NOVA

Dependable Gas Analysis Solutions

INSTRUCTION MANUAL

FOR 975A-CW & 7240

NOVA GAS ANALYZER

tenova

NOVA

ANALYTICAL SYSTEMS

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GAS ANALYZER CALIBRATION AND DATA SHEET

MODEL: 975A-CW & 7240 **SERIAL NO. :**

APPLICATION: SYNGAS ANALYSIS

RANGE(S):

READOUT 1. 0-25.0% O_2

READOUT 2. 0-50.0% CO

READOUT 3. 0-70.0% CO_2

READOUT 4. 0-100.0% HC's (CH_4)

READOUT 5. 0-50.0% H_2

READOUT 6.

OUTPUT(S):

RANGE 1.	4-20 mA ISOL	**FOR**	0-25.0% O_2
RANGE 2.	4-20 mA ISOL	**FOR**	0-50.0% CO
RANGE 3.	4-20 mA ISOL	**FOR**	0-70.0% CO_2
RANGE 4.	4-20 mA ISOL	**FOR**	0-100.0% HC's (CH_4)
RANGE 5.	4-20 mA ISOL	**FOR**	0-50.0% H_2
RANGE 6.		**FOR**	

ALARM(S):

HIGH SETTING:	NONE	**CONTACTS**	-	**RATING**	-	**@**	-
LOW SETTING:	NONE	**CONTACTS**	-	**RATING**	-	**@**	-

ALARM FEATURES: GEN FAULT, IN CAL AND CAL FAIL ALARMS INCLUDED.
ALL ALARMS SET FAIL SAFE.

POWER: 230 VAC, 50 HZ

FLOW RATE: 1 LPM

CALIBRATION: ON AMBIENT AIR FOR O_2 SPAN CALIBRATION AND ZERO CALIBRATION OF ALL OTHER GASES MEASURED.

ON 20% CO, 20% CO_2, 40% CH_4 AND 20% H_2 FOR SPAN CALIBRATION OF THESE GASES MEASURED.

ALTERNATIVELY, INDIVIDUAL GAS CYLINDERS MAY BE USED FOR CO, CO_2, CH_4 AND H_2 SPAN CALIBRATION.

SPECIAL FEATURES: INCLUDES CABINET AC.
INCLUDES MAGNETIC CALIBRATION WAND.
INCLUDES NOVALOGER SOFTWARE AND ACCESSORIES.

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INTRODUCTION

The Nova model 975A analyzer has been designed for the simultaneous analysis of O_2, CO, CO_2, CH_4 and H_2 in process gases.

The analyzer consists of two main components: an **optional Model 7240 heated filter cabinet (HFC)** that is directly mounted on the side of the process duct and the main analyzer cabinet where the gases are detected.

The optional 7240 HFC is designed to filter the sample gases while they are still hot and dry. This helps prevent the filter element from plugging up due to a combination of dust and condensing moisture.

The analyzer is microprocessor based with a touchscreen display. All gas concentration readings are located on the touchscreen display and are visible through a clear Lexan window in the door of the cabinet.

The analyzer utilizes an NDIR infrared detector for the simultaneous measurement of CO, CO_2 and CH_4. In addition, the analyzer is supplied with a CO, CO_2 and CH_4 compensated thermal conductivity cell for hydrogen (H_2) and an electrochemical oxygen sensor for measuring oxygen (O_2) levels.

All detectors are located in a temperature controlled chamber, which prevents any instability due to ambient temperature fluctuations.

Alarm contacts are provided as standard for general fault, in-cal and cal fail. Calibration is automatic and controlled by the HMI touch screen display. The 'CAL NOW' feature allows the operator to perform a manually initiated auto calibration at any time by passing a magnetic wand (included) over the 'CAL NOW' bezel.

A flow meter on the inside panel and low flow alert on the display verify that the sample gas is flowing through the analyzer and can be useful in indicating a plugged sample line or filter.

Note: See the Analyzer Calibration and Data Sheet for more information on ordered options.

SAFETY INFORMATION

General Hazards

Table 1.1 provides safety and hazard labels used throughout the Nova Gas Analyzer to indicate safety hazards and specific instructions regarding equipment setup and operation.

Table 1.1: Nova Gas Analyzer Safety Hazard Labels

Safety Label	Type	Specific Hazards Description
 **DANGER: Disconnect Power before servicing. 115VAC/230 VAC@50 Hz**	**WARNING**	Hazardous voltage is present inside, keep away from Live Circuits. Disconnect power cable and discharge circuits before servicing the equipment. To avoid accidental power up, the equipment should be handled with proper guidance and supervision. To avoid shock hazard, the instrument must be properly grounded. Do not substitute parts or modify this instrument to avoid unnecessary risk of harm. If any of the built-in features in this instrument is impaired, immediately remove power.
 **CAUTION: Hot Surface Contact May Burn**	**HOT**	Hot surface. Avoid contact. Surfaces are hot and may cause personal injury if touched.

The following warning signs contain important or helpful information relating to the setup and/or operation of the system.

Component replacement, internal adjustments and electrical service must be made by qualified maintenance personnel.

Disconnect power cable, discharge circuits and power to any other equipment connected to the instrument before servicing. The instrument must be connected to an electrical ground.

Hazardous/Explosive Gas Warning

Hazardous gases are discharged and exhausted from the Nova Gas Analyzer as part of its normal operation. There is a cabinet vent, a sample vent and one drain port on the analyzer cabinet. All gases and liquids discharged/exhausted from the analyzer are not to be vented into any confined spaces such as an enclosed room.

Hazardous gases processed by the analyzer are contained in the collected off-gas, purge medium and in the gases used for calibration of the analyzer. Table 1.2 below describes the harmful nature of each gas species processed by the Analyzer.

Table 1.2: Hazardous Gas Description

Gas	Gas Name	Hazard
CO	Carbon Monoxide	Flammable, Toxic
CO_2	Carbon Dioxide	Asphyxiant
CH_4	Methane	Flammable, Asphyxiant
H_2	Hydrogen	Flammable, Asphyxiant

Accumulation of these gases in confined spaces, both individually and in combination could be lethal and/or dangerous (flammable and/or explosive). It is the responsibility of the plant to request Material Safety Data Sheets (MSDS) from the calibration gas supplier. Any MSDS data sheets are to be prominently posted near the Nova Gas Analyzer and the calibration gas cylinders.

If the Analyzer is installed in an enclosed room which is considered to be a confined area, then good engineering practice and local regulations may require air-quality monitoring equipment to be installed. Any personnel using the room or working with the analyzer should be informed about the risks of exposure to the gases in Table 1.2 and an atmosphere containing less than 19% Oxygen.

Additionally, care must be taken when performing any maintenance on the Gas Analyzer (or related sample streams) to ensure that all gas connections are tight and leak free. It is strongly suggested that on a regular basis (every 1-3 months) and following any maintenance, the analyzer gas stream is checked to ensure that all connections are leak free, prior to power being applied. See the **Maintenance and Troubleshooting** section of this manual for more information.

OPERATION

See the Flow Diagram on Page 28.

975A Analyzer

The analyzer's built-in sample pump pulls the sample gas from the 7240 heated sample cabinet and into the analyzer's inverted bowl filter.

After the bowl filter and sample pump the sample gas enters the thermoelectrically cooled condenser. Any remaining excess moisture in the incoming sample gas will then be forced to condense here. All condensate is removed from the thermoelectric cooler by a peristaltic pump, which removes only condensate. No gas is allowed to escape.

The sample gas, which is now clean and dry, is allowed to exit from the top of the condenser.

After the condenser, the gas then flows through a liquid block, which is present to prevent any condensate that may have escaped the moisture removal system from contaminating the sensors inside the heated chamber.

Note: In the event that that moisture reaches the liquid block, sample will be unable to pass through the analyzer, as shown on the flow meter. The PTFE membrane in the liquid block can either be let dried or be replaced. To do so, sample must be isolated using a customer-supplied shut-off valve mounted near the process. Once closed, the top of the liquid block can be unthreaded to expose the membrane for drying or replacing. In ambient air, it will take 2-3 hours to properly dry. Prior to replacing the liquid block and reactivating sample, the cause of the presence of condensate in the liquid block must be determined. See Troubleshooting for more details.

After the liquid block, the gas flows through the 'SAMPLE/CAL' solenoid valve (SV1), a flow meter and low flow switch before reaching the sensors located inside the temperature controlled chamber. After the sensors the gas is vented from the analyzer.

Purging

The analyzer utilizes a Zero/Purge pump to continuously draw in air from outside the cabinet through a carbon air scrubber in order to remove any corrosive and toxic gases that may be present in the analyzer cabinet or temperature controlled chamber. The scrubbed air flows through solenoid valve SV2 (Purge/Zero), solenoid valve SV3 (Zero/Span), a pressure regulator, then through the rest of the analyzer.

Calibration

When 'ZERO' calibration is initiated by the touch screen, solenoid valves SV1 and SV2 energize, allowing air to flow in through the 'Zero/Purge' port, then through SV2, SV3, a pressure regulator, SV1 and the rest of the analyzer to zero the infrared detector and H_2 T/C Cell. At the same time the oxygen sensor will be spanned.

When 'SPAN' calibration is initiated by the touch screen, solenoid valves SV1 and SV3, energize and SV2 s de-energizes, allowing span gas to flow in through SV3, a pressure regulator and SV1. The span gas will then flow through the rest of the analyzer, spanning the infrared detector and T/C Cell. At the same time the oxygen sensor will be zeroed.

7240 Heated Filter Cabinet

The internal temperature of the 7240 heated filter cabinet (HFC) is remotely controlled from the main 975A analyzer cabinet at approximately 212°F (100°C).

Inside the HFC, the sample gas flows through a valve and filter. After the gas filtration process, the gases are allowed to leave the heated filter cabinet and cool as they travel to the main analyzer cabinet.

Oxygen Sensor

Oxygen concentration is detected by a customer replaceable electrochemical sensor that produces a mV output proportional to the oxygen level. A typical O_2 sensor output is 0-12 mV between zero O_2 and air at 20.9% O_2.

The output is directed to the main controller, which then corrects the reading for calibration and displays the results on the front panel touch screen. The micro board also sends an RS 485 digital signal to the 4-20 mA output board, which in turn produces a 4-20 mA output to match the O_2 reading.

Infrared Detector

CO, CO_2 and CH_4 are detected by a single NDIR infrared detector that has no moving parts. An infrared beam is pulsed intermittently through a sample tube through which sample gas is flowing. A detector at the other end of the tube senses the amount of infrared falling upon it.

An optical filter is placed in the infrared beam. This optical filter only allows certain wavelengths of the infrared spectrum to pass through it. For example, a 4.3 µm wavelength of the infrared spectrum is the wavelength that CO_2 gas absorbs. If there is no CO_2 in the sample gas, all of the infrared energy in the 4.3 µm wavelength will reach the detector. This is then amplified and inverted so as to give a zero output from the detector.

As the level of CO_2 in the sample gas increases, the filter begins to absorb some of the infrared energy in this wavelength so that less energy reaches the detector.

This now begins to increase the output from the main controller and with it the reading on the display meter.

The other two gases behave the same way except that their infrared absorbency bands are different than CO_2. Optical filters are installed in the 4.7 µm for CO and 3.4 µm for hydrocarbons such as methane. This method allows all three gases to be measured in the same detector.

Hydrogen T/C Cell

In the T/C cell, two Resistance Temperature Devices (RTD's) are mounted in separate chambers. One chamber is for reference and usually contains air. The other chamber has sample gas flowing through it. The RTD's are part of a Wheatstone bridge measuring circuit where a small current is allowed to flow through them, thus heating them. The output of the Wheatstone bridge is determined by any difference in resistance between the two RTD's.

If air is contained in both the reference and sample chambers, the heat from the RTD's is lost into the surrounding air at the same rate, so the output of the Wheatstone bridge is zero. When a sample gas containing hydrogen enters the sample chamber, the RTD in that chamber begins to lose heat at a greater rate than the reference RTD. This causes the sample RTD to change its resistance resulting in an imbalance of the Wheatstone bridge. This in turn creates an mV output from the bridge which is directly proportional to the amount of hydrogen in the sample gas. The output of the T/C cell is linear within 1% over its measurement range.

CO_2 and CH_4 in the sample gas have an effect on the hydrogen T/C cell reading because their thermal conductivities are different from air, which is the reference gas. CO does not have much effect on the H_2 reading in a T/C cell.

When the outputs of all of the detectors are sent to the main controller, it automatically compensates the H_2 reading for the presence of CO, CO_2 and CH_4. It also corrects the output for calibration. The resultant corrected output is then read on the front panel touch screen.

ONE-STEP CALIBRATION

A feature has been installed on this analyzer to allow it to be calibrated without opening the cabinet. A magnetic wand has been supplied with the analyzer; when it is passed over the 'CAL NOW' switch on the front panel, the 'MAG CAL' Menu will appear and the analyzer will go through a complete auto calibration. **See Page 30.** This can be done whether or not the analyzer has been set for a timed auto calibration. Once the auto cal is complete, the analyzer will go back to reading sample gas.

The magnetic wand will function right through the outer polycarbonate window so the cabinet door does not have to be opened.

Note: Upon completion of every calibration, sample gas will be re-introduced prior to completion of the calibration sequence, and for the duration shown in the in the Purge Time Setup Menu.

COLD WEATHER PACKAGE

If the Model number has a 'CW' or CWX suffix it means that this analyzer has the optional cold or extreme cold weather package. In these versions, one or two electric heaters with finned radiators have been installed near the bottom of the enclosure with an air circulation fan placed near the top of the cabinet. An electronic temperature controller with solid-state sensor will turn on the heater if the internal temperature of the cabinet falls below 50°F (10.0°C) or -22°F (-30°C) with the extreme weather package.

In addition, the cabinet is insulated.

NOTE: If the sample lines are exposed to freezing temperatures, then care must be taken to also make sure that the external filter and all external tubing are heat traced and insulated, including the vent line.

When used in high ambient temperatures, an optional solid state cabinet air conditioner may also have been included, which is mounted to the side of the analyzer cabinet. See the included cooler manual for operating details. This cooler has a factory set point of 75 °F (24°C).

DATA LOGGING

Note: If using the SD card for logging, the SD LOG PERIOD must be set to 0 prior to adding and removing the card. The SD LOG period should only be set with the SD card installed.

The analyzer comes equipped with an on-board data logger, which resides in the touch screen. This feature will log gas and alarm data to any standard SD card. A .csv type data file is created that includes a column that shows that time of the logged data, each unique gas reading, including from any cabinet leak detector, as well as hexadecimal number that represents all alarms that were active at the time of the logged data point. To interpret the hexadecimal number, please contact Nova.

To adjust the data logging rate, you will need to enter the PASSWORD Menu **(FIGURE 1).** To change the rate, select SD LOG PERIOD. In the box, enter the number of seconds for the SD LOG PERIOD, which, when multiplied by 2, will give the time between samples in seconds.

To stop the data logging features, enter 0 in the entry box

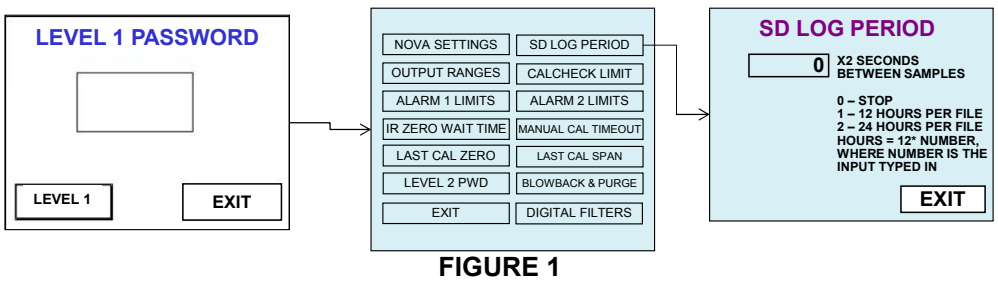

FIGURE 1

The length of the file is a function of the SD LOG PERIOD. For whatever number that is entered as the PERIOD, the data file will capture 12 times this number in hours. For example, if 2 is entered for the PERIOD, the data file will capture 2 times 12 equals 24 hours per data file. Once the end of a data file is reached, a new file will be created with the file name representing the new data and time. Previous files will not be altered or removed. Once the SD card is full, the oldest data file will be overwritten.

To view the data files, the SD card needs to be removed from the touchscreen display. First, enter SD LOG PERIOD and enter 0 to disable the logging. Open the cabinet inner swing panel and locate the SD card slot on the left hand side of the display when looking at the display from the back. Press gently on the SD card and it will pop out slightly from its slot. Remove the SD card from the slot. The data is recorded in a CSV type file, which can be imported into any commercially available spreadsheet software.

To begin logging data again, locate the SD card slot on the back of the touchscreen display. Ensure that the card is oriented correctly. Slide the SD card into the slot until it clicks into place. Do not force the card.

A screen will appear on the touchscreen that asks if you'd like to transfer files SD>GT, GT>SD, etc. Press 'ESC' at the top right corner of the display to exit this screen, then wait for the system to reset and countdown.

Enter the SD LOG PERIOD screen and select the desired LOG PERIOD. Logging will begin immediately.

INSTALLATION

Note: All fittings are imperial unless otherwise specified. Contact local fitting supplier for imperial to metric adapters.

975A Main Analyzer

Mount the analyzer on a vertical surface in an indoor location with the touchscreen at eye level. The mounting location should be away from heavy dust, water drips, cold drafts, vibration and radiant heat. The ambient temperature should be between 55 °F and 105 °F (13°C and 41 °C). If there is dust fallout in the analyzer location, then the cabinet should be fitted with an air purge system.

Connect AC power to the terminals marked L, N and GND on **TB1**. The correct voltage supply is shown on the Calibration and Data Sheet at the front of this manual.

Connect the 4-20 mA outputs on **TB1** to the PLC or recorder.

Connect the 4-20 mA outputs into a receiving device or devices so that the total loop resistance does not exceed 500 ohms. The output ranges will be shown on the Calibration and Data Sheet at the front of this manual.

All Nova analyzers produce a 4-20 mA output current at the analyzer. Do not connect a remote power supply to these output terminals or damage to the output circuits will result. This damage will not be covered under warranty.

Connect any remote annunciators to the alarm contacts provided on **TB1.**

The **'I.C.' (IN CAL)** contacts will close whenever the analyzer is performing an auto calibration.

The **'C.F.' (CAL FAIL)** contacts will close if the analyzer fails to complete a full auto calibration. The most likely cause for this is that the span gas supply has been turned off. A pressure switch on the span gas supply line senses if there is gas present; it will not allow an auto cal if no gas pressure is sensed.

The **'G.F.' (GEN FAULT)** contacts will close when there is low span gas or low gas flow.

If the 7240 HFC is not used, install the pre-filter **in the inverted position (bowl upright)** to the side of a customer supplied isolation valve. The inverted filter will allow any remaining liquids to pass through and be disposed of at the analyzer. **Note: Installation and proper maintenance of the pre-filter is critical to the long-term reliability of the analyzer.**

Connect a ⅜" (14 mm) stainless steel tube between the process sampling port and the inlet port of the analyzer or sequencer (depending on which option was selected).

Connect a ⅜" (14 mm) vent line to the VENT port of the analyzer; this should be taken to an outdoor location with good ventilation.

NOTE: If the sample lines are exposed to freezing temperatures, then care must be taken to also make sure that the external filter and all external tubing are heat traced and insulated, including the vent and drain lines.

When used in high ambient temperatures, an optional solid state cabinet air conditioner may also have been included, which is mounted to the side of the analyzer cabinet. See the included cooler manual for operating details. This cooler has a default factory set point of 75 °F (24°C).

Caution! Hydrogen and methane gas are flammable and CO and CO_2 gas are both highly toxic. Do not allow the vented gases to exhaust into a confined space. If the analyzer is located in an enclosed space, connect a vent line to the vent port and exhaust the sampled gases outside of the confined area.

7240 Heated Filter Cabinet (HFC) (Optional)

Note: Whenever possible, the heated filter should be installed above the analyzer installation and tubing from the heated filter to the analyzer should always slope towards the analyzer.

A hole should be made in the side of the gas duct approximately 1 ½" or larger for the HFC cabinet.

The customer should weld a short 2" pipe weld nipple with threads on the outer end and extending out from the gas duct about 2-3". It should then be centered over the hole in the duct before welding. Install a 2" 150# R.F. ANSI threaded flange on the nipple. Use an anti-seize product on the pipe threads.

Open the door of the 7240 cabinet. In the filter tubing there are two swaged joint fittings. Unscrew the nut from each fitting to remove the entire filter assembly.

Next, remove the square piece of insulation that covers the four mounting bolt heads.

The bolts should enter the holes from the cabinet side and pass right through both flange halves. It's a good idea to coat the threads of the bolts first with an anti-seize product or similar product.

Install the two lower bolts first then place two flat washers, lock washers and nuts on the bolts.

Drop a flange gasket between the two flange halves. The gasket should sit on the two bolts.

Install the top two bolts in the same manner, and then tighten all four evenly.

Wrap insulation around the 2" pipe nipple and flanges to keep in as much heat as possible.

Re-install the filter and tubing assembly.

Put some anti-seize compound on the sampling probe threads (they may already have been pre-coated) then install the probe into the 1" N.P.T. hole in the cabinet. Connect the tubing connectors that join the outlet end of the probe to the blowback valve.

Check all internal tubing connectors to make sure they are tight.

Connect a source of nitrogen at 80-120 PSI (approx. 500-800 kPa) to the port marked 'BLOWBACK N_2' **(For more information see the calibration and data sheet at the front of the manual.)**. This is for blowback of the sampling probe whenever blowback is initiated. This supply line should be ½" pipe in order to minimize line pressure losses during blowback.

7240 HFC to 975A Wiring (for Optional 7240 HFC)

Run a pair of type 'K' thermocouple extension wires from the main analyzer terminals marked 'TYPE K' + and - on **TB1** for the 7240 HFC, to the terminals marked 'TYPE K' + and - in the unheated box on the side of the 7240 HFC. For a type 'K' thermocouple, red is minus.

Also run a pair of 14-16 AWG black and white wires from the main analyzer terminals marked 'HTR' L and N on **TB1** for the 7240 HFC, to the terminals marked 'HTR' L and N in the unheated box on the side of the 7240 HFC.

Also run a pair of 18 AWG red and black wires from the main analyzer terminals marked 'BLOWBACK' + and - on **TB1** for the 7240 HFC, to the terminals marked 'BB' + and - in the 7240 unheated box on the side of the 7240 HFC.

Calibration Gas Cylinder Connections

See the Gas Analyzer Calibration and Data Sheet at the front of the manual for recommended calibration gases.

This analyzer has the automatic calibration feature which requires span calibration gas to be connected to the analyzer and turned on at all times.

A high pressure cylinder equipped with a 0-30 PSI (207 kPa) pressure regulator is recommended for span calibration.

Connect a ¼" (10 mm) metal or plastic tube of sufficient length between the gas cylinder regulator and the analyzer's 'SPAN' port.

The gas cylinder pressure should be regulated down to 5-10 PSI (14-35 kPa).

If the cabinet purge system has been supplied (optional, see the Calibration and Data Sheet at the front of the manual for available options), connect a supply of clean, dry instrument air at 80-120 PSI (approx. 550-820 kPa) to the inlet port of the purge system's air purge pressure regulator. This should be a minimum ⅜" (14 mm) tube.

Once the gas is connected, the valve is opened and regulator pressure set, check all connections for leaks using soapy water.

START-UP AND USE

Move the power switch to 'ON.'

The touchscreen display will turn on and begin a warm up countdown of 30 minutes. During the start-up sequence, the ZERO valve will automatically be opened and allow the zero gas to zero the infrared detector. This occurs every time the analyzer is switched on.

Note: For troubleshooting purposes only, the 30 minute countdown on start-up may be bypassed by pressing the bottom left corner of the screen. This may be done at any time after the first 5 minutes of the countdown. Bypassing the countdown before normal operation may cause the analyzer to not function correctly.

There should be a flow of approximately 1 LPM on the flow meter. Use the knob on the front of the flow meter to adjust the flow if necessary.

After the warm up period is over, or it has been by-passed, the screen will display the MAIN MENU (Menu 1-2). The analyzer has been carefully calibrated at Nova before shipment so the readings on the touchscreen should be very close to the content of the process gas.

SETUP USING TOUCHSCREEN MENUS

*****Note: Screen map menus for your analyzer may not appear exactly as shown. They may differ with the ranges and option packages specified for your analyzer. See the Gas Analyzer Calibration and Data sheet at the front of the manual for information on the ranges and options ordered with your analyzer.*****

The analyzer's touch screen is menu driven, allowing easy navigation of the analyzer's settings. Each screen has an exit or back button so that the operator may exit the menu or return to the previous screen.

The Warm-Up Screen **(FIGURE 2)** displays the model and serial number of the analyzer. After approximately 2 seconds after the power switch is turned on, a countdown will begin, indicating the warm up period. When the warm up period is complete, the **main** Menu **(FIGURE 2)** will appear. This screen displays the gas readings and any alarm messages that may appear.
Note: The analyzer will automatically disable user input for 10 seconds (or longer depending on if a sequence has already been initiated) when an "ABORT" command is initiated on the touchscreen. This is a preventative safety measure to ensure proper operation of the analyzer.

Setup

From this main screen, select 'SETUP' **(FIGURE 2)** to display the 'SETUP' screen 1-3. Here there are 5 selections plus an EXIT.

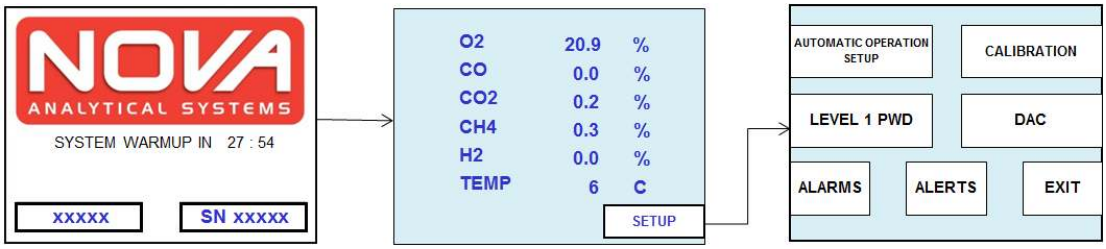

FIGURE 2

Autocal

Select 'SYSTEM TIME SETUP' **(FIGURE 3)** to set the analyzer's date, time and day of the week.

Note: A number from 1-7 represents each day of the week. Ex. 1=Monday, 2=Tuesday, etc.

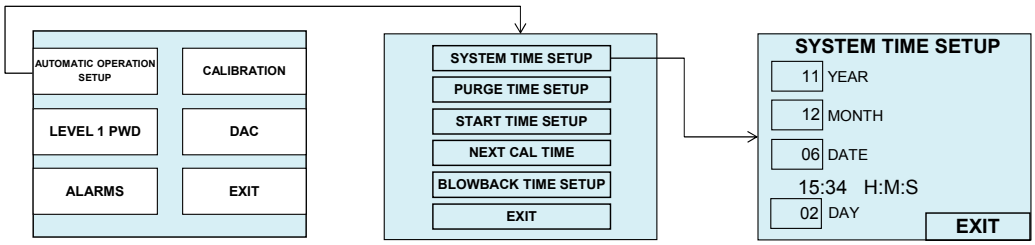

FIGURE 3

Select 'PURGE TIME SETUP' **(FIGURE 4)** to set the purge duration.

Note: Nova does not recommend reducing the PURGING TIME below 2 minutes.

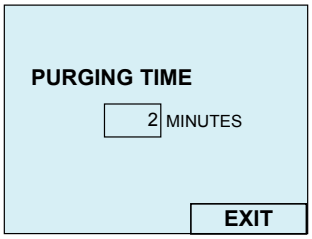

FIGURE 4

Select 'START TIME SETUP' **(FIGURE 5)** to enter the date and time between autocals.

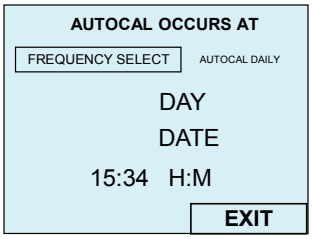

FIGURE 5

Select 'NEXT CAL TIME' **(FIGURE 6)** to view the day and time of the next autocal.

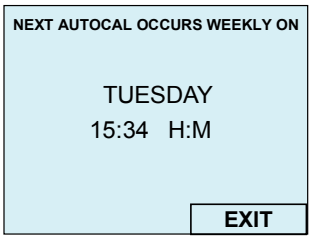

FIGURE 6

Select 'BLOWBACK TIME SETUP' **(FIGURE 7 – OPTIONAL, for use when 7240 HFC also ordered)** to set the blowback period (how often the blowback should initiate), duration and burst frequency. Initially the duration is set for 10 seconds.

The maximum number of bursts can be set to 4 and the maximum duration can be set to 10 seconds.

Note: To turn off AUTOBLOWBACK, set the PERIOD to '0'. However, a manual BLOWBACK can still be initiated according to the BURSTS and DURATION selected.

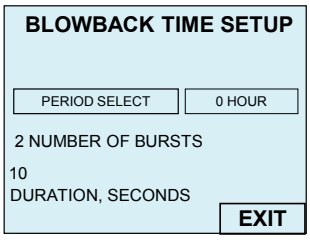

FIGURE 7

Please note the following:

- **In order for an autocal or cal now to occur the analyzer must sense the span gas pressure at the span gas inlet port. Otherwise, it will retain the last auto cal correction settings and a SPAN FAIL alarm will appear.**

- **Only the span gas cylinder connected to the analyzer will be spanned. When multiple cylinders are required, the SPAN operation will calibrate only those gases that are present in the span gas cylinder and which are with 25% (nominal) of the SPAN SETTING value. Therefore separate, manual calibrations will need to be performed if calibration of multiple ranges is required.**

- **When multiple cylinders are used for span, a CALFAIL alarm will be triggered for each channel for which there is no calibration gas present. This alarm will latch. To eliminate this alarm, enter the ALARMS screen and push RESET. To prevent this alarm, enter 0 in the SPAN SETTING for the gas that is NOT being calibrated.**

- **The time it takes for a manual or auto zero to complete will vary, depending on the setting for IR Zero Wait Time.**

- **Upon completion of every calibration, sample gas will be re-introduced prior to completion of the calibration sequence, and for the duration shown in the in the Purge Time Setup Menu.**

Calibration

Select 'CALIBRATION' **(FIGURE 8)** to enter the span gas settings, as well as to automatically or manually zero/span the analyzer and to initiate a Cal Test.

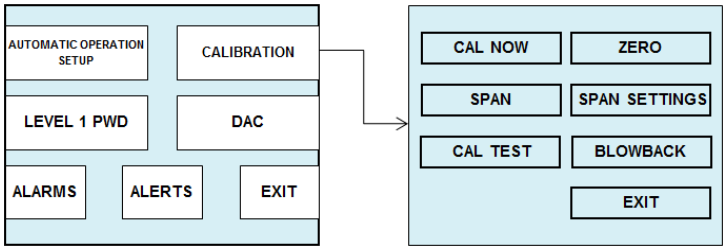

FIGURE 8

Span Settings

Touch 'SPAN SETTINGS' **(FIGURE 9)** to enter the span values for O_2, CO_2 and CH_4.

The tag on the span gas cylinder will indicate the values of the gases present in the cylinder. Enter these values into the SPAN SETTINGS menu by touching the appropriate box. A small keypad will appear when each box is touched. Enter the correct value, including the decimal place, then press 'ENT'. Press 'CLR', to clear the box if the number has been entered incorrectly.

Once the span gas values have been entered they will not need to be entered again until that span gas cylinder is replaced.

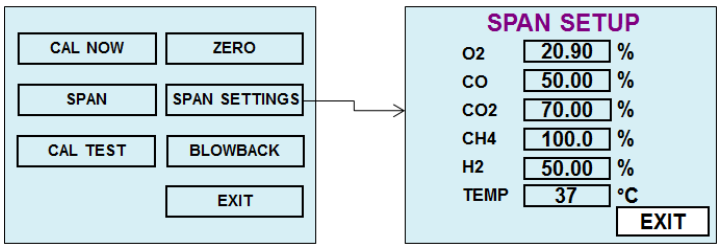

FIGURE 9

Autozero

The auto calibration mode can be set to an autozero mode. This mode functions similarly to autocal, except that the span sequence is not done. During the zero sequence, much of the drift due to ambient temperature and pressure changes can be corrected by a ZERO of the Nova infrared detector. This mode would be used in the event that analyzer requires automatic calibration, but span gas in unavailable, or to keep the analyzer running with optimal accuracy, without the use of span gas. It should be noted that during the entire ZERO PURGE, ZERO and SAMPLE PURGE sequence of the autozero process, the last 4-20 mA readings prior to the start of the sequence will be held, so that the autozero sequence will not be shown in the control room.

Note: For analyzer's installed outside, it is highly recommended that the autozero feature be activated. To do so, enter the Level 1 Password screen. The password is 270. Then enter the NOVA setting screen and enable AUTOZERO, rather than AUTOCAL. The purge time should be set to 2 minutes. Once complete, exit the PASSWORD are and enter AUTOCAL – START TIME SET-UP. Select daily calibration frequency at a time that is suitable. The AUTOZERO sequence will zero the analyzer daily. If N_2 is being used for zero, it will need to remain connected to the analyzer at all times.

Manual Zero and Span

To manually reset zero on the analyzer without a full calibration, press 'ZERO' on the calibration menu **(FIGURE 10).** The Zero Menu will appear and zero gas (air) will begin to flow into the analyzer. Once the readings have stabilized, select 'SET' to zero the CH_4 reading and to span O_2 or 'ABORT' to cancel. After 15 seconds, the CO_2 and CH_4 readings will be set to zero and the O_2 reading will be spanned to 20.9% (the O_2 content of ambient air).

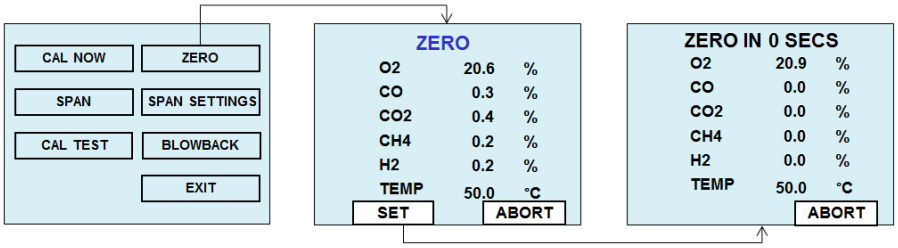

FIGURE 10

To manually reset span on the analyzer without a full calibration, press 'SPAN' on the calibration menu **(FIGURE 11).** The Span Menu will appear at which time the span gas will begin to flow into the analyzer. Wait for 1-2 minutes for the readings to settle. Once the readings have stabilized, press 'SET' to span or 'ABORT' to cancel. After 15 seconds, the CO_2 and CH_4 readings on the touchscreen will be reset to the values that were entered in the 'SPAN SETUP' Menu and the O_2 reading will be zero.

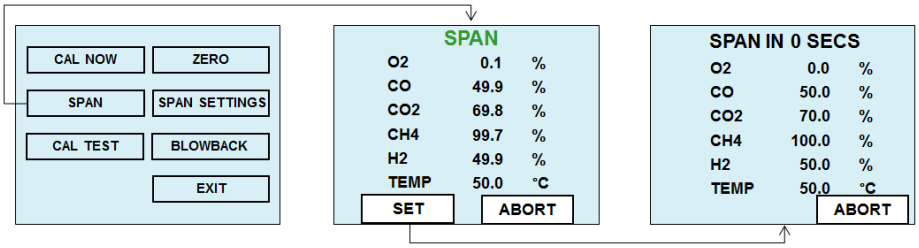

FIGURE 11

Please note the following:

- **In order for an autocal or cal now to occur the analyzer must sense the span gas pressure at the span gas inlet port. Otherwise, it will retain the last auto cal correction settings and a SPAN FAIL alarm will appear.**

- **Only the span gas cylinder connected to the analyzer will be spanned. When multiple cylinders are required, the SPAN operation will calibrate only those gases that are present in the span gas cylinder and which are with 25% (nominal) of the SPAN SETTING value. Therefore separate, manual calibrations will need to be performed if calibration of multiple ranges is required.**

- **When multiple cylinders are used for span, a CALFAIL alarm will be triggered for each channel for which there is no calibration gas present. This alarm will latch. To eliminate this alarm, enter the ALARMS screen and push RESET. To prevent this alarm, enter 0 in the SPAN SETTING for the gas that is NOT being calibrated.**

- **The time it takes for a manual or auto zero to complete will vary, depending on the setting for IR Zero Wait Time.**

- **Upon completion of every calibration, sample gas will be re-introduced prior to completion of the calibration sequence, and for the duration shown in the in the Purge Time Setup Menu.**

Cal Now

Pressing 'CAL NOW' **(FIGURE 12)** will put the analyzer through a complete zero and span calibration. 'CAL NOW' will not alter the timed auto cal settings.

Before performing an auto calibration on the analyzer, make sure the gas cylinder(s) are turned on and are connected to the analyzer.

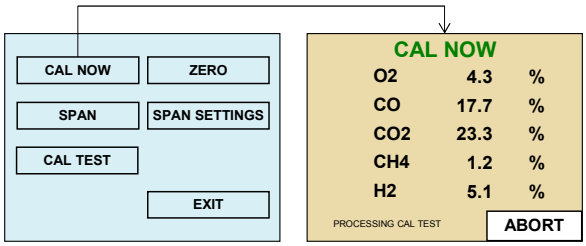

FIGURE 12

Note:

- **The 'CAL NOW' button on the touch screen performs the same function as the magnetically actuated CAL NOW sensor that is located below the touch screen. A 'MAGCAL' cannot be initiated if low zero or low span alarms are active.**

- **In order for an autocal or cal now to occur the analyzer must sense the span gas pressure at the span gas inlet port. Otherwise, it will retain the last auto cal correction settings and a SPAN FAIL alarm will appear.**

- **Only the span gas cylinder connected to the analyzer will be spanned. When multiple cylinders are required, the SPAN operation will calibrate only those gases that are present in the span gas cylinder and which are with 25% (nominal) of the SPAN SETTING value. Therefore separate, manual calibrations will need to be performed if calibration of multiple ranges is required.**

- **When multiple cylinders are used for span, a CALFAIL alarm will be triggered for each channel for which there is no calibration gas present. This alarm will latch. To eliminate this alarm, enter the ALARMS screen and push RESET. To prevent this alarm, enter 0 in the SPAN SETTING for the gas that is NOT being calibrated.**

- **The time it takes for a manual or auto zero to complete will vary, depending on the setting for IR Zero Wait Time.**

- **Upon completion of every calibration, sample gas will be re-introduced prior to completion of the calibration sequence, and for the duration shown in the in the Purge Time Setup Menu.**

Cal Test

When a 'CAL TEST' **(FIGURE 13)** is initiated, span gas will flow through the analyzer, allowing the operator to record the sensor outputs (using a data logger or PLC attached to the 4-20 mA outputs) without actually putting the analyzer through a span calibration. This allows the operator to track the drift of the sensor readings for compliance purposes.

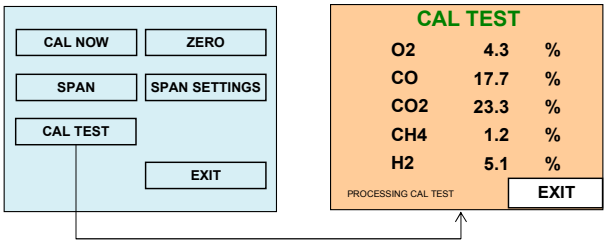

FIGURE 13

Level 1 PWD (Password)

The PASSWORD Menu **(FIGURE 14)** is used when in consultation with a Nova technician who will guide you through additional menus for troubleshooting purposes.

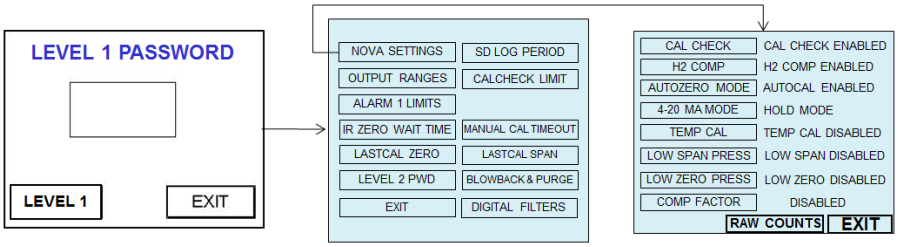

FIGURE 14

Nova Settings

See FIGURE 14.

Cal Check: When Cal Check is enabled, during calibration the SPAN operation will calibrate only those gases that are present in the span gas cylinder and which are within 25% (nominal) of the SPAN SETTING value. Cal Check is factory set to 'enabled.'

Auto Zero/Auto Cal Mode: Allows the operator to select either Auto Zero Mode or Auto Cal mode. The analyzer's factory setting is Auto Cal enabled. Contact Nova for additional information.

4-20 mA Mode: When set to 'Track,' this enables the analyzer 4-20 mA outputs to track the gas readings during calibration. The analyzer is factory set to 'Hold.' Contact Nova for additional information.

Low Zero/Span Press.: Disables the low zero or span pressure alarm to prevent a GENERAL FAULT when the calibration cylinder is closed.

SD Log Period

Allows the user to disable on-board data logging (set to 0) or to set the time between data logging samples **(FIGURE 15).**

Note: If using the SD card for logging, the SD LOG PERIOD must be set to 0 prior to adding and removing the card. The SD LOG period should only be set with the SD card installed.

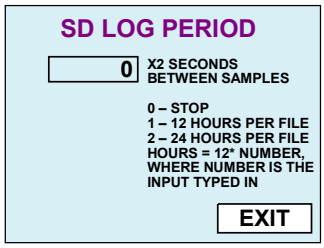

FIGURE 15

Output Ranges

Select "Output Ranges" **(FIGURE 16)** to change the 4-20 mA output range for each gas. Example: 0-25% to 0-50%. The touch screen display will read a decimal number. Example: 25. This value represents the full-scale range of the output of whichever gas has been selected. Changing this value from 25 to 50 will change the full-scale value 4-20 mA output to 50%.

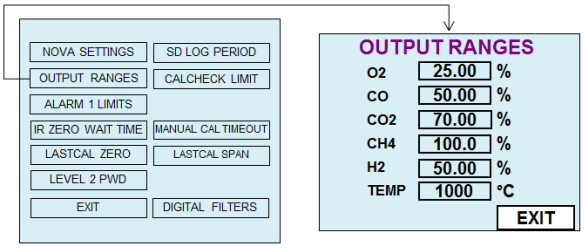

FIGURE 16

Cal Check Limit

Select "Cal Check Limit" **(FIGURE 17)** to change the Cal Check Limit (Factory set to 25%).

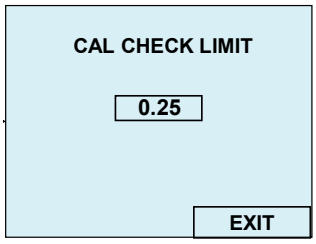

FIGURE 17

Alarm 1/Alarm2 Limits (Optional)

Changes the gas/temperature alarm set points **(FIGURE 18).**

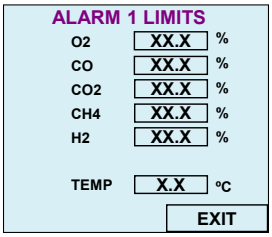

FIGURE 18

IR Zero Wait Time

DO NOT USE. Contact Nova for additional information.

Manual Cal Timout

When the zero or span menus are accessed (in the Calibration Menu), they will time out if action isn't initiated within this specified amount of time. Factory set to 5 minutes.

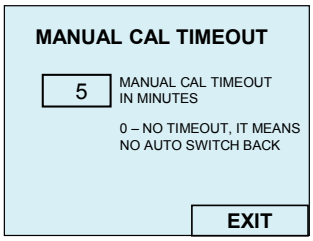

FIGURE 19

Last Cal Zero/Last Cal Span

Allows the operator to view the analyzer response to calibration gas (at ZERO or SPAN) immediately prior to the last successful zero or span calibration **(FIGURE 20).**

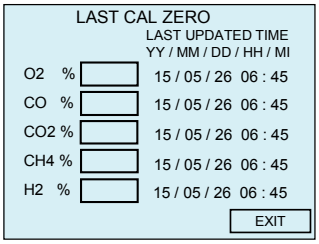

FIGURE 20

Level 2 PWD (Password)

DO NOT USE. Contact Nova for additional information.

Blowback & Purge (Optional)

DO NOT USE. Contact Nova for additional information.

Digital Filters

Used to adjust the digital filter for the infrared detector.

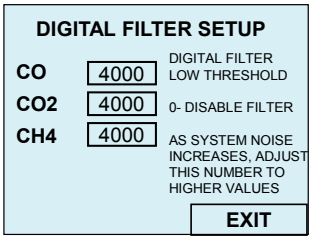

FIGURE 21

Alarms

Press 'ALARMS' to view the ALARM STATUS Menu **(FIGURE 22)**. Active alarms are also displayed on the main screen. Only active alarms will be displayed.

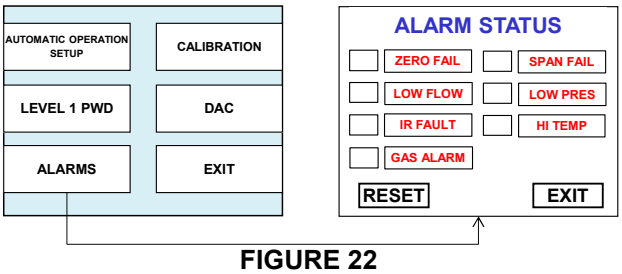

FIGURE 22

The '**ALARM STATUS**' Menu 1-4 is used to view alarms that have been triggered.

ZERO FAIL: There is a greater than 25% full scale difference between the current display reading and the previous reading taken during a ZERO operation. This indicates that the wrong ZERO gas is being used, one of the calibration solenoid valves is leaking, or there is no flow, due to a failed pump or blocked vent, during the zero calibration sequence.

SPAN FAIL: There is a greater than 25% full scale difference between the current display reading, and the previous reading taken during a SPAN operation or the SPAN setting. This indicates that the wrong SPAN gas is being used or that one of the calibration solenoid valves is leaking or there is no flow, due to a failed pressure regulator or blocked vent, during the span calibration sequence...

LOW FLOW: Check the sample pre-filter filter for plugging. This can be done by temporarily removing the incoming sample line to see if the flow resumes. If so, the pre-filter is plugged (Also check the internal pressure gauge). If the sample filter is OK, check that the flow control valve is opened sufficiently to give 1 LPM on the flow meter.

LOW PRES: There is low ZERO or SPAN gas pressure. Check to make sure the calibration gas cylinder(s) are turned on, that there is pressure in the cylinders and that the pressure regulator is set to about 5 PSI. An auto cal will not be allowed if this alarm has been activated.

IR FAULT: There is a greater than 50% full scale difference between the current display reading and the previous reading taken. This indicates that there is a problem with the infrared detector and that it requires service or replacement. An IR Fault alarm will result in a CAL FAIL alarm contact closure.

GAS/HI TEMP ALARMS (OPTIONAL): One or more of the gas or temperature alarm set points has been reached. Touch 'ALARMS' to view the triggered alarm(s). Alarm set points may be adjusted in the PASSWORD area. Contact Nova for more additional information.

Output Set

From the SETUP Menu **(FIGURE 23),** select 'DAC.' These menus govern the 4 mA and 20 mA output calibrations for each gas.

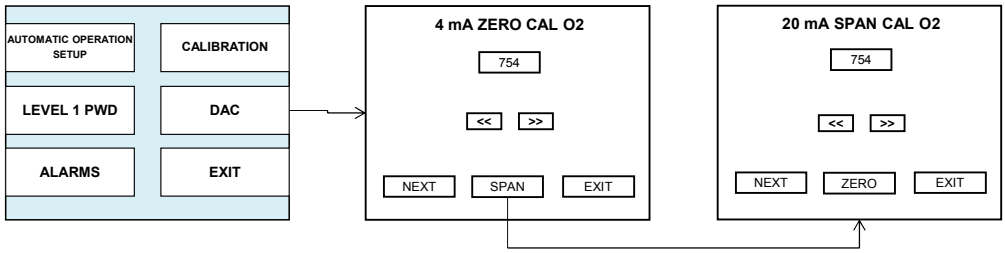

FIGURE 23

Connect a multimeter to the output terminals of the supplied 4-20 mA cable.

Each gas reading is converted to a digital number from zero to 4096. A zero gas reading is usually represented by a number around 750 and a full scale reading is usually a number around 3600. This allows a buffer zone at each end to allow for over and under range indication.

The box displaying the number value may be pressed in order to display a keypad, which allows a different value to be entered. The left or right arrows may also be pressed to decrease or increase the value respectively.

Adjust the value to produce the correct zero reading at the outputs. This value should be 4.0 mA in series with a load. For a 250-Ohm load the zero value should be 1.00 V across the load.

Example: With a 250-Ohm load the output reads 1.106 V. Using the left arrow, adjust the reading until 1.000V is displayed on the multi-meter.

Complete this procedure for each gas. Select 'SPAN' to go to the 20 mA Output Setup menu for that gas or select 'NEXT' to go to the 4 mA or 20 mA menu for the next gas.

Follow the same procedure to correct the 20 mA span side of each gas.

The output calibrations are now complete.

NOVALOGGER INSTALLATION (OPTIONAL)

If the Novalogger option has been ordered, install the program on a PC computer from the CD supplied. You will also be required to install the supplied RS-485 to USB adapter drivers that come with the adapter.

A special cable will be supplied with the analyzer. Plug one end of this cable into the back of the analyzer.

The other end of the cable has a serial converter which converts the RS-485 output to a USB Type A plug for the PC. Plug this adapter into the PC only after all the supplied software has been installed.

The Novalogger software is designed display the same gases as the analyzer that is connected to it. The HELP menu in the Novalogger software and the enclosed Novalogger manual will aid in learning the different display functions.

MAINTENANCE AND TROUBLESHOOTING

****DANGEROUS/EXPLOSIVE GAS CAUTION****

- **Prior to conducting any maintenance or replacing any sensors on the analyzer, close the process isolation valve so that the process gas cannot be vented into the control room or workspace.**

- **The Gas Analyzer that you purchased may contain gases that can create an explosive condition if exposed to ambient air, although this will not occur under normal operation. Care must be taken when performing any maintenance on the equipment (or related sample streams) to ensure that all gas connections are tight and leak free.**

  It is strongly suggested that on a regular basis (every 1-3 months) and following any maintenance, the analyzer gas stream is checked to ensure that all connections are leak free, prior to power being applied. This can be done by temporarily plugging the sample vent lines and verifying that the flow meter indication drops to zero for pumped gas or gas under pressure (compressed air or N_2 can also be used). For pumped samples repeat the same procedure by plugging the sample vent(s). Should the flow not drop to zero, use soapy water to discover and repair the leaks. If, at any time, there is uncertainty about the source or method of repair for sample stream leaks, contact Nova immediately for assistance.

Countdown Bypass

For troubleshooting purposes only, the 30 minute countdown on start-up may be bypassed by pressing the bottom left corner of the screen. This may be done at any time after the first 5 minutes of the countdown. Bypassing the countdown before normal operation may cause the analyzer to not function correctly.

Cabinet Purge Operation (Optional)

Note:

- **Please see the Calibration and Data Sheet at the front of this manual to view the options included with your analyzer.**

- **Under normal field operation conditions, power must be disconnected from the analyzer before the cabinet door can be opened. If power is to be applied with the door open, then an area gas test must be made first to ensure the air around the cabinet is clear of flammables. Follow your own plants safety procedure in all cases.**

Before power can be reapplied, the cabinet must first be closed and then undergo a **three minute** 'Rapid Exchange' purge with air.

Cabinet Leak Detected (Optional)

Note: Please see the Calibration and Data Sheet at the front of this manual to view the options included with your analyzer.

Immediate corrective actions listed below are recommended to correct for the possible presence of explosive, toxic and/or corrosive gases.

1. Power down the analyzer.

2. Shut off sample to the analyzer

3. Remove sample inlet tubing.

4. Plug the analyzer vent(s) and drain.

5. Apply an external source of pressurized air / N_2 (or use sample pump) to pressure the sample stream to 5-10 psig (0.35 – 0.7BAR) MAX.
6. Apply soapy water, or equivalent leak detector fluid, any joints or components in the sample stream. Check pumps, filters and liquid blocker first.
7. Note: Apply only very small amounts of liquid to potential leaks points, and do not apply to any liquid to electronics or electrical components or permanent damage may occur.
8. Leaks will present as small bubbles.
9. Tighten joint or replace component that is leaking, until all witness of small bubbles is gone.
10. Check all parts in the sample stream so that multiple leaks can be eliminated
11. Reconnect sample tubing
12. Power up the analyzer.

Note: if the cabinet leak alarm persists, consult Nova for further instructions on troubleshooting or recalibrating the leak detector.

Flow

Once a day, check the flow meter for a flow of 1 LPM. Also check to make sure that there are no alarm indications on the display.

If the flow is getting low, adjust the flow control knob on the front of the flow meter. There should be a flow of 1 LPM.

If the flow is still low, check the 7240 HFC filter, it could be getting plugged up.

CAUTION, Parts inside this cabinet are hot. Make sure the power is turned off before opening the cabinet. Always wear heavy gloves.
If flow is still low, check the bowl filter element in the main analyzer. Replace if necessary.

If the flow is still low the liquid block inside the main analyzer may be plugged with moisture. The PTFE membrane in the liquid block can either be left to dry or replaced.
To replace the PTFE membrane, sample gas must first be isolated using a customer-supplied shut-off valve mounted near the process. Once closed, the top of the liquid block can be unthreaded to expose the membrane for drying or replacing. In ambient air, it will take 2-3 hours to properly dry. Prior to replacing the liquid block and reactivating sample, the cause of the presence of condensate in the liquid block must be determined. See the Condensate Discharge section below for more details.

Note: The analyzer must not be operated without these filters in place.

Condenser Troubleshooting

Temperature Drops Some, But Not All The Way Down To 5 °C (40°F)

Exhaust Fan Failure: Look at the underside of the cabinet and check that the fan is running. If not, check to see if there is a 12VDC signal appearing at WP5 and WP6 of the TEC Control Module **(Located under TB4 cover plate.)** If 12VDC is there, the problem is the fan has stopped working and must be replaced.

Thermoelectric Cooling Assembly Failure: If 12 VDC is found at WP5 and WP6 and the cooling fan is turning, then either the TEC Control Module or the thermoelectric cooling assembly has failed.

To see if the controller is OK, check the voltage at terminals WP1 and WP2 on the controller. It should be close to 12VDC. If no voltage is there, then the control module is faulty. Replace it.

If 12VDC does appear at WP1 and WP2, and the temperature shown on the front panel is showing room temperature, then the thermoelectric cooling unit has failed. It should then be replaced.

To replace the T/E cooling unit, obtain a new cooling assembly. Begin by removing the outlet tube at the top by pressing in on the white collar and pulling out on the tube at the same time. Next, remove the insulation sleeve. This will expose the condensate trap.

Lift off the top half of the square insulation. Each half consists of two layers glued together. This will expose the four mounting screws for the cold transfer plate. Remove the inlet and outlet tubes and the remaining insulation.

Remove the mounting screws and lift off the plate. Move it to one side. The thermistor wires will still be attached. Remove the four base screws from the underside of the cabinet, then remove cooling unit. Remove the 4 wires that are connected to the terminal strip, making note of where each wire is attached.

Transfer the base plate over to the new cooler unit. Reconnect the wiring to the terminal strip on the side of the new cooler unit. Make sure that the wires going to the TE element and the fan match up with the old unit. If there are jumpers on the new one, remove them.

Temporarily power up the unit. Check the airflow from the fan, it should blow downward. If it does not, remove the fan and flip it over.

Remount the new cooling unit back into the bottom of the cabinet.

Remount the cold plate with the four screws to the bottom of the cabinet, then reinstall the lower section of insulation.

Reconnect the inlet and outlet tubes then reinstall the upper section of insulation. Install the insulation sleeve back over the condensate trap, then reconnect the outlet tube.

With power applied, wait several minutes. The temperature should begin dropping and then level off at approximately 41 °F (5 °C). If it does not level off, but instead continues dropping below 5°C, check the voltage on the two leads that go the TE element. It should be around 6-8 volts. If it is still at 12VDC, then check the fan leads. The fan should always be 12VDC. The leads may be reversed.

Very Little or No By-pass Flow From DRAIN Port

Disconnect incoming sample line to see if flow resumes. If it does, then the sample line itself or an upstream filter is plugged. If the by-pass flow does not resume, unscrew the external filter bowl to see if inlet filter is plugged. If so, replace it.

If replacement of the filter does not allow the flow to resume, check the drain pump.

No Sample Outlet Flow

Make sure the sample and drain pump are both running and the sample line to the analyzer is disconnected. The temperature should also have dropped on the controller display, indicating that there is DC power available to the pump.

Adjust the knob on the flow meter. If there still is little or no flow then check to see if the outlet tube from the top of the cooler or from the pump has become disconnected.

If everything looks functional, then the cause may be a plugged bowl filter element or worn out tubing.

No Condensate Flow from the Drain

As the filter element begins to plug up, less and less sample gas will be by-passed out of the DRAIN port. There will be no reduction in flow on the front panel flow meter.

To test this by-pass flow, connect a short tube to the DRAIN port and place the other end of the tube into a container of water. If there is a good flow of bubbles, then the sample filter is in good condition. If there is no flow here, then the condensate will not be carried out of the condenser. The filter element will then need to be replaced.

CAL FAIL Alarm

In the event of a **Zero Fail, Span Fail** or **IR Fault**, or a CAL FAIL alarm contact closure, the most likely cause for this is a solenoid valve failure, zero pump failure or power failure with incorrect restart. Also check to be sure that the span gas has about 5-10 PSI of pressure showing at its regulator.
The recommended process for eliminating the CAL FAIL alarm is as follows:

1. Under the main menu, enter the PASSWORD screen. The password is 270.
2. Under the password protected screen, ensure that CAL CHECK is disabled.
3. Return to the calibration screen.
4. Enter ZERO –ensure that there is 1 LPM of flow on the front flow meter.
5. Wait for the readings to settle.
6. Take a multi-meter and measure the voltage on the O_2 terminal of TB5 – Verify that there is approx. 12 mV coming from the O_2 sensor on air. Make note of the reading.
7. If the reading is reasonably stable, press SET.
8. Enter SPAN.
9. Wait for the readings to settle. Make note of the readings.
10. Take a multi-meter and measure the voltage between the CO and CO_2 SIG + and – at terminal TB5 – Verify that there is 3-5 V is coming from each channel of the infrared detector on span gas. Make note of the readings.
11. If the readings are reasonably stable and within acceptable limits, press SET.
12. If the readings at TB5 are unacceptable, see further sensor troubleshooting information below or contact Nova.
13. Do a CAL NOW. Ensure that the purge time is at least 2 minutes.

If the alarm persists, check the solenoid valves for flow impediments or for stickiness by ensuring that the correct gas flows when ZERO, SPAN or SAMPLE is selected.

If there is uncertainty about whether the solenoid valves are sticking, direct a clean source of air into the bottom of the flow meter (on the side of the cabinet and enter ZERO), bypassing the suspect solenoid valves. If the readings are different than the previous ZERO (step 2 above), the SAMPLE/CAL solenoid valve (SV1) needs to be cleaned or replaced.

If the readings are the same, then direct the span gas into the bottom of the flow meter, bypassing the suspect solenoid valves. If the readings are different than the previous SPAN (step 12 above), the span solenoid valve (SV2) needs to be changed.

Once the source of the CAL FAIL has been determined and corrected, re-calibrate the analyzer using the manual ZERO and SPAN features with the CAL CHECK enabled. To enable CAL CHECK, enter the PASSWORD screen, type in the password (270) and then enter NOVA. Enable CAL CHECK and then EXIT.

When complete, perform a CAL NOW and verify that the CAL FAIL alarm has de-latched.
Return to the PASSWORD screen and clear the password.

O_2 Sensor

The O_2 sensor is an electrochemical sensor with a life expectancy of approximately 1-3 years. The analyzer's O_2 reading will become unstable with the depletion of the O_2 sensor. A reading that behaves erratically (more than ± 0.5% oscillations) would indicate that a new sensor is required.

See Appendix B for replacement instructions.

Infrared Detector

The CO, CO_2 and CH_4 detector is an optical device that does not deplete over time. This detector consists of two components – the small cylindrical detector and a microprocessor board, all housed in a temperature-controlled chamber.

If the analyzer is unable to read the correct levels of CO, CO_2 or CH_4 present in the span gas mixture, or if the gas readings become erratic, the detector has likely become contaminated and needs to be cleaned. Cleaning should only be performed as a last resort and is not recommended on a regular basis. **See Appendix B** for detailed cleaning instructions.

If the readings are still below the span gas value, or if they are erratic, the IR source output may have dropped too low and needs to be changed. To do so, contact Nova for a replacement emitter source. Refer to the cleaning instructions in **Appendix B** for guidance on replacing the source.

To determine if the detector has been caused to fail, the output of each channel may be read by using a voltmeter connected to the terminals on TB5, located on the side the heated chamber. By introducing zero and span gases, the output voltages should change from zero to approx. 3-5 V, depending on the span gas level and range.

If there is no output change with calibration gases, then replace the detector. **See Appendix B for replacement instructions.**

Hydrogen T/C Cell

The thermal conductivity cell is a non-depleting type and has a life expectancy of 20 years or more unless physically damaged by shock or corrosive gases.

See Appendix B for replacement instructions.

FACTORY SERVICE

If the analyzer must be returned to NOVA for warranty, repair or service, please call for a return authorization number. For out of warranty repairs, a purchase order number should follow once the cost of repairs has been determined.

Send the analyzer back prepaid with at least 4" of padding surrounding it on all sides.

Ensure the RMA number as well as the model and serial number of the analyzer are clearly marked on the outside of the box in permanent marker.

PARTS LIST FOR NOVA MODEL 975A

TO ORDER SPARE PARTS EMAIL spareparts@nova-gas.com OR CALL 800-295-3771

*******PLEASE *PROVIDE MODEL AND SERIAL NUMBER* WHEN ORDERING SPARE PARTS. THE MODEL AND SERIAL NUMBER ARE LOCATED ON THE CALIBRATION AND DATA SHEET AT THE FRONT OF THIS MANUAL.*******

DESCRIPTION	PART NO.
Small Bowl Filter Complete	975-TGI4772FILTER
*Small Bowl Filter Element	975-TGI1047FILTER
*Sample Pump	975-TGI8099PUMP
#10 Relief Valve	975-TGI3491VALVE
Thermoelectric Cooler Assembly	975-TGI63505SUB
TE Cooler	975-TGI7490COOLERREL
TE Cooler Thermocouple	975-TGI6704THERMOCPLE
TE Cooler Exhaust Fan	975-TGI7969FAN
*Peristaltic Pump Motor	975-TGI6569PUMPREL
*Step down Transformer	975-TGI8733TRANSFORMR
*Peristaltic Pump Head	975-TGI6522PUMP
*Peristaltic Pump Fan Blade	975-TGI6524PUMP
Liquid Block (SM015)	975-TGI7452FILTER
*Replacement Liquid Block Membrane	975-TGI6454FILTER
Sample/Cal Solenoid Valve SV1	975-TGI5965VALVE
Flow Meter	975-TGI3730FLOWMETER
Low Flow Switch	975-TGI2327SWITCH
Oxygen Sensor	975-TGI1837SENSOR
CO, CO_2, and CH_4 Infrared Detector	975-TGI50354SUB
Hydrogen T/C Cell	975-TGI50209SUB
Pressure Regulator	975-TGI5622REGULATOR
Suction Strainer (Air In Port)	975-TGI5874FILTER
*Air Scrubber	975-TGI1066FILTER
*Zero/Purge Pump	975-TGI2891PUMP
Zero/Span Solenoid Valve, SV3	975-TGI5443VALVE
Temperature Controlled Chamber Assembly	975-TGI63224SUB
Touchscreen Display	975-TGI4957DISPLAY
Power Switch	975-TGI2602SWITCH
Temp Controller for TE Condenser	975-TGI6703CONTROLLER
Temp. Controller for Heated Chamber	975-TGI3007CONTROLLER
Thermocouple	975-TGI4786THERMOCPLE
Heater Pad for Heated Chamber (2)	975-TGI5889HEATERREL
Main Microprocessor Board (NGC-01)	975-TGI63101SUB
Microprocessor Power Supply (PS01)	975-TGI63100SUB
4-20 mA Output Board (420SM2) – O_2, CO	975-TGI63005SUB-#1
4-20 mA Output Board (420SM2) – CO_2, CH_4	975-TGI63005SUB-#2

4-20 mA Output Board (420SM2) – H_2	975-TGI63005SUB-#3
12 VDC Power Supply	975-TGI2672WRSUPPLY
24 VDC Power Supply	975-TGI4261PWRSUPPLY
Alarm Board (SSRC8)	975-TGI63009SUB
Alarm Relay	975-TGI8358RELAYREL
'CAL NOW' Hall Effect Switch	975-TGI50358SUB
HFC Heater SSR	975-TGI8578RELAY
HFC Temperature Controller	975-TGI5099MISC
*2A Fuse, Analyzer Power Fuse	975-TGI2986FUSEREL
*5A Fuse, Cabinet Temp. or 7240 HFC	975-TGI3781FUSEREL
1A FUSE, Cabinet LEL Det. (Optional)	975-TGI2902FUSEREL
RS485 to USB Cable (Optional)	975-TGI5393WIRE
*Magnetic Wand	975-TGI6123MISC
Modbus (Optional)	975-TGI6430MISC
Flame Arrestor	975-TGI50612SUB
Cabinet LEL Detector (Optional)	975-TGI6267SENSOR
Cabinet Fan	975-TGI4189MISC
Cabinet Heater/AC	975-TGI7883COOLER
Surge Suppressor	975-TGI6176MISC

*** Recommended Spare Parts**

SPARE PARTS LIST FOR NOVA MODEL 7240 (OPTIONAL)

TO ORDER SPARE PARTS EMAIL spareparts@nova-gas.com OR CALL 800-295-3771

*******PLEASE *PROVIDE MODEL AND SERIAL NUMBER* WHEN ORDERING SPARE PARTS. THE MODEL AND SERIAL NUMBER ARE LOCATED ON THE CALIBRATION AND DATA SHEET AT THE FRONT OF THIS MANUAL.*******

DESCRIPTION	PART NO.
*19" Hi Temp Sampling Probe	7240-TGI50700FABSUB
Shut-off Valve	7240- TGI6167VALVE
Sample Filter Complete	7240- TGI5608FILTER
*Sample Filter Element	7240-TGI1033FILTER
*Heater Element	7240-TGI3690HEATER
3-Way Blowback Spool Valve	7240-TGI2332VALVE
Thermocouple (type K)	7240-TGI3168MISC
Pilot Solenoid Valve	7240-TGI5443VALVE
Blow Back Relief Valve	7240-TGI3984VALVE

*** Recommended Spare Parts**