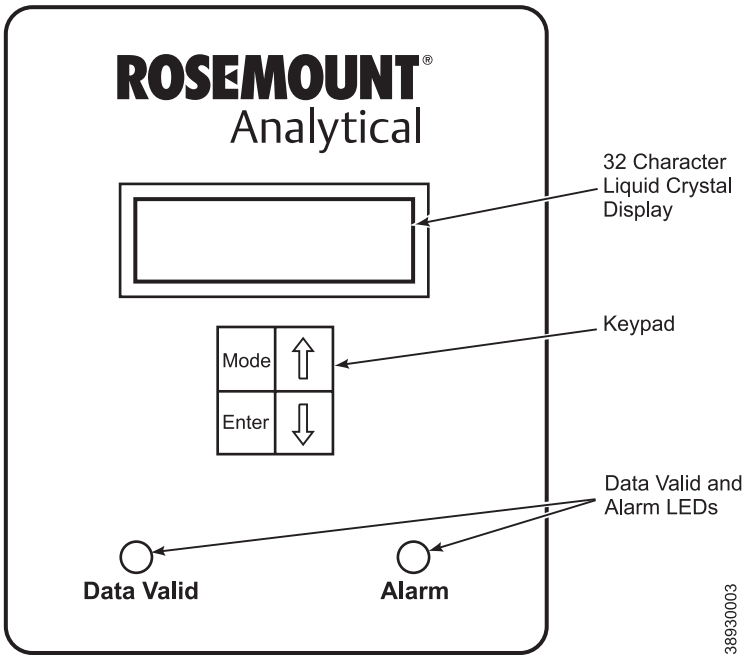
Each mode is accessed sequentially by each push of the MODE key. Figure 4-1 illustrates the display and keys of the control unit. After a mode has been selected the ARROW keys will select the various options within these modes. The ENTER key will input the displayed value and may step the cursor to the next option where applicable.

1. MODE Key. Pressing the MODE key will either take the instrument to the next mode of operation or back to the OPERATING MODE if pressed from within a mode.
2. ARROW Keys. Pressing the ARROW keys will do one of two things depending on the position in the program:
    - It will increase ↑ or decrease ↓the displayed value. If the key is held down it will scroll quickly to the desired value.
    - It will step through the available options within a mode or sub-mode.

3. ENTER Key. Pressing the ENTER key will do one of two things depending on the position in the program:
   - It will input the displayed parameter value.
   - It will select the displayed mode or option from within a mode or submode.

NOTE
Allow time for the instrument to respond to a key instruction otherwise a double key entry may be recorded.

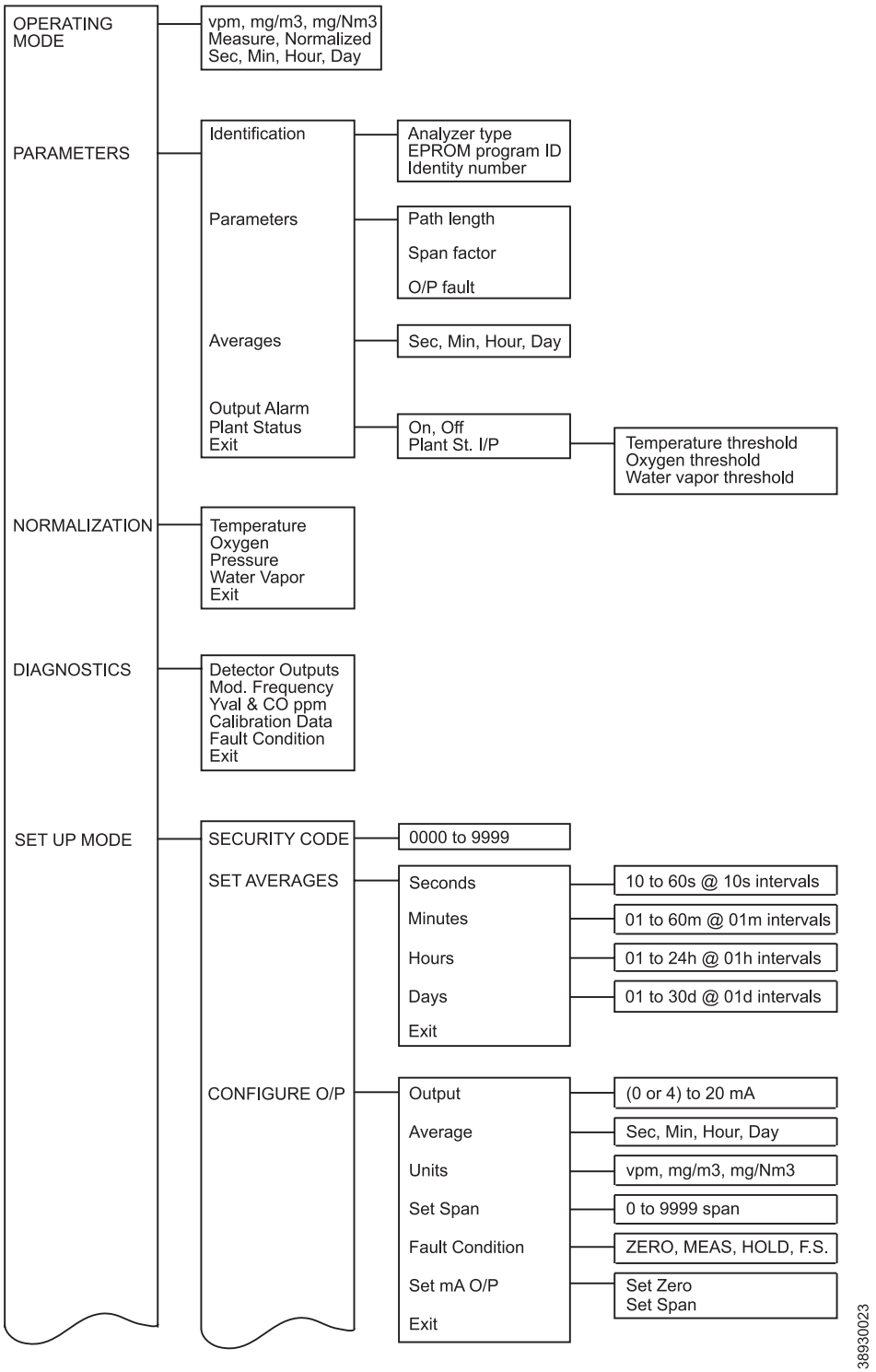
Figure 4-1. Control Unit Keypad



MENU TREE

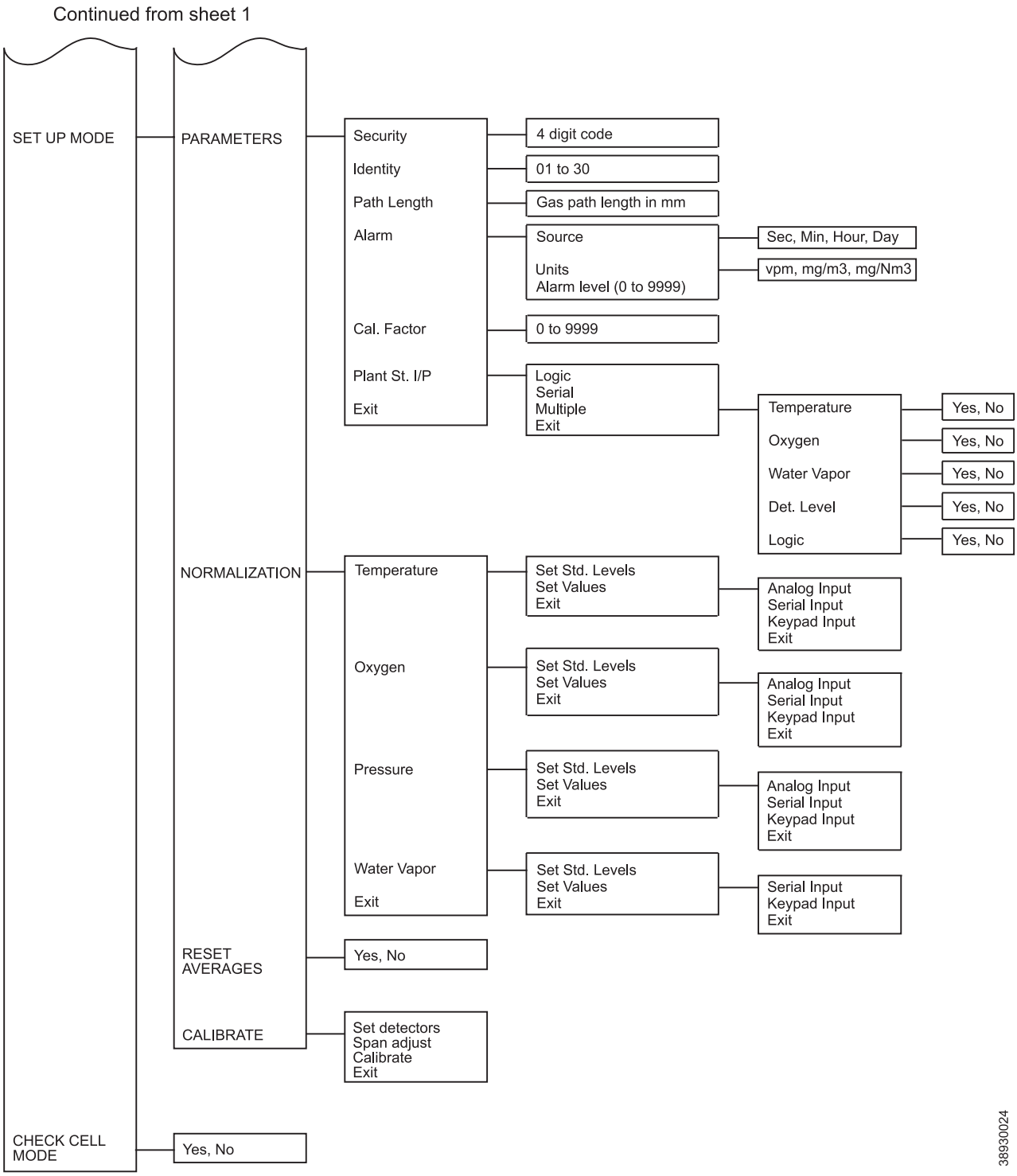
Figure 4-2 shows the arrangement of the CCO 5500 Analyzer menu tree.

Figure 4-2. CCO 5500 Analyzer Menu Tree (Sheet 1 of 2)



Continued on sheet 2

Figure 4-2. CCO 5500 Analyzer Menu Tree (Sheet 2 of 2)



OPERATING MODE

From this mode of operation the averaging time of the displayed gas concentration may be altered to one of the other averaging stacks and the measured/normalized gas measurements observed. When in this mode the display will appear similar to that shown below. If the display is not similar to this press the MODE key until number 1 appears in the top left corner of the display.

1 CO 0015mg/Nm3
Normalized Av03h

To change the data displayed press the ENTER key and a flashing cursor will appear at the beginning of the concentration units, i.e. vpm or mg/Nm^3. The ARROW keys will now change the highlighted parameter. Each push of the ENTER key will select another of the parameters in the following order:

1. Concentration Units - vpm, mg/m^3 (or mg/Nm^3).
2. Measured or Normalized display.
3. Averaging Time - seconds, minutes, hours or days.

Press the ENTER key when the cursor is flashing on the averaging time and the cursor will disappear from the display. The ENTER key may be pressed again if required to bring the cursor back onto the display.

PARAMETERS

In this mode the parameters set within the SET UP MODE may be examined but not changed. Press the MODE key until the number 2 appears in the top left corner of the display then press the ENTER key. The ARROW keys will now scroll through the available options; press the ENTER key to display one of the selected options below.

1. Identification
2. Parameters
3. Averages
4. Output Alarm
5. Plant Status

Press the ENTER key again to exit from each option.

Refer to SET UP MODE for further details of the display information and how to change the held parameters.

Identification

The analyzer type, identity number, and EPROM program ID are displayed from this option. Use the arrow keys to scroll between these options.

Parameters

The following parameters are displayed from this option selected using the ARROW keys:

1. Path Length - The path length currently used to calculate the gas concentration.
2. Span Factor - From the SET UP MODE ⇨ CALIBRATE option the sensitivity of the instrument can be adjusted. The Span Factor was initially set at the factory using known gas concentrations.
3. O/P (Output) Fault - Should a fault condition occur the analog output can be set from one of four options.

Averages

Selecting this option will display the times set for each of the four averaging stacks; seconds, minutes, hours, and days.

Output

The base, span and averaging of the analog output is displayed from this option.

Alarm

A changeover relay contact output is available to indicate a high gas concentration. The level at which this output is operated and the averaging stack from which the gas value is obtained, may be examined from this display.

Plant Status

When plant status is OFF the minutes, hours, and days averaging stacks do not update.

NOTE
When the plant status is OFF pollutant levels will be zero. It is NOT normally permitted to use plant OFF zero levels to reduce the recorded mean emitted pollutant levels.

This function may be used to ensure data is only collected when the plant is fully operational. There are three options that can be used to determine plant status ON or OFF; Logic Input, Serial Input and Multiple. Multiple has four options: Temperature threshold, Oxygen threshold, Water Vapor threshold and Logic Input. The plant status and its governing factor may be viewed from this display.

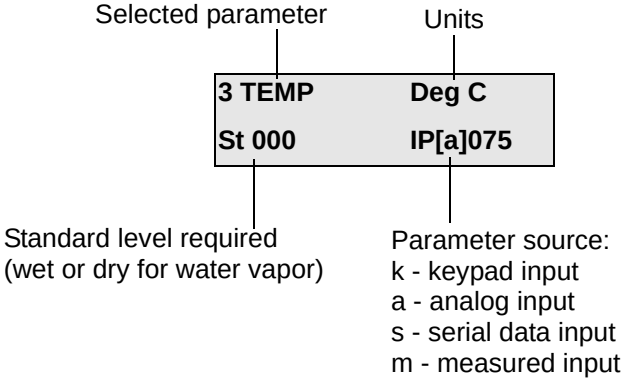
NORMALIZATION

Press the MODE key until the number 3 is seen in the top left corner of the display. From this mode the normalization parameters currently used can be displayed. Press the ENTER key to enter the routine and use the ARROW keys to select which of the normalizing parameters to display. Listed below are the four normalizing parameters accessible through this mode:

1. Temperature
2. Oxygen
3. Pressure
4. Water Vapor

When the required normalizing parameter is displayed press the ENTER key to display the normalization data. Press the ENTER key again to exit the parameter.

For each of the four normalizing parameters the display will appear similar to that shown below.



DIAGNOSTIC MODE

The detector levels, chopper blade frequency, 'Y' parameter and the fault condition may be examined from this mode. Press the MODE key until number 4 appears in the top left corner of the display and press ENTER to access this mode. Once in Diagnostics the five suboptions are as follows:

1. Detector Outputs
2. Modulation Frequency
3. Yval and CO ppm
4. Calibration Data
5. Fault Conditions

Detector Outputs

Detector levels from the detector are displayed here. D1 is the reference level and should always be less than D2. The level of D2 should be between 10,000 and 20,000.

E2 and E1 are the detector levels with the gas cell within the source unit in the sight path, and will be roughly 1/2 of the D2 and D1 levels. Smoothed detector values may also be displayed; these are noted as d1, d2, e1 and e2.

4 D2 = 18765E = 13453
D1 = 15464E = 10654

Sat.# indicates whether the detector signals are saturating within the micro-processor (this value should always be zero). If a number other than zero is displayed it indicates saturation and the detector gain should be adjusted. Refer to Detector Levels in Section 3, Configuration and Startup.

Phase is the time correction applied for the calculation of the detector levels. This will be between 0.1 and 5.9 milliseconds. This value is calculated by the instrument and may not be adjusted.

4 Sat. # = 00000
Phase = 3.5msec

Modulation (Chopper Motor) Frequency

The chopper blade should 'chop' the IR radiation at a frequency of about 37 Hz. This frequency is measured by the processor and can be displayed from this option.

4 ModFreq = 37.4 Hz
Mark/Space = 0.984

As the chopper blades interrupt the IR beam the radiation is split into two. Half the time the blade obscures the beam and half the time the beam radiates across the duct. The value of Mark/Space should be between 0.9 and 1.1 where:

Mark/Space = Time IR Beam Obscured/Time IR beam clear.

YVals and CO ppm

A parameter 'Y' determines the calculation of the gas concentration - refer to Principles of Cross-Duct Gas Analyzers in Section 1, Description and Specifications.

As a check on the program operation this parameter and the resulting raw gas calculation may be viewed here.

4 CO (0) = 3287ppm
CO (60) = 3289ppm

The term Yx is the second averaging stack's held value and the term Y(60) is the 60-second raw value from which all of the other averaging stacks are calculated. These gas values represent the raw gas data before averaging for the corresponding Y values. Also displayed by pressing the arrow keys are the Z values. These are adjusted Y values used to compensate for cross sensitivities in the measurement range.

4 Y = 6060 Yx = 6058
Y (60) = 6058

Calibration Data

The calibration factors, determined during the calibration routine (SCcal), and the value currently being used (SCwkg) can be examined from this display. Should the two values be different this indicates a change in instrument temperature between the time of calibration and the current temperature. Press one of the ARROW keys to examine the temperature information.

4 SCwkg 9877
SCcal 9865

Temperature has a small effect on the filter/gas cell characteristics compensated for by the instrument. Temperature measurement is made within the receiver.

4 Rx T^{o}F = 30.3
SCcal T^{o}F = 30.1

Fault Condition

To display the current fault condition press the ENTER key while this is displayed. This display mode is automatically selected by the instrument should a fault condition occur. The following fault conditions are recognized by the instrument:

4 Fault Status
Fault Condition

1. *ALL CLEAR* - No fault condition.
2. Det. Saturated - the detector level gain within either the receiver or the control unit is too high for the current duct conditions.
3. Low Det. Level - detector levels are too low (< 3,000).
4. Mod. Freq. O.R. - chopper motor frequency is out of range (< 30 Hz or >45 Hz).
5. Reference Fail. - no reference signal from the source unit.
6. Cal. Fact. O.R. - after the calibration routine the calculated Set Cal factor is out of range. Refer to Section 6, Troubleshooting.

By pressing the arrow key the previous fault condition can be observed.

4 Previous fault
Det. Saturated

NOTE
If a fault condition exists, the minutes, hours, and days averages will not be updated. Refer to Data Valid LED Out in Section 6, Troubleshooting.

SET UP MODE

To prevent any unauthorized changes the user must enter a four number security code before the mode can be entered.

Operating parameters must be set in the instrument for it to function correctly. All operating parameters are set within the control unit during the SET UP MODE where they are held in non-volatile memory and so retained in the event of a power loss.

Even if the measured data is not going to be normalized the normalizing parameters must be set for the instrument to function properly.

NOTE
After this mode has been selected the instrument will suspend its operation and the Data Valid LED will extinguish. If no key is pressed within 5 seconds after selection of this mode the CCO 5500 Analyzer will revert to the normal OPERATING MODE.

To aid configuration and to record any subsequent changes to the operating parameters it is recommended that Table 3-1, Instrument Settings, be completed to provide a record of the instrument setup.

Press the MODE key until the number 5 is displayed in the top left-hand corner. After the security code has been correctly entered there are six submodes of operation from which the setup parameters may be changed. These six submodes are listed below:

1. Set Averages - The four averaging stack times (seconds, minutes, hours and days) may be set as required.
2. Configure O/P - Analog output setup: origin, units, span, rolling average and fault condition.
3. Parameters - The following are set from this mode: security code, identity number, path length, alarm level, cal factor, and plant status.
4. Normalization - All normalization parameters may be set up from this mode.
5. Reset Average - Selecting this submode allows the four averaging stacks to be reset.
6. Calibrate - The outputs of the detectors and the basic calibration of the instrument can be set.

Use the ARROW keys to toggle between these six options and press ENTER when the desired option is displayed.

Security Code Entry

5 SET UP MODE
Security # 0000

Once the display is as shown here press the ENTER key to gain access to the SET UP MODE. The cursor will now flash over the first digit of the security code number; select the required first digit with the arrow keys and press ENTER. Repeat this procedure for the remaining three numbers. If the code is correct after the ENTER key is pressed on the last digit then the sequence will be continued. If it is not correct the instrument will return to the OPERATING MODE. Refer to Parameters for further details.

NOTE
The code number will be set to 0000 at the factory and should be changed by the user from within the SET UP MODE.

Set Averages

Four separate averages are calculated within the instrument. These are defined in units of seconds, minutes, hours, and days. Any of the four averaging stacks can be used to provide the analog output of the instrument. Each averaging time can be set within predefined limits.

1. Press the ENTER key when this display is shown; the display will now show one of the averages. Use the ARROW keys to select the average time that requires changing and press the ENTER key to change it. The value can now be changed using the ARROW keys and confirmed by pressing the ENTER key.

5 SET AVERAGES

2. Set the seconds averaging stack to the required value. This is limited to within 10 to 60 seconds in 10-second intervals.

5 SET AVERAGES
secs 60

3. Set the minutes averaging stack to the required value. This is limited to within 1 to 60 minutes in 1-minute intervals.

5 SET AVERAGES
mins 60

4. Set the hours averaging stack to the required value. This is limited to within 1 to 24 hours in 1-hour intervals.

5 SET AVERAGES
hours 24

5. Set the days averaging stack to the required value. This is limited to within 1 to 30 days in 1-day intervals.

5 SET AVERAGES
days 30

Configure O/P

The analog current loop output is set up from this mode. Press the ENTER key while this display is shown to access it then press the ARROW keys to step through the available options. Press the ENTER key to access and change the displayed parameters of each of the six available options listed:

5 CONFIGURE O/P

1. Output
2. Averages
3. Units
4. Set Span
5. Fault Condition
6. Set mA Output

Output

An origin of 0 or 4 mA can be set for the current loop output. The ARROW keys will toggle between these two options. Press the ENTER key to enter the new value.

5 CONFIGURE O/P
OUTPUT = 4 to 20mA

Average

Any of the four averaging stacks (seconds, minutes, hours and days) may be used for the analog output. They are selected by the ARROW keys and entered using the ENTER key.

5 CONFIGURE O/P	
Average	**0.1m**

Units

The analog output can represent the gas concentration in units of mg/m^3, mg/Nm^3 or vpm. The ARROW keys will toggle between these three options. Press the ENTER key to enter the new value.

5 CONFIGURE O/P	
Units	**mg/m3**

Set Span

Select the required span using the ARROW keys for each digit. The ENTER key is pressed to enter the value of each digit. The units will be displayed in vpm, mg/m^3 or mg/Nm^3, depending on what has been selected beforehand.

5 CONFIGURE O/P	
Span	**0000mg/m3**

NOTE
Once Set Span is selected the current value will be displayed for 1 second. The first digit of the display then defaults to zero; thus the span value must be re-entered for the unit to function correctly.

Fault Condition

Should a fault condition occur the current output of the instrument may be set to one of the following options:

5 CONFIGURE O/P	
Fault cond	**ZERO**

1. Set the output at 0 mA - ZERO.
2. Adjust the output to the calculated gas concentration even though a fault condition exists - MEAS.
3. Hold the last calculated gas concentration - HOLD.
4. Set the output to full scale (20 mA) - F.S.

One of these options can be selected by pressing the ARROW keys; when the desired option is displayed press the ENTER key to confirm.

Set mA Output

NOTE
This is set at the factory and should not be altered without due consideration.

From this option the current levels of the analog output are set up. Press the ENTER key to select this parameter and the following Set Zero option appears.

5 CONFIGURE O/P	
Set Zero	**(007)**

With a calibrated current meter across the analog current loop terminals adjust the Set Zero value so the current meter level reads 0 mA. Nothing else should be connected to these terminals when the output is being set up. Adjust the Set Zero value using the two arrow keys until the reading on the current meter is 0 mA. Press the ENTER key when the correct output current is displayed on the ammeter.

NOTE
Zero mA should be set up no matter what has been selected as the base of the current output. This is factory set by Rosemount Analytical.

Once the Set Zero value has been entered the following Set Span option appears. In a similar manner to the above the Set Span value should be adjusted so the calibrated current meter reads 20 mA.

5 CONFIGURE O/P	
Set Span	**(247)**

Parameters

With this option displayed press ENTER to access the list of six available options. The ARROW keys will cycle through these options. When the option that requires changing is displayed press ENTER. When all required changes have been made select the EXIT option and press ENTER. The six available options are:

5 PARAMETERS

1. Security Number
2. Identity Number
3. Path Length
4. Alarm
5. Cal. Factor
6. Plant Status Input

Security Number

To prevent any unauthorized tampering with the set up information it is important that the security code be changed from the factory setting. Each digit is selected with the ENTER key and changed with the ARROW keys.

5 PARAMETERS	
Security #	**0000**

NOTE
It is important to make a note of this number otherwise it will not be possible to change the instrument set up.

Identity Number

If the system is being used as part of an integral monitoring system and the serial input and outputs are being used, the central processor requires a 'Device Identity' to identify each instrument. This number must be unique for each equipment item and can be set from 1 to 30 as required.

5 PARAMETERS	
Identity #	**30**

Path Length

NOTE
Once path length is selected the current value will be displayed for 1 second. The first value of the display then defaults to zero; therefore the value must be re-entered to calculate the gas concentrations correctly.

5 PARAMETERS
Pathlength 0000mm

The transmissivity of a sample of any gas depends both on the concentration and on the path length through which the radiation is transmitted. Similarly, the output of the CCO 5500 Analyzer gas monitor also depends on the path length of the flue gas through which the radiation is transmitted.

Refer to Points to Consider in Section 2, Installation.

The CCO 5500 Analyzer is sensitive to the product of concentration and path length. In order to obtain a true value of concentration of gas it is necessary to input the correct path length into the processor. This value is then used to produce a final value of gas concentration.

NOTE
The path length entered must represent the length of the actual gas pass not the flange to flange dimension between the source and receiver.

Alarm

A contact output is available to warn of a high gas concentration. This contact output may be triggered from any of the four averaging stacks. Select the source with the ARROW key and enter it with the ENTER key.

5 PARAMETERS
Alarm source 15m

Select the units for the alarm; these may be different to the units selected for the analog output.

5 PARAMETERS
Alarm mg/Nm3

After the source has been selected the instrument requires a level that the output will be triggered. Set the desired level with the ARROW keys.

5 PARAMETERS
Alarm 0000mg/Nm3

Cal Factor

NOTE
Do not enter this mode without first recording the original cal factor as displayed in Mode 4. Refer to Calibration Data. The Cal factor will be lost when this menu option is entered.

During the calibration routine the instrument calculates a 'Cal Factor' which sets the basic calibration of the instrument. This value may be changed from this mode.

5 PARAMETERS
Cal Factor

NOTE
Since this value controls the calibration of the instrument, only change if necessary.

Plant Status Input

Used to determine whether the plant is operating under correct conditions. If it is not, plant status will be OFF and the minutes, hours, and days averaging stacks will not be updated. If data is stored while the plant status is OFF diluted overall readings will be registered.

5 PARAMETERS

Plant Status I/P

There is a choice of three controls for plant status: Logic Input, Serial Input, and Multiple. Only one can be used to control plant status at any one time. Multiple input has five options that may be configured for plant status: Temperature, Oxygen, Water Vapor, Detector Level, and Logic Input. Any or all of these may be used to determine plant status.

- **Logic Input**

  If the PS1 and PS2 terminals are linked in the control unit the logic contact is made and the plant status is OFF. These terminals may be linked manually during a plant shut down or they may be wired to a switch/contact outside the unit (e.g. a value that opens and closes the duct). Select this option by pressing ENTER when the Plant Status I/P ⇨ Logic Input option is displayed.

- **Serial Input**

  If this option is selected the criteria controlling plant status is transmitted via the serial data link. Select this option by pressing ENTER when the Plant Status I/P ⇨ Serial Input option is displayed.

- **Multiple**

  Five options are available here. Press ENTER when the Plant Status I/P ⇨ Multiple option is displayed and the first option ‘Temperature’ will be displayed. Use the arrow keys to toggle YES or NO. NO will mean that the temperature threshold is not used to determine plant status. If YES is selected a temperature threshold configuration display will appear. Configure the instrument for temperature threshold. Press ENTER when configured; the next option ‘Oxygen’ will appear. After the last option (Logic Input) has been set the ‘Multiple’ option will appear. Use the down arrow to scroll down to ‘EXIT’ and press ENTER. The plant status is now fully configured.

  Plant status will only be OFF if all options selected are registering plant status OFF. If any one of them is not fulfilling plant status OFF conditions then the instrument will register plant status ON.

- **Temperature**

  A value is set here for the temperature threshold. While the temperature (taken from the normalizing temperature) is above the threshold value plant status is ON. If the temperature drops below the threshold plant status is OFF and only the seconds averaging stack will update.

5 Plant Status I/P	
Temp. th'd	**262°F**

- **Oxygen**

  Set and used in a similar manner to the temperature threshold. However, if the normalizing oxygen level rises above the threshold, plant status is OFF. For plant status ON the oxygen level must be below the threshold.

- **Water Vapor**

  Set and used in a similar manner to the temperature threshold. If the normalizing water vapor level falls below the threshold plant status is OFF. For plant status ON the water vapor level must be above the threshold.

- **Detector Level**

  Set and used in a similar manner to the temperature threshold. However, if the detector level rises above the threshold plant status is OFF. For plant status ON the detector level must be below the threshold set. Only used for the NO_x analyzer.

- **Logic Input**

  Select YES or NO and press ENTER. For plant status to be ON the logic input (PS1 and PS2) must be open circuit; for plant status to be OFF the logic input must be closed circuit. After this option has been configured the menu will exit to the Multiple option. Use the down arrow to select EXIT and press ENTER.

Normalization

Press ENTER to access one of the four normalizing parameters listed below. Use the ARROW keys to cycle through the four options and press ENTER once the desired option is selected.

5 NORMALIZATION

1. Temperature
2. Oxygen
3. Pressure
4. Water Vapor

Once selected each of the above normalizing parameters have the same suboptions: Set Standard Levels and Set Values. Under set values are three more suboptions that determine how the instrument reads the data: Analog Input, Serial Input and Keypad Input.

Temperature

An analog input should always be used for temperature correction; this ensures that the flue gas temperature is being measured continuously and accurately. Connect the analog output of the temperature transducer into the Rosemount Analytical analyzer and select the analog input option. This value is used to normalize the gas concentration measurement and to correct for the effects of temperature on the IR absorption spectrum.

If the Keypad Input is used and the gas temperature is higher than 572^{o}F (300^{o}C), the compensation algorithm will become less precise and instrument accuracy will deteriorate accordingly. This is not recommended.

NOTE
If normalization is not required the instrument must hold the temperature of the gas in the duct using the Analog Input option.

Press ENTER with the temperature option selected to access Set Standard Levels, and Set Values. Use the ARROW keys to toggle between these two options and EXIT.

- **Set Standard Levels**

  Each normalizing parameter normalizes the measured gas concentration to standard conditions of temperature, oxygen, pressure and water vapor. These levels are set from within this option. Use the ARROW keys to change each displayed normalizing standard value.

  5 TEMP DegF
  std level = 000

- **Set Values**

  The normalizing data can be brought into the instrument in one of 3 ways:

  - **Analog Input**

    Using the 4-20 mA inputs within the processor to receive the measured transducer data. The values at 4 mA and at 20 mA will be requested should this option be selected.

    5 TEMP DegF
    Analog Input

  - **Serial Input**

    If an input unit is being used all normalizing data can be transmitted via the serial data line.

    5 TEMP DegF
    Serial Input

  - **Keypad Input**

    Entering a fixed value via the keypad is suitable where the value is stable to about ±5%.

    5 TEMP DegF
    Keypad Input

  With an integrated system the lead analyzer should have its normalizing parameters set to the 4-20 mA inputs. All the other analyzers must then be set to serial and the normalization parameters will be transmitted down the serial data highway.

Oxygen

To correct the data to standard levels of oxygen an estimate of the oxygen at the point of measurement is required. If the oxygen level is being continuously measured connect the analog output of the oxygen analyzer into the CCO 5500 Analyzer, and select Analog Input. This input must be defined as either WET or DRY depending on how the measurement is made. After the wet or dry has been defined the Analog Input values need defining. Set the 4 mA and 20 mA values. If the oxygen level is relatively constant through all firing conditions then a fixed keypad input may be used.

With an integrated system the oxygen data can be taken to the instrument via the serial data line.

NOTE
If normalization is not required the instrument must have the normalizing parameters for oxygen set.

Pressure

To correct the data to a standard pressure, normally 14.65 psi (101 kPa), the pressure at the point of measurement needs to be determined. If the flue pressure is relatively constant through all firing conditions then a fixed Keypad Input may be used. If the pressure is not constant it should be measured and brought into the instrument via the 4-20 mA Analog Input within the processor.

NOTE
If normalization is not required the instrument must have the normalizing parameters for pressure set to 14.65 psi (101 kPa)(Standard Level and Keypad Input).

With an integrated system the pressure data can be taken to the instrument via the serial data line.

Water Vapor

An across the duct monitor measures the gas concentration under wet conditions. Unlike a sampling system the gas has not been preconditioned in any way before the measurement is made.

When the water vapor present is of a known and relatively fixed level set the standard level to DRY to normalize it to dry conditions. Use a fixed value in the keypad option representing the expected water vapor produced for the fuel type. If the measurement is not to be normalized for water vapor set the standard level to WET.

With an integrated system the water vapor data can be taken to the instrument via the serial data line.

Reset Averages

NOTE
Resetting averages will cause the rolling average data to be cleared from memory.

The average values that are currently held in the four averaging stacks can be reset using this option; this will erase the current average that is held in all of the averaging stacks. Select this option by pressing the ENTER key and using the ARROW keys. Confirmation is requested before the averages are reset.

5 RESET AVERAGES

NOTE
If this option is selected all data in the averaging stacks is reset and the data for as much as the last 30 days will be lost.

Calibrate

From this option the two detector levels may be displayed and a basic calibration conducted. While in this mode the gas cell is not moved; this gives an immediate response for setting up the detector levels. The basic calibration of the instrument is set by a Cal Factor that is calculated during a calibration routine. Press the ENTER key while this is displayed and the following options are available:

5 CALIBRATE

1. Set Detectors
2. Span Adjust
3. Calibrate

Set Detectors

Both the D1 and D2 levels can be displayed; saturation counts are also displayed. To give an immediate response to any alterations that are required the filters and gas cells are not moved during this operation.

5 D2 = 10534 # = 00000
D1 = 15000 # = 00000

Refer to Detector Levels in Section 3, Configuration and Startup, for a discussion of the detector level and saturation count.

Span Adjust

NOTE
The Span Factor is initially set at the factory; do not adjust it unless the instrument sensitivity is suspected. It is recommended that before adjustments are made the original value is recorded.

Instrument sensitivity can be adjusted if a known concentration of measurement gas exists between the source and receiver units and instrument sensitivity is suspected. If a problem arises with this consult Rosemount Analytical Inc.

5 Val = 250 –> 250ppm
Span Factor 1000

The Span Factor may need adjusting if new gas cells or filters have been fitted.

Calibrate

Re-enter Mode 5 CALIBRATE menu and proceed to the calibrate option. The basic calibration of the instrument can be calculated from this routine. It is preferable to conduct this operation with the plant shut down to ensure a zero gas concentration within the duct. If this is not possible the instrument can calibrate to a known value of the gas concentration referred to as the calibration target.

5 CALIBRATE
Calibrate

Set the calibration target either to a known value of the gas concentration or to zero. Then, set the desired number of cycles over which the calibration factor is determined (a minimum of 30 is recommended). The calibration should now be run and the display will show a count down during its execution. When the calibration is complete the new "Cal Factor" will be displayed for about 5 seconds and the instrument will exit the calibration routine.

5 CALIBRATE
Target 0000ppm

5 CALIBRATE
Set # cycles = 30

5 cycle # 30
CAL IN PROGRESS

5 CAL COMPLETE
Cal FACT K = 9054

NOTE
The calibration routine must be run during commissioning otherwise the instrument will not be able to calculate the true level of gas within the duct.

Do not run the calibration routine unless reasonable conditions exist in the duct. If it is not the initial calibration record the Cal Factor from the parameters option before running the calibration.

To aid configuration and to record any subsequent changes to the operating parameters, Table 3-1 lists all of the options available and can be used as a record of the operating parameters.

CHECK CELL MODE

This mode is for use with a Rosemount Analytical check cell. It verifies the calibration and operation of the analyzer. For details of its use refer to “Notes for Using a Rosemount Analytical Check Cell” on page 4-21.

Press the ENTER key on viewing this display if the CHECK CELL MODE is required. Use the ARROW keys to toggle the display to YES and press the ENTER key again.

6 Ch’k Cell Mode

The CHECK CELL MODE is now selected. Note that the display will default back to Mode 1 if YES is not selected within 5 seconds.

6 Ch’k Cell Mode
YES

The check cell must not be inserted before this option is accessed. Refer to Notes for Using a Rosemount Analytical Check Cell.

6 CO = 0060ppm
CO = 0121ppm.m

SHUTDOWN PROCEDURE

The system should not need shutting down unless maintenance is being carried out. In this case power down the power supply (and thus the control unit and analyzer heads). Close the manually operated isolating valves on the analyzer heads and proceed with service. When completed open the valves and power up the system. The system may need a calibration performed depending on the type of maintenance carried out. For details refer to Section 6, Troubleshooting.

ROUTINE CHECKS

Notes for Using a Rosemount Analytical Check Cell

The check cell and holder are optional items available from Rosemount Analytical Inc. The Rosemount Analytical check cell has been designed to verify the reading of Rosemount Analytical cross duct analyzers. When placed within the measurement path a known increase in gas concentration can be generated.

NOTE
The check cell should be placed at the receiver side.

Measurement Conditions

For absolute verification it is necessary to conduct a check on the instrument when there is no measurement gas present. If a background concentration of measurement gas is present an increase will still be generated, but the net effect will be complex.

Mode 6

This mode of the analyzer is used in conjunction with a check cell to verify the calibration and operation of the monitor.

The ideal time to perform a check cell test is with the plant off, auto zero condition on, and the analyzer well stabilized at zero. Do not insert the check cell in any other mode than Mode 6.

The rolling averages of the analyzer will not update while in Mode 6.

Check Cell Procedure

1. Enter Mode 6 on the control unit before inserting the check cell into the analyzer. Press ENTER when Mode 6 is displayed.
2. Use an ARROW key to toggle from NO to YES and press the ENTER key to access the check cell function. If this is not selected within 5 seconds the instrument returns to the normal OPERATING MODE.
3. When this option is seen the check cell must be inserted observing the procedure outlined below.

6 Ch'k Cell Mode
YES

4. Remove the two screws retaining the cover on the check cell holder (Figure 4-3).
5. Insert the check cell into the check cell holder and replace and tighten the screws. The cell can be inserted in either direction. Refer to Figure 4-4.
6. Introducing the check cell may cause an initial major disturbance to the instrument operation.
7. Wait for the instrument reading to settle (5 to 10 minutes) and record the gas measurement with the cell in position.
8. Remove the check cell and wait for the analyzer to return to zero (another 5 to 10 minutes).
9. Replace the cover on the check cell holder and press the MODE key on the control unit. The instrument now returns to OPERATING MODE.

Figure 4-3. Check Cell Holder

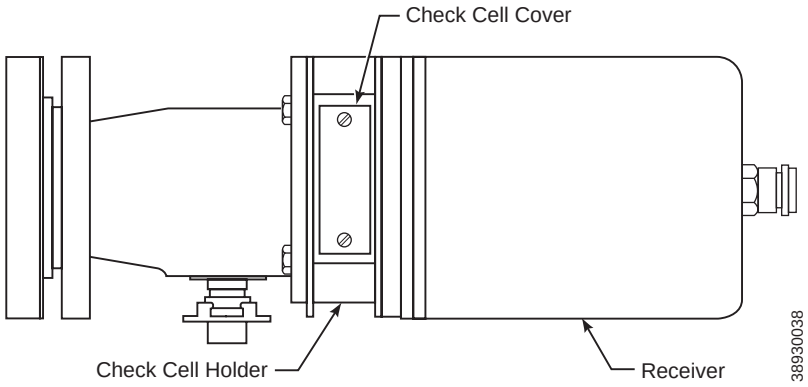
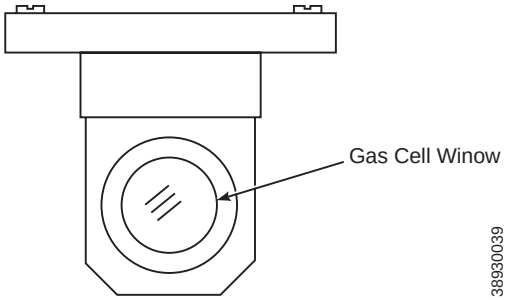


Figure 4-4. Check Cell



10. This test can be done with the plant on line but any pollutant gas present (it will probably be residing at a different temperature) will interfere with the check cell value.

NOTE
Do not insert the check cell in any other mode as this will influence the recorded rolling averages.

The calibration of the CCO 5500 Analyzer is fixed at the point of manufacture. If gross errors exist this could suggest an instrument malfunction. If minor errors are observed, please check the procedure and if necessary, return the gas cell for recertification.

Alarms and Emergency Conditions

The alarm thresholds for the system are set as described in the normal OPERATING MODE. When an alarm condition is obtained the red LED on the control unit will light up. This will go out when the alarm condition has cleared. When the condition has cleared the fact that an alarm condition occurred will be recorded by the software. The 4 to 20 mA output from the analyzer will also alter according to the pollution levels detected.

Emergency Shutdown Procedure

The same as normal shutdown. Remove power from the power supply and the whole system will close down. Close the isolating valves if required and stop the flow of air to the air purges.

Isolation Procedure

Shut down power to the power supply. Shut off compressed air to the air purges and close the isolating valves.

Section 5 Maintenance

PREVENTIVE MAINTENANCE

The equipment is designed to keep maintenance to an absolute minimum.

Cleaning Windows

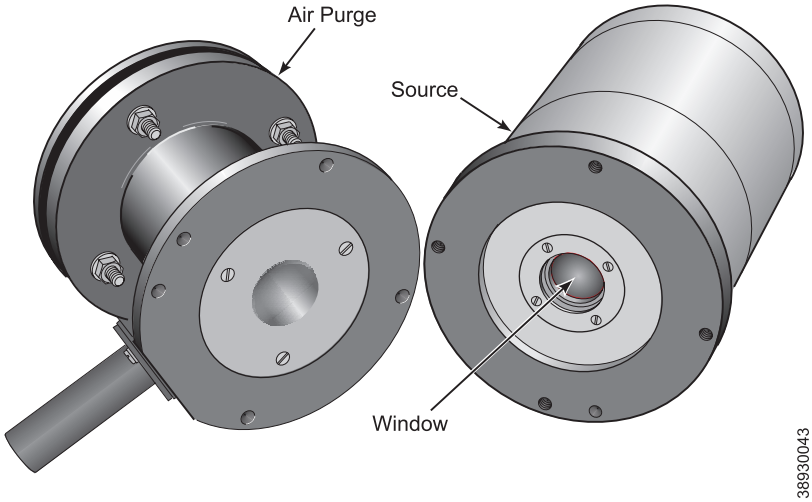
It is important that the optical windows of both the source and receiver are kept reasonably clean. Any mounting tubes should be free from build-up of dust and fly ash. The optical window (Figure 5-1) should be cleaned every six months and more frequently for dirty processes.

⚠WARNING

Great care must be taken when removing the CCO 5500 Analyzer from a positive pressure stack or duct. The source may be very hot and there may be dangerous vapors present. Observe all required safety practices.

1. Unbolt and remove the source and receiver from their air purges.
2. Wipe the windows with a soft dry cloth.

Figure 5-1. Optical Window



CORRECTIVE MAINTENANCE

The following maintenance procedures describe the necessary steps for removing and replacing failed elements of the CCO 5500 Analyzer.

⚠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.

Replacement of the Heater Element

The heater element has a finite life and at some stage will have to be replaced. The unit is designed to give a minimum of two years continuous operation and can be replaced on site when necessary.

Replace a failed heater element according to the following procedure:

1. Shut down and lock out power to the CCO 5500 Analyzer.
2. Unbolt and remove the source unit from the air purge.
3. Loosen the source unit cable gland (Figure 5-2) so the cable can slip when the rear cover plate is removed.
4. Unscrew and remove the rear cover plate.
5. Unscrew and remove the circuit board (Figure 5-3).

Figure 5-2. Source Rear Cover Plate

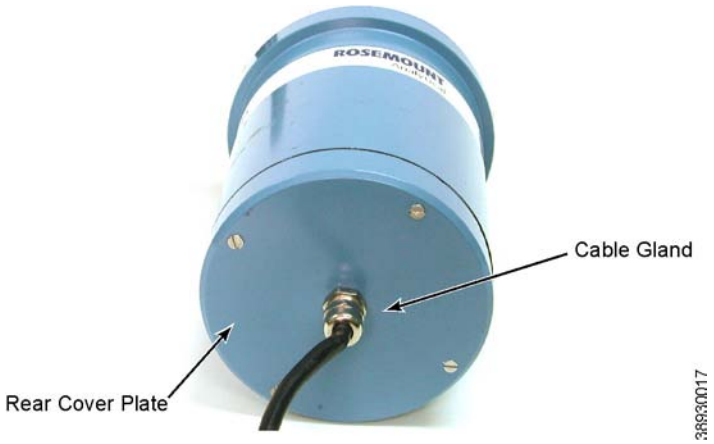


Figure 5-3. Source Unit Circuit Board

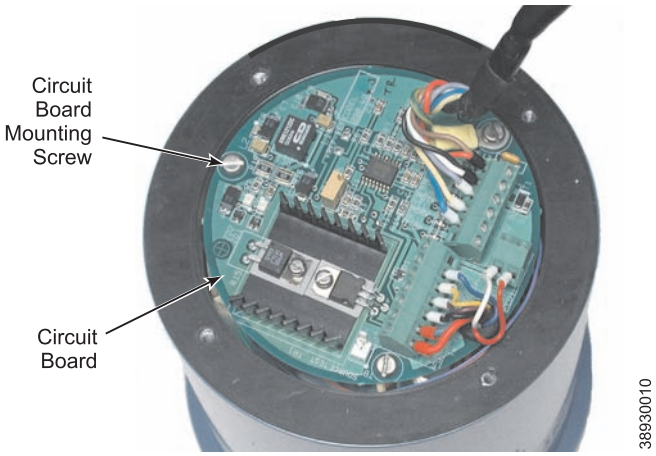
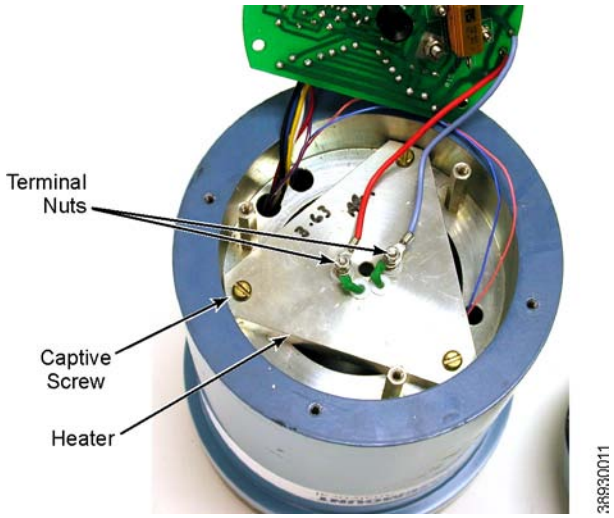


Figure 5-4. Heater Element



6. Remove the terminal nuts (Figure 5-4) and remove the heater wires.
7. Unscrew the three captive screws.
8. Remove and discard the heater assembly.
9. Install the new heater assembly and tighten the three captive screws.
10. Install the two wires and terminal nuts removed in step 6.
11. Install the circuit board and retaining screws removed in step 5.
12. Install and fasten the rear cover plate.
13. Power up the CCO 5500 Analyzer and allow fifteen minutes for the heater to reach operating temperature. The analyzer will start to monitor the gas levels.

Replacement of Chopper Motor Assembly

1. Shut down and lock out power to the CCO 5500 Analyzer.
2. Unbolt and remove the source unit from the air purge.
3. Remove the window plate (Figure 5-5) from the source unit.
4. Unscrew the three brass screws that secure the circuit board and center plate assembly.
5. Lift the circuit board and center plate assembly out of the source unit.
6. De-solder the red and black chopper motor power wires from the circuit board.
7. Unscrew and remove the three chopper motor screws (Figure 5-6).
8. Install the new chopper motor and retaining screws removed in step 7.
9. Solder the chopper motor power wires to the circuit board. Solder the red wire to the M+ terminal and the black wire to the M- terminal.
10. Install the center plate and circuit board assembly. Secure the assembly with three brass screws removed in step 4.
11. Line up and install the window plate onto the source unit. Fully seat the window plate flange in the source unit.
12. Secure the source unit to the air purge using the four screws removed in step 2. Tighten the screws evenly.

13. Power up the CCO 5500 Analyzer and check the chopper motor frequency in Mode 4 (DIAGNOSTICS). Adjust using the trim potentiometer as described in "Source Adjustments".

Figure 5-5. Source Unit Circuit Board and Center Plate Assembly

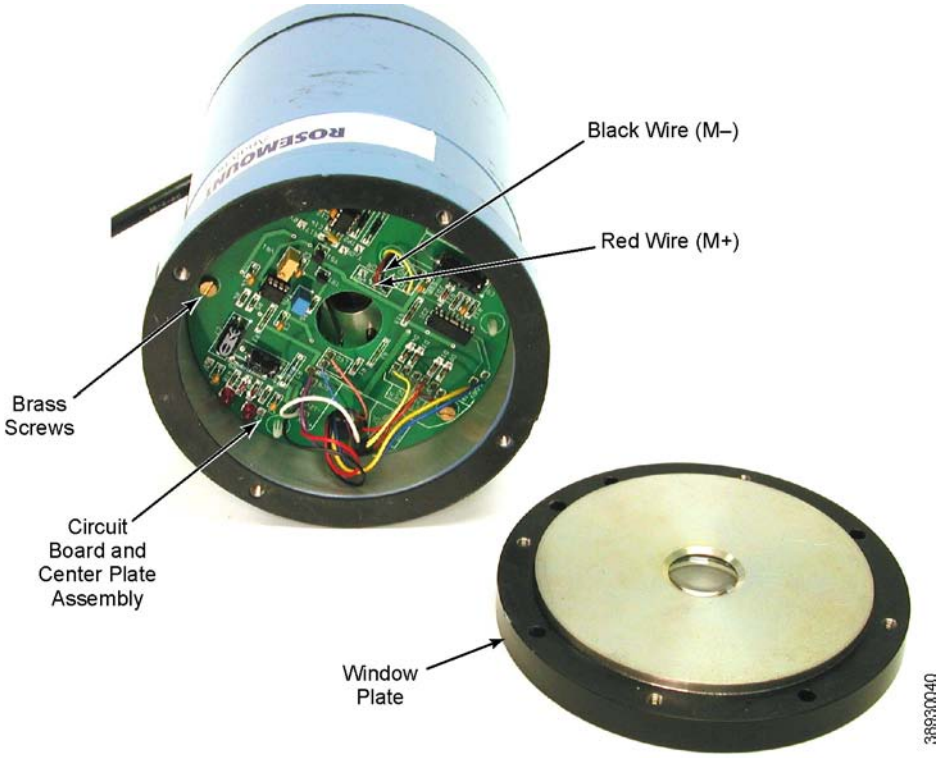


Figure 5-6. Chopper Motor Assembly

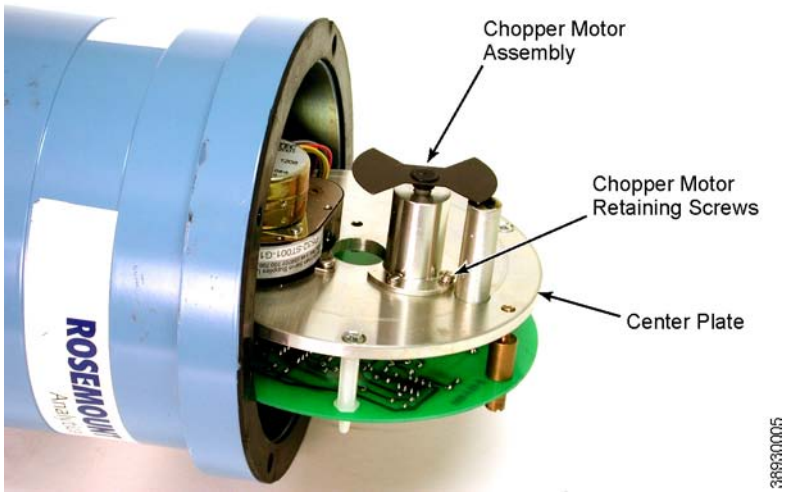
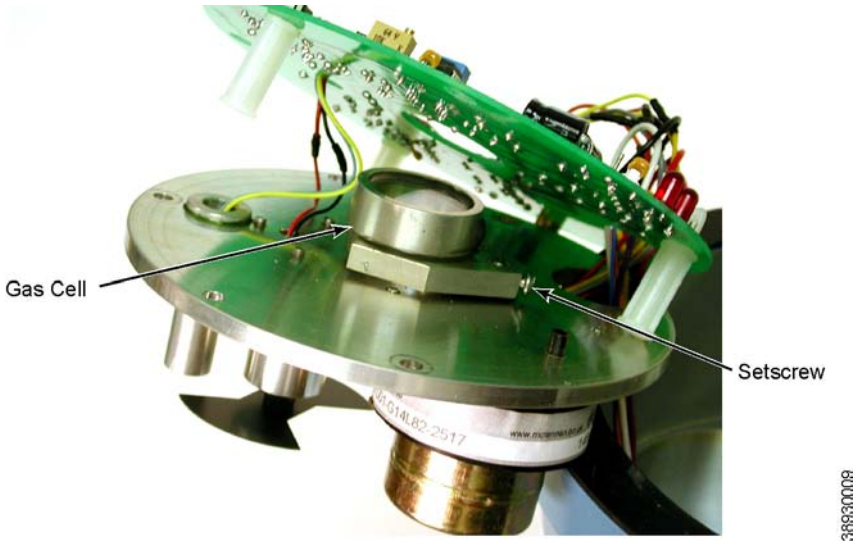


Figure 5-7. Source Gas Cell



Replacement of Source Unit Gas Cell

Replace the source unit gas cell according to the following procedure.

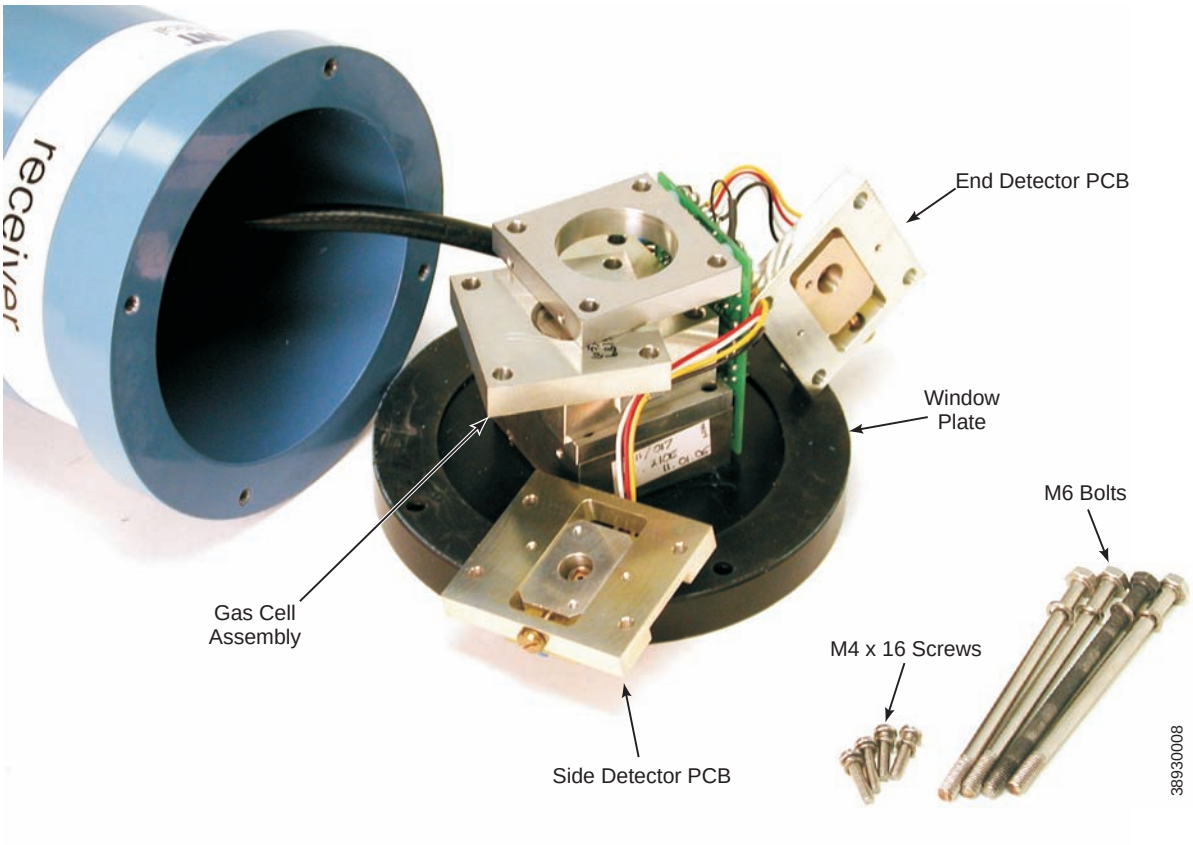
1. Shut down and lock out power to the CCO 5500 Analyzer.
2. Unbolt and remove the source from the air purge.
3. Remove the window plate (Figure 5-5) from the source unit.
4. Unscrew the three brass screws that secure the circuit board and center plate assembly.
5. Lift the circuit board and center plate assembly out of the source unit.
6. Loosen the setscrew at the end of the gas cell assembly (Figure 5-7).
7. Pry the gas cell from the stepper motor shaft.
8. Insert a new gas cell onto the stepper motor shaft and tighten the setscrew.
9. Install the center plate and circuit board assembly and secure with the three brass screws removed in step 4.
10. Line up and install the window plate onto the source unit. Fully seat the window plate flange in the source unit.
11. Secure the source unit to the air purge using the four screws removed in step 2. Tighten the screws evenly.
12. Power up and recalibrate the CCO 5500 Analyzer. Refer to Section 4, Calibrate.

Replacement of Receiver Unit Gas Cell

Replace the receiver unit gas cell according to the following procedure.

1. Shut down and lock out power to the CCO 5500 Analyzer.
2. Unbolt and remove the receiver unit from its air purge.
3. Loosen the receiver unit cable gland so the cable can slip when the window plate is removed.
4. Unscrew and pull the window plate (Figure 5-8) from the front of the receiver unit.
5. Use a marker pen to match-mark all components of the receiver stack.
6. Remove the four M4x16 screws that secure the side detector PCB to the receiver stack.
7. Remove the four M6 bolts that secure the detector stack components.
8. Observe the orientation of the gas cell assembly in the detector stack.
9. Slide the gas cell assembly out of the detector stack.
10. Replace the gas cell using the same orientation observed in step 8. (The notch in the gas cell assembly should be nearest to the large circuit board secured to the detector stack).
11. Place the end detector on top of the detector stack.

Figure 5-8. Receiver Gas Cell



⚠CAUTION

Do not to overtighten the detector stack mounting bolts. Over-tightening the mounting bolts may fracture the gas cell.

12. Install and gently tighten the M6 mounting bolts removed in step 7.
13. Position the side detector against the receiver stack. Install and tighten the M4x16 side detector mounting screws.
14. Line up and install the window plate onto the receiver unit. Fully seat the window plate flange in the receiver unit.
15. Secure the receiver unit to the air purge using the four screws removed in step 2. Tighten the screws evenly.
16. Power up and recalibrate the CCO 5500 Analyzer. Refer to Section 4, Calibrate.

Electronics

The electronics require no routine maintenance. They are all solid state and undergo a rigorous factory burn-in procedure. If there is any doubt about the electronics performance, the control unit may be interrogated from the keypad to determine whether or not they are functioning properly. Refer to Section 6, Troubleshooting.

SPAN FACTOR ADJUSTMENT

The span factor does not require periodic adjustment. However, if either of the following repair actions are performed, a span factor adjustment may be required.

- Gas cell changed either in the receiver or source.
- Interference filter changed in the receiver.

Use the procedure to adjust the span factor:

1. At the control unit keypad select Mode 5 ⇨ Configure O/P ⇨ Set Span.
2. Set the span factor to 1000.
3. Calibrate the analyzer under zero conditions. Refer to Section 4, Calibrate.
4. Obtain a check cell reading in Mode 6. The check cell is defined at a temperature of 68^{o}F (20^{o}C) and a path length of 3.28 ft (1 m).
5. Select Mode 5 ⇨ Normalization. Set the Temperature to 68^{o}F (20^{o}C).
6. Select Mode 5 ⇨ Parameters ⇨ Pathlength to enter the 3.28 ft (1 m) path length.

NOTE
The check cell reading must be less than 999 ppm·m. If greater than 999 ppm·m, you must enter a larger path length to reduce the effective ppm·m value of the check cell. Select a path length such that ppm·m/path length is less than 999).

7. Select Mode 5 ⇨ Configure O/P ⇨ Set Span. Enter the span factor indicated for the check cell in Mode 6. If this value exceeded 999 ppm divide by the path length entered above to determine the span.

8. Press Enter and wait for the second reading to appear under the span factor option. This should read the same as the value entered in step 7.
9. Using the up and down arrow keys, adjust the span factor until the second reading agrees with the certified check cell value (divided by the path length if appropriate).
10. Record the span factor value and press Enter.
11. Confirm the span factor is set by selecting Mode 2 ⇨ Parameters ⇨ Span Factor and checking the value.

Resetting the Span Factor

An example of resetting the span factor is outlined below:

1. Certified check cell of 2880 ppm is inserted into the check cell holder with the analyzer in Mode 6. A reading of 3240 is taken.
2. Due to the value of the check cell exceeding 999 ppm a suitable path length needs to be used to reduce the effective value of the check cell. In this case a path length of 4 m is chosen, thus the effective value of the check cell is 720 ppm (2880/4).
3. However, in Mode 6 it reads higher (3240); this value is effectively 810 ppm at a 4 m path length.
4. 810 is keyed in as the first value in the span factor option.
5. The span factor is then adjusted until the second value reads 720.
6. Press Enter to set the span factor.

Section 6 Troubleshooting

FAULT FINDING WITH THE KEYPAD

⚠WARNING

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

Should a fault occur, the control unit display switches from its current mode of operation, to the DIAGNOSTICS MODE and displays the current fault condition. Refer to "Data Valid LED Out" for further information on the fault conditions. If the fault clears the display will stay in DIAGNOSTICS MODE and display 'All Clear'.

Enter DIAGNOSTICS MODE from the keypad of the instrument; this can be done at any time without interrupting or disturbing the analog outputs of the equipment. As an initial guide to equipment performance typical values for instrument operation are given below:

	D2 min	D2 max	D1 min	D1 max	Set Cal min	Set Cal max
CCO 5500	3000	20,000	3000	20,000	2000	2900

where:

Modulation Frequency	=	30 to 45 Hz
Mark/Space Ratio	=	0.9 to 1.1
Saturation Count	=	50 maximum for all analyzers

Should the values be outside of the above ranges the Data valid LED will extinguish, and the fault condition will be displayed.

Data Valid LED Out

If one or more fault conditions occur, the data valid LED on the front panel will extinguish, the data valid relay will operate, and the instrument will automatically enter the DIAGNOSTICS MODE to display the fault condition.

The following fault conditions are recognized by the instrument.

Table 6-1. Fault Conditions

Detector signals saturated *(Sat# over 50)*
Possible Causes
Incorrect detector gain adjustment.
Instrument condition during high opacity conditions which have now cleared.
Low detector levels *(D1 < 3,000)*
Possible Causes
High opacity in duct.
Dirty windows.
Incorrect detector gain adjustment.
Heater cartridge failure.
Cal factor out of range
Possible Causes
Calibration conducted during unstable duct conditions.
Poor alignment.
Incorrect detector gain adjustment.
Modulation frequency is below 30 Hz or above 45 Hz
Possible Causes
Poor supply voltage.
Faulty chopper motor.
Incorrect setting within the source unit.
Reference signal failure
Possible Causes
Chopper motor failure.

NOTE
If a fault condition is recognized by the instrument the minutes, hours, and days averages will not be updated.

TROUBLESHOOTING TABLES

The troubleshooting tables provide fault diagnosis, possible causes and the appropriate actions, if an instrument fault is suspected. Note the symptoms and when the fault has occurred. Refer to the appropriate tables.

NOTE
Be sure to use the tables from the top down and pay particular attention when ‘proceed to next test’ and ‘proceed to next possible cause’ are indicated.

The troubleshooting tables should indicate which of the four units failed:

- Source Unit
- Receiver Unit
- Control Unit
- Power Supply Unit

The faulty unit can then be returned to Rosemount Analytical Inc. for repair.

Table 6-2. Configuration Problems

No Display on Control Unit			
Possible Cause	**Test**	**Result**	**Action**
Power input failure	Check 110/220V selection switch	Setting correct	Go to next test
		Setting incorrect	Change setting and go to next test
	Check power indication LED in control unit	LED illuminated	Power OK - go to next possible cause
		LED not illuminated	Go to next test
	Check fuse in power supply unit	Fuse OK	Go to next possible cause
		Fuse blown	Replace fuse
Power supply failure	Check power rail LEDs in power supply unit	All LEDs illuminated	Supplies OK - proceed to next possible cause
		LEDs not illuminated	Go to next test
	Check fuse in control unit	Fuse OK	Go to next possible cause
		Fuse blown	Replace fuse
Connection problem	Check wiring between control unit and power supply unit	Wiring OK	Go to next test
		Incorrect wiring	Correct wiring
	Check ribbon cable connections in control unit	Connections OK	Go to next possible cause
		Connections loose	Secure connections
Control unit failure			Contact Rosemount Analytical Inc.

Display Nonsense on Control Unit			
Possible Cause	**Test**	**Result**	**Action**
Micro-processor fault	Reset by interrupting mains supply	Fault clears	No further action
		Fault continues	Go to next possible cause
Program corruption, failed micro PCB			Contact Rosemount Analytical Inc.

Display Message 'Waiting for Reference'			
Possible Cause	**Test**	**Result**	**Action**
Reference wave failure	Checking wiring between power supply unit and control unit and also between power supply unit and source unit	Wiring OK	Go to next test
		Wiring incorrect	Correct wiring
	Check reference wave in power supply unit - use oscilloscope at terminals 4 and 5	37 Hz square wave approx. 12V - OK	Go to next test
		37 Hz square wave approx. 12V - Not OK	Contact Rosemount Analytical Inc.
	Check reference wave in control unit - use oscilloscope at terminals 2 and 5	37 Hz square wave approx. 12V - OK	Contact Rosemount Analytical Inc.
		37 Hz square wave approx. 12V - Not OK	Check and rectify wiring/continuity between power supply unit and control unit
Chopper motor failure in source unit	Check if chopper blade is rotating	No	Go to next test
		Yes	Contact Rosemount Analytical Inc.
	Replace chopper motor	Fault clears	No further action
		Fault continues	Contact Rosemount Analytical Inc.

Configuration Problems Continued on Next Page

Data Valid LED Not Illuminated			
Possible Cause	**Test**	**Result**	**Action**
Analyzer fault condition	Interrogate fault status in Mode 4	*All Clear*	Contact Rosemount Analytical Inc.
		Fault condition identified	Go to relevant symptom

Reference Failure			
Possible Cause	**Test**	**Result**	**Action**
Reference wave failure	Proceed as for symptom 3 (display message 'Waiting for Reference')	Fault clears	No further action
		Fault continues	Contact Rosemount Analytical Inc.

Low detector level			
Possible Cause	**Test**	**Result**	**Action**
Incorrect wiring	Checking wiring	Fault clears	No further action
		Fault continues	Go to next possible cause
Dirty windows or obstructed sight path	Check and clean the Rx and Tx windows - clear sight path between receiver unit and source unit	Detector levels in range	No further action
		Fault continues	Go to next possible cause
Misalignment	Realign receiver and source units	Detector levels in range	No further action
		Fault continues	Go to next possible cause
Incorrect gain settings	Adjust gains in control unit and/or receiver unit	Detector levels in range	No further action
		Fault continues	Go to next possible cause
Source failure	Check heater cartridge	Cartridge open circuit	Replace heater cartridge
		Cartridge OK	Go to next possible cause
Source gas cell drive failure	Check drive LED in control unit	LED flashing	Go to next test
		LED not flashing	Contact Rosemount Analytical Inc.
	Check gas cell/filter drive	No movement	Contact Rosemount Analytical Inc.
		Movement	Contact Rosemount Analytical Inc.

Detector Saturated			
Possible Cause	**Test**	**Result**	**Action**
Incorrect gain settings	Adjust gain settings in control unit and/or receiver unit	Saturation clears	No further action
		Fault continues	Go to next test
	Monitor detector levels from receiver unit	Signal OK	
		Signal faulty	Contact Rosemount Analytical Inc.

Modulation Frequency Out of Range			
Possible Cause	**Test**	**Result**	**Action**
Chopper motor speed out of range	Adjust chopper motor speed	Mod. Frequency in range	No further action
		Unable to adjust	Go to next test
	Monitor reference waveform across test points 10 and 11 in power supply unit using oscilloscope	30 - 45 Hz waveform OK	
		<30 or >45 Hz - waveform incorrect	Contact Rosemount Analytical Inc.

Configuration Problems Continued on Next Page

Set Call Out of Range			
Possible Cause	**Test**	**Result**	**Action**
Calibrated with incorrect target value or under fluctuating gas level	Calibrate with correct target value	Cal factor in range	No further action
		Cal factor out of range	Go to next possible cause
Poor alignment / window contamination / path obscured	Proceed as for low detector level	Cal factor in range	No further action
		Cal factor out of range	Go to next possible cause
Source unit gas cell drive failure	Proceed as for low detector level	Cal factor in range	No further action
		Cal factor out of range	Go to next possible cause
D2 detector/circuit failure	Check D2 signal level	OK	Go to next possible cause
		Not OK	Go to next test
	Monitor D2 signal from Rx	OK	
		Not OK	Contact Rosemount Analytical Inc.
Source gas cell failure	Replace source unit gas cell	Cal factor in range	No further action
		Cal factor out of range	Go to the next possible cause
Receiver gas cell failure	Replace receiver unit gas cell	Cal factor in range	No further action
		Cal factor out of range	Contact Rosemount Analytical Inc.

Table 6-3. Operational Problems

Output Reading Permanently Zero or Full Scale			
Possible Cause	**Test**	**Result**	**Action**
Incorrect normalizing parameter setting	Enter parameter mode and ensure all parameters are as required	Parameters correct	Go to next possible cause
		Parameters incorrect	Enter correct parameters
Incorrect calibration (Set Cal value) zero gas level	Enter DIAGNOSTICS MODE and observe the Y(60) value	1800 <Y <2010	Instrument OK - true level of gas in duct (output permanently zero)
		Y <1800	Go to next possible cause
Detector levels low or saturated	Enter DIAGNOSTICS MODE and check the detector levels and saturation count	Detector levels OK	Go to next possible cause
		Detector levels out of tolerance	Reconfigure the instrument and consult the fault-finding table again
Output circuitry failure	Enter SET UP MODE (configure output and attempt to set zero and span	Output responds correctly	Reconfigure the instrument and consult the fault-finding table again
		Output does not respond correctly	Replace control unit

Averages Not Updated			
Possible Cause	**Test**	**Result**	**Action**
Fault condition exists	Enter DIAGNOSTICS MODE and check fault condition	Fault condition exists	Refer to Section 4, Fault Condition
		No fault condition	Go to next possible cause
Plant status contact in control unit has been made	Check plant status input LED in control unit	LED off	Operation correct - stable gas level
		LED on	Plant status in use - instrument will not update until plant on

COMPONENT TESTS

Some instrument components/operation can be verified as follows:

Heater Cartridge

Perform steps 1 through 4 under "Replacement of the Heater Element" in Section 5, Maintenance. Remove one lead from the heater cartridge and measure the resistance across the two cartridge terminals. It should be about 3.5 ohms. If the circuit is open the heater cartridge needs to be replaced.

Chopper Motor

1. Power up the CCO 5500 Analyzer.
2. Observe the chopper motor and blade between the lens and heater cartridge. If the blade is spinning the chopper motor is OK.
3. If the blade is not spinning the supply to the chopper motor voltage can be measured at the test points M+ and M– on the circuit board (Figure 5-5). The voltage should read approximately 1VDC. If the voltage is good replace the chopper motor. If the voltage is not 1 VDC the source unit electronics is suspect.

LED INDICATIONS

If instrument malfunction is suspected there are LEDs within the instrument indicating various power rails and equipment operations.

Control Unit LEDs	Description
5V, -15, +15	Situated top/left of processor. Should all be ON, indicating that the power supplies to the instrument are functioning correctly.
M-DIR	Should operate approximately every 4 seconds.
SOL_MDRV	Supply to the solenoid that drives the filter into the optical path within the receiver pulses every time the M-DIR changes (approximately every 2 seconds).
+V1, -V1 and +12V	Middle bottom left of board. All should be ON. Power supplies to the isolated analog current output.
+12V	Bottom left of board. Should be ON. Indication of the isolated supply for the plant status input.
PS	Bottom left of board. In normal operation this LED should be OFF. During plant-off periods, however, if the plant status input is being used this LED will illuminate and the rolling averages not updated.
Receiver LEDs	**Description**
+V and -V	These LEDs should be ON indicating that the power supplies within the unit are functioning correctly.
Source LEDs	**Description**
+V and -V	These LEDs should be ON indicating that the power supplies within the unit are functioning correctly.
Power Supply LED	**Description**
+12V	This LED should be ON indicating that the power supply unit is functioning correctly. This LED will extinguish should the supply voltage drop from 12 to 11V.

TEST POINTS

If further checks on instrument operation are required, there are various test points within the instrument. Many of these are simple DC voltages and so may be checked using a voltmeter set to DC volts, otherwise may be investigated using an oscilloscope:

Control Unit	Description
T1	D1 signal from receiver head with some conditioning in the processor, smoothed by a factor of divide by 10. Flattened saw-tooth, 32 to 45 Hz (modulation frequency), 1V peak to peak (maximum), centered on 0V. 0V for T1 to T6 may be taken from 0V test point, top left of board. Test-points T1 to T6 are to be found in the center of the board.
T2	D1 signal after amplification in processor. Flattened saw-tooth, 32 to 45 Hz, 3.5V peak to peak (maximum), centered on 0V. Amplitude may be varied by a trim pot. Refer to Section 4, Detector Outputs.
T3	D1 output to the A/D converter within the micro-processor offset by 2.5V. Flattened saw-tooth, 32 to 45 Hz, 3.5V peak to peak (maximum), centered on 2.5V.
T4	As T1 but for D2 signal.
T5	As T2 but for D2 signal.
T6	As T3 but for D2 signal.
T7	Receiver ambient temperature to the A/D converter with the micro-processor - 1mV represents 33.8^{o}F (1^{o}C).
T8	Normalizing input for pressure before A/D converter 0.8 to 4.0V = 4 to 20 mA.
T9	As T8 except oxygen.
T10	As T8 except temperature.
+5 and 0V	Supply rails for the micro-processor. DC voltage.
12V	Supply rail for the plant status input.
+15V, -15V and 0VA	Supply rails for the analog current output.
VIN	Output from the D/A converter. 0 to 2.5V represents 0 to 20 mA (4 mA at 0.V).
-15V1, 0V and +15V1	Isolated supply for the analog current output.
0VB and +12VB	Isolated supply for the plant status input.
F	Reference wave from the source unit (via the power supply). Square wave, 30 to 45 Hz, 5V peak to peak, centered on 2.5V.
Power Supply	**Description**
0V and +12V	Power supply for the instrument.
Receiver	**Description**
0V	0V for the receiver.
T1	Detector output without conditioning.
T2	Detector output after first stage of gain.
T3	Detector output after both stages of gain.
Source	**Description**
S-	0V supply to the heater cartridge.
S+	12V supply to the heater cartridge.
M+ and M-	Supply to the chopper motor (+1VDC).
T3	Reference wave.
T4	Reference wave.

Section 7 Spare Parts

SPARE PARTS

Contact Rosemount Analytical Inc. customer service center with the serial number of your instrument and they will make recommendations based on your system. Below are typical spares that should be considered.

CCO 5500 Analyzer Recommended Spare Parts

Figure Num	Part Num	Description
	1A99995H01	Source unit assembly
	1A99995H02	Receiver unit assembly
	1A99995H03	Power supply assembly
	1A99995H04	Control unit assembly.
	1A99995H05	Purge assembly.
	1A99995H06	Site mounting flanges (set of 2), 165 mm OD, 4 M8 holes on 125 mm BC.
	1A99995H07	Heater cartridge.
	1A99995H08	Protection window.
	1A99995H09	Gasket, source/receiver to air purge assembly.
	1A99995H10	Gasket, source/receiver to site flange.
	1A99995H11	Chopper motor and disk.
	1A99995H12	Stepper motor and gearbox.
	1A99995H13	PCB assembly, source control.
	1A99995H14	PCB assembly, source stepper control.
	1A99995H15	PCB assembly, receiver end detector (includes 1A99995H20).
	1A99995H16	PCB assembly, receiver detector (includes 1A99995H20).
	1A99995H17	PCB assembly, receiver.
	1A99995H18	PCB assembly, universal micro with EPROM and tested.
	1A99995H19	Switch mode power supply.
	1A99995H20	IR detector
	1A99995H21	Calibration check cell holder (no cell).
	1A99995H22	CO calibration check cell (specify value).
	1A99995H23	Span gas cell, 10 mm.
	1A99995H24	100% gas cell, 5 mm.
	1A99995H25	Lens
	1A99995H27	Regulator, pressure, for purge assembly
	1A99995H29	Regulator assembly. pressure
	1A99995H30	PCB assembly, power supply
	1A99995H31	PCB assembly, signal processor interface

Appendix A Safety Data

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. Sí˙ové 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 installering af dette udstyr.

Følgende sikkerhedsinstruktioner gælder specifikt i alle EU-medlemslande. Instruktionerne skal nøje følges for overholdelse af Lavsspændingsdirektivet 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 kabelforskruninger skal have en intern dimension, så passende kabelaflastning 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 fejlsitua-tion. 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 -aardingen 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 oppper-vlakken 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 standaards: 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 meerpolige 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 strickt 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

Οδηγιεσ ασφαλειασ για την καλωδιωση και εγκατασταση τησ συσκευησ

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 παροχηθούν 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 tartsák 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 földvezetéket 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 vezetéket 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 találhatóak. 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 címkéken 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 időri 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 ciscun 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. Matinimo tinklo laidai turi atitikti IEC227 ar IEC245 reikalavimus.
4. Visi laidai turi būti tinkami naudojimui aplinkos temperatūtoje, 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 mechaniškai veikiantį įzoliavimo jungiklį. Jeigu ne, tuomet turi būti nurodytos kitos įrenginio atjungimo priemonės, ir aiškai 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 dėšinėje, 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 srovės tiekimui" 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 jāmarķē. Slēdžiem jāatbilst kādam vispāratzītam 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' l-UE. Dawn għandhom jiġu osservati b'mod strett biex tkun żgurata l-konformità mad-Direttiva dwar il-Vultaġġ Baxx. Stati li mhumiex membri ta' l-UE għandhom ukoll ikunu konformi ma' dan li ġej ħlief 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-għatjien kollha tas-sigurtà u l-erts tas-sigurtà għandhom jitpoġġew lura f'posthom. 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 jipprovdu 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 jġorru 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-għatjien ikunu mmarkati bis-simbolu fuq il-lemin, x'aktarx li jkun hemm vultaġġi perikoluži taħthom. Dawn l-għatjien għandhom jitneħħew biss meta titneħħa l-provvista tad-dawl mit-tagħmir - u minn ħaddiema tal-manutenzjoni mħarrġa biss.

8. Meta t-tagħmir jew l-għatjien ikunu mmarkati bis-simbolu fuq il-lemin, ikun hemm periklu mill-uċuħ jaħarqu li jkun hemm taħthom. Dawn l-għatjien 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-għatjien 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 Enerġizzat” jew kliem simili, hemm periklu ta' nar f'żoni fejn atmosfera esplossiva 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 imħarreġ.

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 kabelforskruvninger 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. Kretsbrytere 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 fjærnes 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 fjærnes 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 instrukser.

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 bucins 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 vzt'ahujú konkrétne na všetky členské štáty EÚ. Musia byt' striktne dodržané, aby sa zaistila zhoda so Smernicou o nízkom napätí. Štáty, ktoré nie sú členskými štátmi EÚ by mali nasledovné pokyny taktiež dodržiavat', pokiaľ nie sú nahradené miestnymi alebo národnými normami.

1. Adekvátne uzemnenia musia byt' vykonané na všetkých bodoch uzemnenia, interných aj externých, tam, kde sú poskytnuté.
2. Po inštalácii alebo riešení problémov musia byt' všetky bezpečnostné kryty a bezpečnostné uzemnenia vymenené. Integrita všetkých uzemňovacích terminálov musí byt' vždy zachovaná.
3. Káble sieťového napájania musia byt' v zhode s požiadavkami IEC227 alebo IEC245.
4. Všetky káblové pripojenia by mali byt' vhodné pre používanie v teplote okolia vyššej, ako 75°C.
5. Všetky použité káblové priechodky musia mat' také vnútorné rozmery, aby poskytovali adekvátne uchopenie kábla.
6. Pre zaistenie bezpečnej prevádzky tohto zariadenia musí byt' pripojenie k sieťovému napájaniu zapojené len cez prerušovač obvodu, ktorý počas poruchovej situácie odpojí všetky obvody elektrických vodičov. Prerušovač obvodu by mal obsahovat' aj mechanicky ovládaný úsekový vypínač. Ak nie, musí byt' poskytnutý iný spôsob odpojenia zariadenia od sieťového napájania a tento spôsob musí byt' zreteľne označený. Prerušovače obvodu alebo spínače musia byt' v zhode s uznanou normou, ako napr. IEC947. Všetky káblové pripojenia musia vyhovovat' 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 odoberat' 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 byt' odstraňované len vyškoleným servisným personálom, pričom je zariadenie odpojené od elektrickej energie. Určité povrchy môžu ostat' 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 "Neotvárat' pod elektrickým prúdom" alebo podobné, existuje nebezpečenstvo vznietenia v oblastiach s prítomnost'ou výbušného ovzdušia. Toto zariadenie sa smie otvárat' len v prípade odpojenia od elektrického napájania a ponechania zariadenia vychladnút' 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 cumpliran 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 abrira 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 abrira 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 frånkoppla 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 föreliggerisk 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.

Appendix B Returning Equipment to the Factory

RETURNING MATERIAL

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

1. Secure a return authorization number from a Rosemount Analytical sales office or representative before returning the equipment. Equipment must be returned with complete identification in accordance with Rosemount Analytical 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 Rosemount Analytical 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 Rosemount Analytical'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 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.

CCO 5500

Instruction Manual
IM-106-5500, Rev 1.0
June 2009

CCO 5500 Carbon Monoxide (CO) Analyzer

Part no._____

Serial no._____

Order no._____

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