



Users Manual

J.U.M. Total Hydrocarbon Analyzer HFID 3-500

Please read this manual thoroughly and follow all warnings and instructions!



WARNING



A person who has not read and does not understand all operating instructions is not qualified to operate this instrument. Failure to read and understand safety instructions and warnings can result in injury or death!

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J.U.M. reserves the right to make improvements to the product described in this manual at any time without prior notice. Further, J.U.M. reserves the right to revise this manual and to make changes in its content without obligation to notify any person or organization of such revision or change.

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1. Safety Instructions

- Please read this manual thoroughly and follow all warnings and instructions.
- Save this manual as a future reference.
- When handling the instrument be aware that the instruments front panel, casing and rear panel bulkhead connectors have sharp edges!
- Do not place the analyzer on an unstable cart, stand or table. The analyzer might fall causing serious damages and/or personal injuries.
- The analyzer must be operated in a clean and dry environment which is not subjected to excessive vibration or extreme temperature variations.
- Prevent any kind of liquid from entering the instrument.
- The analyzer must be operated with the line voltage specified in the data sheet and on the serial number label.
- Replace fuses only with the same type of fuse with the exact same electrical specifications. The use of other fuse types or operating the analyzer with repaired fuses or with the fuse short circuited may result in a fire, serious personal injury and/or damage of the analyzer. Damages are not covered by our limited warranty.
- Use only the power cord supplied with the instrument. If an extension cord is used observe the maximum allowed power ratings. Never use non-grounded power cords or extension cords.
- Do not allow anything to rest on the power cord. Do not lay cord in sharp bends or where persons can trip over or walk on the cord.
- The analyzer must be operated using the gases specified in the data sheet and in the calibration procedures.
- Use only the specified materials for gas supply tubing.
- Do not allow anything to rest on the gas supply tubing. Do not lay tubing in sharp bends or where persons can trip over or walk on the tubing.
- Do not exceed the maximum allowed voltage/current ratings for the dry alarm and/or identification contacts. Damages to the analyzer or any peripheral instruments caused by incorrect voltage/current are not covered by our limited warranty.



- Always observe the times given for the calibration and all other operational procedures.
- Do not put any objects through the openings and venting holes in the cabinet. The analyzer contains high rpm fans and parts that are operated at line voltage. This could result in a short, fire or severe personal injury.
- Do not block air intakes and fan exhausts. This could cause the analyzer to overheat and create a major safety hazard.
- Always disconnect AC power and all supply gases before opening the analyzer.
- Do not attempt to service or repair the analyzer yourself. Refer all maintenance and repair work to factory authorized service personnel. Please contact your sales representative or one of our factory service centers. The addresses for all J.U.M. offices can be found on the last page of this manual.
- If you are experiencing difficulties or problems with your instrument always contact your sales representative or J.U.M. Engineering immediately.
- Use only original J.U.M. components and replacement parts. The use of non-J.U.M. parts voids all warranties.
- Damage or removal of any type of seal (lacquer, label or lead wire tag) will void all warranties.
- Never store, rest or operate the analyzer upside down or on its front or back panel.
- Under no circumstances should flammable objects, materials, liquids and/or gases be stored near the analyzer.
- Follow all federal and local regulations regarding handling and storage of compressed and flammable gases.

2 Other Important Information

2.1 Unpacking the Instrument

Take great care when unpacking the instrument. **Be aware of the weight of the analyzer.** Incorrect lifting or dropping of the instrument may cause serious personal injury. Carefully remove the protective foil around the instrument and the protective caps over the gas connectors. **Do not discard the shipping box. It must be used to return the instrument in the event of a warranty repair.**



2.2 Sensitivity of the Instrument

The Model 3-500 Analyzer is a highly sensitive total hydrocarbon monitor. It is used to measure trace hydrocarbon contamination in the **parts-per-million** (ppm) range. To understand the sensitivity of this type of measurement, consider this:

One part per million is the equivalent of about one ounce of contamination in a typical 10,000 gallon railroad tank car, full of water.



To maintain the integrity of the measurement of trace hydrocarbons in the sample stream, avoid any dust, dirt, liquid and/or hydrocarbon contamination from extraneous sources. Contamination can severely effect the performance of the analyzer and will lead to incorrect readings.

Make sure that all gas supply lines and cylinder regulators are kept scrupulously clean. If necessary use clean gloves and/or forceps when handling components or any part that comes in contact with the sample gas, fuel gas, span/zero gas, or burner air supply streams.

2.3 High Temperature Hazard

Several parts of this instrument are maintained at high temperature (up to 410°F), as required by the United States Environmental Protection Agency and other environmental agencies worldwide for exhaust emission test procedures. The heated oven is located in the right rear half of the instrument. Thus the back panel, the right side panel, the bottom and the cover plate are also very hot. To avoid personal injury do not touch the instrument during warm up, operation and cool off. Wait at least 60 minutes after analyzer was turned off before touching the unit.

2.4 Toxic Gas Hazard

Sample bypass flow exits the instrument through the BYPASS fitting on the back of the instrument. When the sample gas is containing any toxic gases or components like carbon monoxide or benzene, the bypass stream will also contain these toxic gases. Therefore make sure that the bypass exhaust is conducted to a safe disposal area.

2.5 Shipping of the Instrument

Important: If the analyzer has to be shipped always use a shipping container the same size or larger than the original J.U.M. box. Provide enough padding, at least 15 cm (6") of medium soft foam rubber or tightly packed styrofoam flakes on all sides of the instrument. Always wrap a protective foil or bag around the analyzer to prevent dust, moisture and packing materials from entering the instrument. **NEVER SHIP THE UNIT MOUNTED IN OR HANGING IN A RACK!**



2.6 Packing List

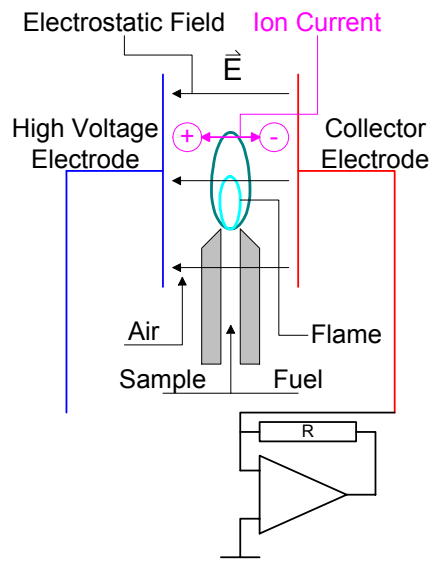
Qty.	Description	Part No.
1	THC FID Analyzer Model 3-500	
1	Users Manual, English	
1	Parts package consisting of:	
1	Power cord	
1	Fuse 4,0A (230 VAC)	3.504.000
1	Fuse 6.3A (115 VAC)	3.506.300
1	Recorder cable, 2 m (7 ft.)	
1	25-in Sub-D Plug (male)	
1	Plastic housing for Sub-D Plug	
1	Alan key 1.5 mm	
1	Alan key 2.5 mm	
1	Igniter # __ (see also label inside analyzer for #) . . .	3.504.00_
1	Pump diaphragm	3.500.006
2	Pump valves	3.500.007
1	Pump gasket (cold pump)	3.500.009
1	O-ring set f. heated pump (set of 2)	3.501.207
1	Single-Use Sample Filter Cartridge	3.505.789
1	Sample Filter O-Ring	3.503.020

3. The FID Principle

All J.U.M. Engineering heated total hydrocarbon analyzers, our non-methane hydrocarbon analyzer and our non-methane/non-ethane hydrocarbon analyzer use the Flame Ionization Detection (FID) method to determine the presence of total hydrocarbon concentrations in a gaseous sample:

Burning hydrocarbon-free hydrogen in hydrocarbon-free air produces a negligible number of ions.

Once a sample containing hydrocarbons is introduced into this flame a very complex ionization process is started. This process creates a large number of ions. A high polarizing voltage is applied between the two electrodes around the burner nozzle and produces an electrostatic field. Now negative ions migrate to the collector electrode and positive ions migrate to the high voltage electrode. The so generated ionization current between the two electrodes is directly proportional to the hydrocarbon concentration in the sample that is burned by the flame. This signal is measured and amplified by our electrometer-unit.



4. Description

The J.U.M. Flame Ionization Analyzer Model 3-500 is a heated analyzer designed to continuously measure the concentration of total organic hydrocarbons in a gaseous sample. The sample can be ambient air, or the exhaust gases from a combustion process etc. The measurement is obtained by using the Flame Ionization Detector (FID).

It meets the requirements for 2. BlmSchV, 13 BlmSchV and 17. BlmSchV and meets the requirements of EPA CFR 60 Method 25A and EPA CFR 40 Method 503.

The Model 3-500 is supplied in various versions through the use of options. The standard instrument has five total hydrocarbons measuring ranges: from 0-10 to 100,000 ppm with 10:1 decade range adjustment; Flame Out Indication on the front panel via dual color LED (red LED - flame is out, green LED - flame is lit); 0-10 VDC and 4-20 mA recorder outputs. Calibration gases are introduced into the analyzer through the sample inlet (overflow setup required! see also page 43).

A sample pressure regulator provides a controlled back pressure at the sample capillary which gives admittance of a constant sample flow rate to the burner. This technique without the conventional back pressure regulator is used by J.U.M. Engineering for over 30 years to provide the highest possible sample flow rate stability and lowest maintenance. Our compactly designed flow control module for controlling the fuel and air flow rates via needle valves use high precision pressure regulators. The needle valves are factory adjusted and sealed to ensure the optimization of the burner.

The Model 3-500 is specially cleaned at the factory, and "burned in" for 14 days under continuous operating conditions at 190°C (375°F), to remove any residual hydrocarbons in the piping system. Thus, when this instrument reaches the end user, it is totally hydrocarbon background free (less than 0.1 ppm background), so it is extremely important that you equip this analyzer with the highest grade, cleanest gas plumbing system available, in order to allow the analyzer to reach its full potential of measuring trace hydrocarbons.

5. Analyzer Installation

5.1 Operating Conditions

For best results the analyzer must be operated in a clean and dry environment which is not subjected to extreme temperature variations, moisture or vibrations. The ambient temperature range is 5 to 43 °C (41 to 110 °F).



The Model 3-500 is supplied with a power cord pigtail, standard to the industry. The power required is 230 VAC/50Hz, 850 Watts (115 VAC/60Hz, 850 Watts).

See data sheet on page 38 for voltage requirement on this analyzer.



A standard 230 VAC (115 VAC) fuse is mounted on the lower right side of the rear panel. One spare 4 A (6.3 A) fuse is supplied with the spare part package.

Important: ALL GAS SUPPLY TUBING MUST BE TOTALLY HYDROCARBON FREE. The normal tubing used for calibration and fuel gases should be Teflon® tubing, PA or equivalent, 0.25 mm (.010”) wall or better. Stainless steel tubing is a suitable alternate. All gas supply tubing is 1/4” od. **Do not use copper tubing.** Copper tubing always contains residual tooling oils, which can cause very high background readings.



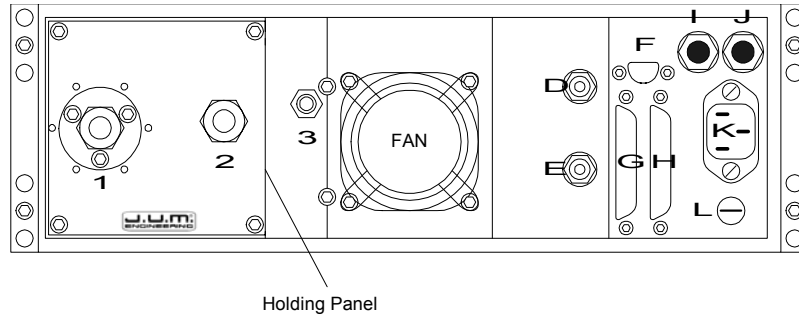
All supply gases for the Model 3-500 in high pressure cylinders should be equipped with specially cleaned, hydrocarbon free, two-stage cylinder regulators, with dual pressure gauges. High pressure gauge range: 0-345 bar (0-34.5 MPa, 0-5000 psig). Outlet pressure gauge range: 0-7 bar (0-0.7 MPa, 0-100 psig).

Important: DO NOT OVER TIGHTEN TUBE FITTINGS! ALWAYS CHECK FITTING FOR LEAKS! Always follow fitting manufacturers specifications when tightening tube fittings!



The gas cylinders must be handled and stored according to all federal and local regulations.

5.2 Rear Panel Layout



#	Description
1	SAMPLE IN & Sample Filter
2	BYPASS
3	FID-EXHAUST
4	AMBIENT AIR IN
5	FUEL GAS IN
6	9-Pin Sub-D Connector RS 232 Data Output
7	25-Pin Sub-D Connector STK 1
8	25-Pin Sub-D Connector STK 2
9	4-20 mA OUT
J	0-10 VDC OUT
K	AC Power In
L	Fuse

5.3 Gas Requirements

5.3.1 Fuel Gas

The Model 3-500 requires fuel gas to power the flame in the Flame Ionization Detector. The standard fuel gas used is 100% Hydrogen, with less than 0.5 ppm total hydrocarbon background, methane equivalent. The analyzer can also be ordered for a 40% Hydrogen - 60% Helium mixed fuel gas. Hydrogen concentration to be $40\% \pm 1\%$, also less than 0.5 ppm total hydrocarbon background, methane equivalent.

For the required fuel gas for this analyzer see page 38.



Fuel gas is connected to the rear bulkhead connector marked FUEL GAS IN. Set the cylinder regulator to an output pressure of 1.5 bar (0.15 MPa, 21 psig). Exact pressure control is required.

Note: The fuel gas dual stage pressure regulator inside the instrument is factory set and locked. Only under emergency conditions should this regulator ever be unlocked, or adjusted. Always contact the factory for instructions, if adjustment of this regulator becomes necessary. **Any unauthorized action on this pressure regulator voids all warranties and will seriously affect the performance of the instrument!**



5.3.2 Burner Air

The Model 3-500 is equipped with an internal burner air supply. This air supply is powered by the second diaphragm pump in the instrument, which not only supplies hydrocarbon free burner air for the burner, but also a pressure reference for the sample capillary. Thus, an auxiliary supply of burner air from an external cylinder or generator is not required, and therefore there is no burner air inlet fitting.

Important: The air purifier cartridge has to be changed/refilled every 18 months to ensure proper function. The initial filling date can be found on the air purifier cartridge.



The necessary air is drawn through the AMBIENT AIR IN fitting. **DO NOT BLOCK THIS INLET! DO NOT APPLY PRESSURE TO THIS INLET!** The internal air pump is equipped with an additional dust filter. Check filter regularly for contamination and replace if necessary.



Caution: Before opening the analyzer to check/change filter turn analyzer off and disconnect electrical power and all supply gases!



Comparison Chart for Filter Contamination				
OK	OK	OK	Change Filter!	

5.3.3 Zero Gas

Zero Gas is either Grade #5 Nitrogen (N₂) or hydrocarbon free synthetic air (CGA fitting 580). Grade #5 is high purity Nitrogen containing less than 0.1 ppm total hydrocarbons (methane equivalent). The choice of zero gas depends on the application.

The choice also depends on the oxygen background in the sample gas and the oxygen synergism effect. Please contact your sales representative or one of our offices for factory recommendation

See page 45 for the oxygen synergism effect.



Zero gas has to be introduced through the SAMPLE IN fitting instruments back panel. A constant overflow of 2.8-3.3 liters a minute has to be provided using an additional T-fitting at the sample inlet

See page 43 for basic overflow calibration setup.



Set the gas cylinder regulators to a pressure of 1 bar (0.1 MPa, 15 psig) on the output pressure gauge. Exact pressure control is required.

5.3.4 Span Gas

Span gas is any part per million hydrocarbons in background Air or Nitrogen. The concentration and background depends on your application. Check with your sales representative or factory for recommendation. The most suitable mixture is Propane (C₃H₈) in Nitrogen or in Synthetic Air in a concentration to give 80-90% full scale on the analyzer range most used. The regulator has a CGA 590 fitting if the propane is balance air, or a CGA 350, if the propane has balance nitrogen.

Span gas also has to be introduced through the SAMPLE IN fitting instruments back panel. A constant overflow of 2.8-3.3 liters a minute has to be provided using an additional T-fitting at the sample inlet

Set the gas cylinder regulators to a pressure of 1 bar (0.1 MPa, 15 psig) on the output pressure gauge. Exact pressure control is required.

5.3.5 Sample

Sample is introduced via 1/4" stainless steel or Teflon® tubing to the 1/4" bulkhead fitting marked SAMPLE IN on the instruments rear panel. Under normal applications, the sample line used should be a separately powered heated sample line heated to 204°C (400°F). A small sample line insulation over wrap is required to cover the sample inlet connector to minimize "cold spots".

The Model 3-500 is equipped with a built-in heated sample pump, which will automatically provide the correct sample flow and sample pressure, when the instrument sample pressure is adjusted to 200 mbar.

Very Important: Under no circumstances should a pressurized sample line be attached to the sample inlet. Sample inlet pressure is ideally **ZERO!** If only a pressurized sample line is available, provide a sample tee fitting on the SAMPLE IN bulkhead connector to bypass the pressure to the atmosphere to avoid damage to the analyzer. The internal sample pump will provide the analyzer with the correct amount of sample.



5.3.6 Leak Test of Supply Gas Fittings

NOTE: Using e.g. "Snoop®" Leak Test Liquid, check all regulators and gas fittings for leaks. Use only hydrocarbon free leak test liquids. Do not use soap sud. Do not perform leak test while analyzer is running. Disconnect instrument from electrical power. Shock hazard!



5.3.7 Inlet Pressure for Supply Gases, Overview

Supply Gas	Required Inlet Pressure
FUEL GAS	1.5 bar (0.15 MPa, 21 psig)
ZERO GAS	1 bar (0.1 MPa, 15 psig) @ 2.8-3.3 liters/minute overflow
SPAN GAS	1 bar (0.1 MPa, 15 psig) @ 2.8-3.3 liters/minute overflow
AMBIENT AIR IN	NO PRESSURE !
SAMPLE IN	NO PRESSURE !


5.4 Gas Outlets

5.4.1 Bypass

The BYPASS outlet should be connected to a suitable venting system to safeguard against toxic exhaust gases since excess sample gas exits through this outlet. The gas flow from the bypass is approximately 3 liters per minute. **Never restrict the bypass flow.**



5.4.2 FID-Exhaust

Never block the FID Exhaust. Under normal circumstances no additional tubing should be connected to the exhaust. 

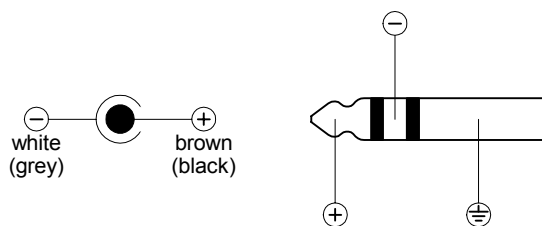
If a vent line has to be connected to the FID EXHAUST outlet use 10 mm (13/32 in.) inside diameter Tygon® tube slanted at a downward angle of at least 10 degrees. This prevents condensed moisture from entering the system. The FID burner exhaust gas always contains moisture since water vapor is formed during the oxidation of hydrogen, even if air and fuel entering the burner are completely dry. Therefore it is necessary to keep the venting line free at all times.

If the exhaust line becomes blocked, water may back up and enter the exhaust, which will cause back pressure and a noisy reading.

If a flame arrestor has to be used please contact J.U.M. Engineering or your sales representative.

5.5 Signal Outputs

The analog analyzer signals 0-10 VDC and 4-20 mA are available on two 6.35 mm 3 pole (stereo) receptacles on the rear panel. A male plug lead assembly is included with the parts package for connecting the analog recorder output to the user readout device. The brown (black) lead is positive (+) and is connected to the center post. The white (grey) lead is negative (-) (GND) and is connected to the upper shaft.



An additional 0-10 VDC out is also provided on STK 1.

See page 25 for STK 1 Pin-Out.

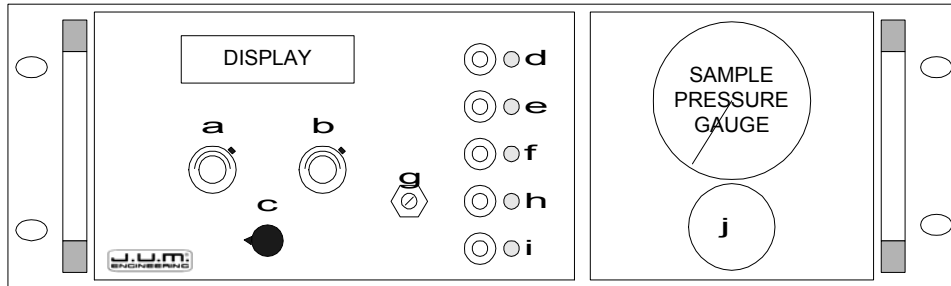


The Analyzer is now ready to be switched on.



6. Operating Instructions

6.1 Operating Controls



#	Description
a	Potentiometer ZERO Adjust
b	Potentiometer SPAN Adjust
c	RANGE SWITCH
d	Push Button + LED HEATER On/Off
e	Push Button + LED PUMP On/Off
f	Push Button + LED AMPLIFIER On/Off
g	Potentiometer FLAME ADJ.
h	Push Button + LED IGNITE
i	Push Button + LED TEMP. Display
j	SAMPLE PRESSURE Regulator

6.2 Placing the Analyzer into Service

1) Before connecting AC power to the analyzer make sure all gas connections are made correctly and all front panel push buttons are in OFF position. Plug power cord into 230V (115V) AC supply and connect to receptacle on the rear panel. Set the RANGE SWITCH to position "2".

2) Push the HEATER button in. The green HEATER LED will come on after 8-15 seconds. When the temperature set point of 190°C is reached this LED starts blinking.

Wait 15 Minutes until the temperature set point is reached and the oven temperature has stabilized.



3) Set AMPLIFIER push button to ON position. The AMPLIFIER LED turns green and the DISPLAY comes on. The display will read "8.8.8.8.8" for a moment and then "PE 2.XX" for about 4 seconds.

4) To read out the actual oven temperature in °C depress TEMP. push button and read temperature on the DISPLAY.

For conversion of °C to °F see Conversion Chart on page 44.



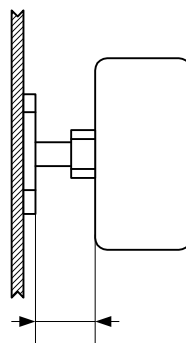
Very Important: The PID-type microprocessor temperature controller is factory set and locked to 190°C (374°F) and is not to be adjusted without authorization by J.U.M. Engineering. The parameter settings for the temp. controller are factory optimized and locked. Any unauthorized changes will severely affect the performance of your analyzer.



To read out the concentration reset the TEMP. push button to the OFF position. The concentration read out normally is negative before ignition.

5) Set PUMP push button to ON position. The PUMP LED comes on. The SAMPLE PRESSURE goes up to 200 mbar. Adjust if necessary.

Important: NEVER turn the sample pressure regulator knob all the way in! This can damage the regulator beyond repair. Damages caused thereby are not covered by our limited warranty! If the analyzer does not reach 200 mbar at an oven temperature of 190°C the analyzer should be sent to the factory for service immediately!



!!! MIN. 6.35mm (1/4") !!!

6.3 Ignition of the FID-Flame

6.3.1 Manual Ignition of the FID-Flame

Let the analyzer heat up for at least 60 minutes before igniting the FID-flame.



8) Make sure the fuel gas cylinder is connected properly to the FUEL GAS IN connector (see page 9) on the instruments back panel and that the output regulator is open. Set output pressure to exactly 1.5 bar (21 psig).

9) Push in the IGNITE button for **1 to 1.5 seconds. NEVER HOLD IN LONGER. OTHERWISE YOU MIGHT DAMAGE THE IGNITER!** You should hear a slight "Pop" when the flame ignites, and the front panel meter reading should jump slightly and then return to read some concentration above zero. If you do not get ignition on the first try, then repeat ignition procedure. There is visible indication when the flame is lit. The RED IGNITE LED turns to GREEN. .



Note: If the analyzer is equipped with the automatic fuel shut-off valve (Option FOAS 33) you might have to flush the fuel lines with fuel gas first to ensure proper ignition.



If the IGNITE LED turns from RED to GREEN the internal shut-off valve opens to enable fuel gas to reach the detector. If the LED turns back to RED this valve closes. Thus no more fuel gas reaches the detector.

If the fuel lines are not completely filled with fuel gas prior to ignition the amount of fuel gas that reaches the detector might be too small to ignite the flame.

For safety reasons this shut-off valve can only be opened by the automatic flame out control or by pushing in the IGNITE button.

Important: In order not to destroy the igniter do not push the IGNITE button in for more than 1.5 seconds. **The AMPLIFIER has to be switched OFF before the following procedure is performed!**



Now flush the fuel lines as follows:

- 1) **Turn OFF AMPLIFIER !**
- 2) Push in the IGNITE button and hold in for 60 seconds. Now fuel is flowing and is filling the entire fuel delivery system.
- 3) Release IGNITE button
- 4) Turn AMPLIFIER back ON again
- 5) Ignite FID flame according to § 6.3.1

6.3.2 Automatic Ignition, Option AZM 35

If equipped with this internal option set up analyzer as described in § 6.2. After the oven has reached a temperature of 160°C (320°F) the fuel shut-off valve is opened to flush the system thoroughly with fuel gas. After another 30 minutes the Analyzer will execute 5 tries to ignite the analyzer. The analyzer will usually ignite after the first or second try. If after the fifth try the flame is still not lit the whole ignition procedure will be repeated.

Note: Manual ignition according to § 6.3.1 is possible but not recommended!



6.4 Standard Measuring Ranges

Each range of the electrometer reads 0 to 100% full scale as 0 to 10.00, which is 0 to 10.00 VDC per range. Standard Ranges on this Analyzer are:

1	0 to 10 ppm Propane
2	0 to 100 ppm Propane
3	0 to 1,000 ppm Propane
4	0 to 10,000 ppm Propane
5	0 to 100,000 ppm Propane (peak detection only)

If your analyzer was ordered with an alternate range configuration see data sheet on page 38.



6.5 Stabilizing the Sample Pressure

This procedure is recommended on initial setup and after the analyzer has been stored or was not in use for longer periods of time.

- 1) Adjust SAMPLE PRESSURE regulator to read exactly 200 mbar on the SAMPLE PRESSURE gauge.
- 2) Turn PUMP OFF. After 10-15 seconds turn PUMP ON again.
- 3) If necessary, readjust SAMPLE PRESSURE to 200 mbar.

Important: NEVER turn the sample pressure regulator knob all the way in! This can damage the regulator beyond repair. If the analyzer does not reach 200 mbar at an oven temperature of 190°C the analyzer should be sent to the factory for service immediately!



Important: The FID has to be re-ignited since burner air supply is interrupted when the internal pump is switched off resulting in an extinct flame.

After another 15 minutes the analyzer is ready to be calibrated



6.6 Analyzer Calibration

Always calibrate your analyzer with zero gas AND span gas. Do it as often as possible. When circumstances allow, do it once (or better twice) a day. As more often you calibrate, as quicker you see when a "hang up" starts forming.

Important: During the complete calibration process the SAMPLE PRESSURE must remain at **exactly 200 mbar!** Never change the sample pressure while calibrating the analyzer.



Very Important: Under no circumstances should the calibration gases be connected directly to the sample inlet. A constant overflow must be provided using a T-fitting at the sample inlet to bypass the pressure to the atmosphere. The internal sample pump will provide the analyzer with the correct amount of calibration gas.




SEE DRAWING ON PAGE 43 FOR BASIC OVERFLOW CALIBRATION SETUP

Pressurizing SAMPLE IN will severely damage the analyzer. Damages thereby are not covered by our limited warranty!

6.6.1 Analyzer Zeroing

1) Make sure the zero gas cylinder is connected properly to the SAMPLE IN connector (see page 9) on the instruments back panel using a pressure relief T-fitting.

See drawing on p. 43 for basic overflow calibration setup. 


2) Set output pressure for ZERO GAS to exactly 1,0 bar (0.1 MPa, 15 psig) @ 2.8-3.3 l/min.

3) Set RANGE SWITCH to range #1 or #2.

4) After 5-10 minutes when the zero reading has stabilized, unlock and adjust the ZERO adjust potentiometer until the reading on the panel meter is on zero "0.00". Re-lock the pot dial.

6.6.2 Analyzer Span Calibration

1) Make sure the span gas cylinder is connected properly to the SPAN GAS IN connector (see page 10) on the instruments back panel using a pressure relief T-fitting.

See drawing on p. 43 for basic overflow calibration setup. 

2) Set output pressure for SPAN GAS to exactly 1,0 bar (0.1 MPa, 15 psig) @ 2.8-3.3 l/min.

3) Set RANGE SWITCH to the required range position.

4) After 5-10 minutes when the span reading has stabilized, unlock and adjust the SPAN adjust potentiometer until the reading on the panel meter agrees with the span gas cylinder analysis certificate. Re-lock the pot dial.

The analyzer is now ready to measure sample. 

7. Analyzer Sample

Important: During sampling the SAMPLE PRESSURE must remain at **exactly 200 mbar!** Operating the analyzer at a SAMPLE PRESSURE other than 200 mbar will result in incorrect readings.



- 1) Make sure the analyzer is connected to the sample source properly (see page 10).
- 2) Set RANGE SWITCH to the required range position.
- 3) Again check that the SAMPLE PRESSURE gauge is reading exactly 200 mbar. Readjust, if necessary.

The panel meter (and the chart recorder, if connected) will now continuously indicate the total hydrocarbon content of the sample.

8. Sample Filter Cartridge Replacement

8.1 Preparation

This analyzer is equipped with a single-use replaceable sample filter cartridge. Depending on the particulate contamination in the sample, the filter element has to be replaced accordingly.


Important: The analyzer should be cooled down to room temperature and disconnected from AC power before the filter is replaced. The only tools required are a 3 mm hex screwdriver, and two 9/16" open end wrenches if a sample line is connected to SAMPLE IN. **Always use two wrenches when disconnecting sample line: One on nut of the inlet fitting and the other one filter cap itself to counter the force while opening/tightening the fitting!**



One spare sample filter element is included in the parts package (see p. 4).



8.2 Changing the Sample Filter

- 1.) Turn analyzer OFF. See §13 on page 29 for Analyzer Turn-Off Procedure 
- 2.) Disconnect analyzer from sample source and from AC power. Close all supply gas cylinders and disconnect analyzer from all supply gases and remove all other electrical connectors.

3.) **Let analyzer cool down to room temperature for at least one hour**



4.) If applicable, remove analyzer from rack or case and place on a clean and stable workbench **with the rear panel facing towards you.**

Very Important: Be aware of the weight of the analyzer when taking it out of the rack/case! Do not rest analyzer on its front/back panel!

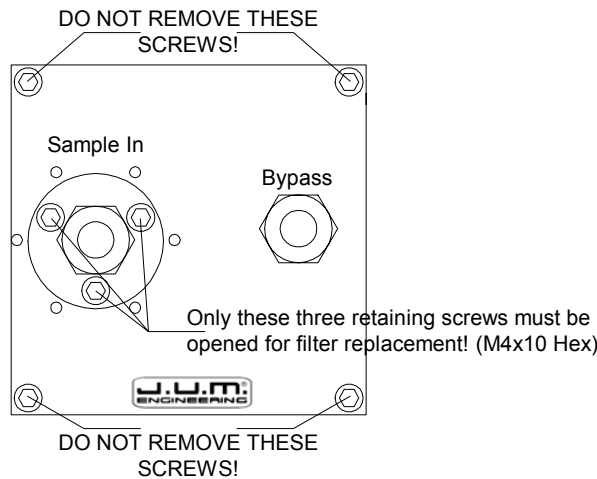


5) Always use gloves/respirator and use a clean work space and clean tools when changing the sample filter.

Very Important: Any contaminant that is brought into the analyzer during sample filter replacement severely affects the performance of the analyzer!



6) Using a 3 mm hex screwdriver carefully unscrew the **three sample filter cap retaining screws only** and remove filter cap.



7) Remove and discard old filter cartridge. See page 42 for exploded view of sample filter.



Very Important: Always use protective gloves and/or forceps to handle the used filter cartridge! Always follow government and local regulations for industrial waste disposal!



8.) Thoroughly inspect filter cap, housing and O-ring. **For best results it is recommended to also replace the O-ring every time the sample filter is changed.**

Very Important: Only use Viton® O-rings. All other materials will severely affect the performance of the analyzer!



9.) After O-ring is replaced, put new filter cartridge onto the alignment head of the filter cap and carefully stick it into the filter case so that the other end of the filter cartridge slips onto the second alignment head inside of the filter housing. See page 42 for a detailed exploded view drawing of the sample filter module.



10.) Carefully tighten the three retaining screws with the 3 mm hex screwdriver. Re-connect sample line if applicable.



11.) Put analyzer back into rack/case and reconnect all supply gases and electrical connectors. Reconnect to sample source and to AC power.



The analyzer is now again ready to be placed in service again.



9. Flame Out Control

This analyzer is equipped with an automatic Flame Out Indicator for the FID flame. When the FID flame is lit, the two-color LED above the IGNITE push button changes its color from RED to GREEN, immediately after successful ignition of the flame. The IGNITE LED turns to RED, when the FID flame goes off for any reason. The automatic fuel shut-off valve will close, when the IGNITE LED turns RED, and reopens once the flame is lit again (LED turns green). Contact closure for flame alarm is provided on STK 1.

See page 25 for STK 1 Pin-Out.



Note: The flame out control module is factory optimized for an oven temperature of 190°C and a delay of 90 seconds. To avoid misreadings, the flame out set point should only be adjusted, when the ambient temperature conditions are changed since a change will result in a cooler or hotter overall temperature inside the instruments case.



9.1 Preparation

Important: The analyzer must be running with the burner ON (ignited) for at least 60 minutes before Flame Out Alarm can be set. If the analyzer is not already running, start up the instrument in normal fashion. Let it warm up for 60 minutes, ignite and wait 1 hour before setting the alarm!



Locate the flame out adjust trim potentiometer. It is situated in the lower center part of the front panel and is marked FLAME ADJ.

Note: Flame out control will also indicate alarm when AC power is interrupted.



9.2 Adjust Flame Out Set Point

1) Make sure the FID flame is lit. Using a small precision type screwdriver turn the FLAME ADJ. screw driver trim potentiometer on the front panel clockwise, until IGNITE LED turns to GREEN color, if necessary.



2) Switch PUMP OFF to interrupt burner air supply causing the flame to go out. The positive reading on the front panel meter turns negative. After 10 seconds switch the PUMP ON again. The concentration read out should still be negative.

3) Start counting down 90 seconds immediately after the reading becomes negative using a stop watch.

4) Adjust FLAME ADJ. trim potentiometer until the IGNITE LED turns to RED color after a **total time delay of 90 seconds**. If equipped, the fuel shut off valve also closes after 90 seconds.



4) If the IGNITE LED turns RED before 90 seconds slightly turn the trim potentiometer clockwise until the IGNITE LED turns back to green. Turn the trim potentiometer slightly counterclockwise if after 90 seconds the IGNITE LED is still green.

5) Ignite FID again. The read out meter should jump to a positive reading, and the IGNITE LED should change to green immediately after successful ignition.

7) Repeat adjustment procedure several times always **with a pause of 25 minutes** in-between adjustments, until the time delay from flame out (negative reading on the meter) to a change of red color of the IGNITE LED takes 90 seconds.

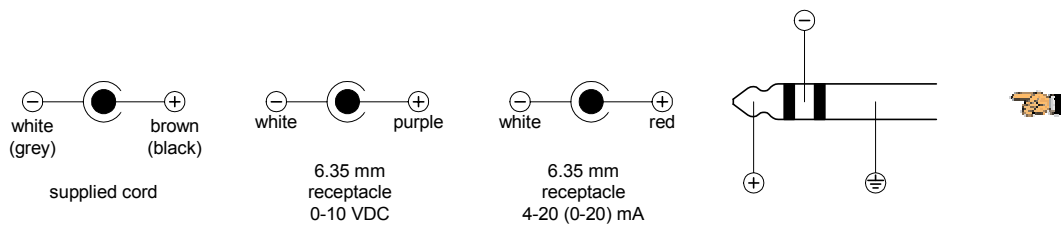


10. Electrical Connectors

Important: All control and alarm outputs are potential free (dry) relay contacts. Damages to the analyzer or any other peripheral instruments caused by exceeding the maximum allowed voltage/current ratings are not covered by our limited warranty. All temperature outputs are 10 mV/°C, linearized, temp. and voltage compensated.



The analog analyzer signal is provided as a voltage signal 0-10 VDC and as a current signal 4-20 mA (0-20 mA instead is optional) on the two 3 pole (stereo) 6.35 mm receptacle 0-10 VDC OUT and 4-20 mA OUT on the rear panel. A male plug lead assembly is included with the parts package for connecting the analog recorder output to a user readout device. The brown lead is positive (+) and is connected to the center post. The white lead is negative (-) (GND) and is connected to the upper shaft.



The oven temperature output (0-5 VDC), contact closure for flame out alarm and all other optional alarm contacts can also be obtained on the 25-Pin Sub-D connector "STK 1". An additional 0-10 VDC signal output is also available on STK 1.

Contacts for remote control range change with range identification (Option RCC 35) and for the range identification of the automatic range change (Option AMU 35) are available on the 25-Pin Sub-D connector "STK 2".

Important: The maximum allowed voltage/current ratings for all dry contacts is 50 Volt DC, 0,1 Ampere.



Note: The RS 232 serial data output is compatible to the NRZ-format (Non-Return-to-Zero). Only TXD and GND are used for data transfer.
Settings: 1 start-bit, 8 data-bits, 1 stop-bit, no parity.



Pin Nr. 1	N/C
Pin Nr. 2	RS 232 TXD (data out)
Pin Nr. 3	RS 232 RXD
Pin Nr. 4	N/C
Pin Nr. 5	RS 232 GND
Pin Nr. 6	N/C
Pin Nr. 7	RS 232 GND ALT.
Pin Nr. 8	N/C
Pin Nr. 9	N/C

Note: There are no 9-Pin or 25-Pin connector cord assemblies supplied with the instrument since necessary lengths and connector styles for external readout and/or control modules may vary. However a male 25-Pin Sub-D plug is included with the parts package. Upon special request individually fitted connector cord assemblies can be ordered with the analyzer.



10.1 Pin-Out - STK 1 Alarm Contacts, Concentration Output and Oven Temperature Output

Pin Nr. 1	COM Concentration Alarm 1 (Option DCC 35)
Pin Nr. 2	Contact Opener Concentration Alarm 1 (Option DCC 35)
Pin Nr. 3	Contact Closure Concentration Alarm 1 (Option DCC 35)
Pin Nr. 4	N/C
Pin Nr. 5	N/C
Pin Nr. 6	N/C
Pin Nr. 7	N/C
Pin Nr. 8	N/C
Pin Nr. 9	N/C
Pin Nr. 10	N/C
Pin Nr. 11	N/C
Pin Nr. 12	Contact Closure Sample Pressure Alarm (Option PDA 35)
Pin Nr. 13	Contact Closure Sample Pressure Alarm (Option PDA 35)
Pin Nr. 14	COM Concentration Alarm 2 (Option DCC 35)
Pin Nr. 15	Contact Opener Concentration Alarm 2 (Option DCC 35)
Pin Nr. 16	Contact Closure Concentration Alarm 2 (Option DCC 35)
Pin Nr. 17	0-5 V Signal Out, Oven Temperature (10mV/°C)
Pin Nr. 18	0-10 V Signal Out, Concentration
Pin Nr. 19	0 V Signal Return (Temp. & Conc.)
Pin Nr. 20	COM Flame Out Alarm
Pin Nr. 21	Contact Opener Flame Out Alarm
Pin Nr. 22	Contact Closure Flame Out Alarm
Pin Nr. 23	N/C
Pin Nr. 24	N/C
Pin Nr. 25	N/C

10.2 Pin-Out - STK 2 external (remote) Range Change Option, Range ID

Pin Nr. 1	Range Identification, Dry Contact, Range #1 (Option AMU 35/RCC 35)
Pin Nr. 2	Range Identification, Dry Contact, Range #2 (Option AMU 35/RCC 35)
Pin Nr. 3	Range Identification, Dry Contact, Range #3 (Option AMU 35/RCC 35)
Pin Nr. 4	Range Identification, Dry Contact, Range #4 (Option AMU 35/RCC 35)
Pin Nr. 5	Range Identification, Dry Contact, Range #5 (Option AMU 35/RCC 35)
Pin Nr. 6	N/C
Pin Nr. 7	Select Range #1, Dry Contact, (Option RCC 35)
Pin Nr. 8	Select Range #2, Dry Contact, (Option RCC 35)
Pin Nr. 9	Select Range #3, Dry Contact, (Option RCC 35)
Pin Nr. 10	Select Range #4, Dry Contact, (Option RCC 35)
Pin Nr. 11	Select Range #5, Dry Contact, (Option RCC 35)
Pin Nr. 12	N/C
Pin Nr. 13	N/C
Pin Nr. 14	COM Range Identification, Dry Contacts, (Option AMU 35/RCC 35)
Pin Nr. 15	24 VDC Return
Pin Nr. 16	COM Valve Operation
Pin Nr. 17	N/C
Pin Nr. 18	N/C
Pin Nr. 19	N/C
Pin Nr. 20	N/C
Pin Nr. 21	Select IGNITE <u>Momentary switch or relay contact only; MAX. 1.5 seconds!!!!</u>
Pin Nr. 22	Select FUEL (external fuel shut-off valve override)
Pin Nr. 23	COM, Range Identification 1V/Range (Option AMU 35)
Pin Nr. 24	+ 1-5 V, Range Identification 1V/Range (Option AMU 35)
Pin Nr. 25	COM Range Select (Option RCC 35)



Important: When using EXTERNAL VALVE SELECT for IGNITE/FUEL always use the +24 VDC supplied on pin 16 to switch the internal valves. DO NOT APPLY ANY EXTERNAL VOLTAGE TO THE VALVES! If +24 VDC & 24 VDC Return are used to power any external valve/device do not exceed 4 Watts of additional power consumption! Damages caused by external voltages and/or exceeding power ratings are not covered by our limited warranty!



11. External and Automatic Analyzer Functions

Depending on the ordering specifications several functions of the analyzer can be controlled externally or automatically.

Important: Use only original J.U.M. Parts. Damages caused by the use of non J.U.M. parts and/or disregard of the maximum allowed loads are not covered by our limited warranty. We are also not responsible for any damages to peripheral instruments caused thereby.



11.1 External Valve Operation, Standard

Important: When using EXTERNAL VALVE SELECT for IGNITE/FUEL always use the +24 VDC supplied on pin 16 to switch the internal valves. **DO NOT APPLY ANY EXTERNAL VOLTAGE TO THE VALVES!** If +24 VDC & 24 VDC Return are used to power any external valve/device do not exceed 4 Watts of additional power consumption! **FOR EXTERNAL IGNITE USE MOMENTARY SWITCH OR RELAY CONTACT ONLY! MAX: 1.5 SEC.!** Damages caused by external voltages and/or exceeding power ratings/time limits are not covered by our limited warranty!



See page 26 for Pin-Out.



11.2 External Range Selection, Option RCC 35

Set EXT/AUTO push button to ON position, EXT/AUTO LED lites. This action disables the RANGE SWITCH and the electrometer ranges can be controlled by an external switching device via STK 2.

Range identification is one individual potential free relay contact per range.

See page 26 for Pin-Out.



Important: The maximum allowed voltage/current rating for the relay contacts is 50 Volt, 0,1 Ampere.



11.3 Automatic Range Change, Option AMU 35

Set EXT/AUTO push button to ON position, EXT/AUTO LED lites. This action disables the RANGE SWITCH and the electrometer ranges are now controlled by an internal PC-card. The measuring range increases by one range if 95% full scale is exceeded. The measuring range decreases by one range if the measured value falls below 10% full scale.

Depending on the ordering specifications range identification is either one individual potential free relay contact per range or as a DC voltage at 1V per range.

See page 26 for Pin-Out.



Important: The maximum allowed voltage/current for the relay contacts is 50 Volt, 0,1 Ampere.



12. 6-digit Engineering Unit Display, Option ENGA 35

The analyzer is equipped with a special 6-digit engineering unit display with an integrated RS 232 data output. This allows to display the signal directly in ppm or any other customer specified unit.

Note: Since the RS 232 data output is integrated into the display it will always transmit the data visible on the display. This means when the display reads the concentration the RS 232 will transmit the concentration signal and when the display reads the oven temperature the RS 232 will transmit the temperature signal.



The 9 pin Sub-D connector for RS 232 out is located on the analyzers back panel.

See page 24 for Pin-Out.



13. Analyzer Turn-Off Procedure

VERY IMPORTANT: IF SAMPLING IS FINISHED DO NOT TURN ANALYZER OFF IMMEDIATELY!



The following procedure is recommended when the analyzer is to be turned off.

It will help removing residual hydrocarbons and other contaminants brought into the analyzer during sampling. These hydrocarbons will condense during cool down and contaminate the sample wetted components if the analyzer was turned off immediately after measuring sample.

- 1) Disconnect the analyzer from sample source.
- 2) Now let the analyzer run in SAMPLE mode for **at least 1 to 1 1/2 hours** at operating temp. with ALL FUNCTIONS ON (running the analyzer dry). Monitoring ambient air.
- 3) Then turn off AMPLIFIER, PUMP and HEATER.
- 4) Close the regulators of all supply gases.
- 5) Disconnect AC power and all supply gases, if necessary.



**VERY IMPORTANT:
This is NOT a "self-cleaning" feature!**



14. Operating Instructions, Short Review

- 1) Make sure all front panel push buttons are in OFF position before connecting supply gases and electrical power.
- 2) Connect all supply gases to their rear panel fittings and set output pressures on cylinder regulators. **DO NOT OVERTIGHTEN FITTINGS.**
- 3) Test all gas connections for leaks before powering up the analyzer. **USE ONLY HYDROCARBON-FREE LEAK TEST LIQUIDS.**
- 4) Connect AC power supply and set HEATER push button to ON position. HEATER LED turns green after 8-15 seconds. A steady green LED indicates heater is warming up. A flashing LED indicates temperature set point is achieved.
- 5) Set RANGE SWITCH to Range #2.
- 6) After 15 minutes set PUMP and AMPLIFIER push buttons to ON position.
- 7) To read oven temp. (in °C) on display depress TEMP push button.
- 8) Check the SAMPLE PRESSURE gauge. It should read 200 mbar. Readjust after 5 min. if necessary. The MODE SWITCH must be in SAMPLE position.
- 9) Let analyzer run for at least another 45 minutes before igniting.
- 10) Carefully flush fuel lines for easier ignition: **TURN AMPLIFIER OFF BEFORE FLUSHING!** Hold IGNITE button in for 1 minute.
- 11) **Turn AMPLIFIER ON again.** Depress IGNITE push button. **NEVER HOLD IN LONGER THAN 1.5 SECONDS.** The IGNITE LED turns from red to green and you should hear a slight "pop". Retry, if necessary
- 12) **DO NOT** change ZERO or SPAN pots until analyzer is running for at least two hours.
- 13) Verify the ZERO pot is in the range of 4.5 to 4.9 turns.

- 14) Verify the SPAN pot is in range of 3.5 to 5.5 turns.
- 15) Verify the SAMPLE PRESSURE gauge reads 200 mbar. Readjust if necessary. **Never change the SAMPLE PRESSURE during calibration and sampling!**
- 16) **Before calibrating ZERO make sure that a pressure relief T-fitting is used to bypass calibration gas pressure to the atmosphere @ 2.8-3.3 l/min!**
- 17) Set the RANGE SWITCH to Position #1 or #2.
- 18) After 5-10 min. when the zero reading has stabilized, adjust the ZERO ADJUST potentiometer until the reading on the panel meter is on Zero, "0.00".
- 19) **Before calibrating SPAN make sure that a pressure relief T-fitting is used to bypass calibration gas pressure to the atmosphere @ 2.8-3.3 l/min!**
- 20) Set the RANGE SWITCH to Position #3.
- 21) After 5-10 min. when the span concentration has stabilized, adjust the SPAN ADJUST potentiometer until the panel meter reading agrees with the span gas cylinder analysis.
- 22) Make sure analyzer is connected to the sample source properly.
- 23) Now the analyzer is ready to measure sample.
- 24) The panel meter (and the chart recorder, if connected) will now continuously indicate the total hydrocarbon content of the sample.
- 25) Analog outputs, 0-10 VDC and 4-20 mA, are provided on back panel; RS232 and 0-20 mA instead of 4-20 mA are optional.
- 26) When sampling is finished DO NOT TURN ANALYZER OFF IMMEDIATELY.

27) Disconnect sample source.

28) Now let the analyzer run **for at least one hour** at operating temp. with ALL FUNCTIONS ON. Measuring ambient air.

29) Turn off AMPLIFIER, PUMP and HEATER.

30) Turn off all supply gases.

31) Disconnect AC voltage and all supply gases, if necessary.

15. Technical Data

<u>Dimensions</u>	
Width	19" (483 mm)
Height	3 Panel Units (132 mm)
Depth	460 mm (18 1/8")
Weight	23 kg (50 lbs)

<u>Line Voltage/Fuses</u>	
230 VAC/50 Hz	4 A medium
115 VAC/60 Hz	6.3 A medium

<u>Sample Filter</u>	
Type	Single use cartridge
Material Filter	2 µm Bonded Microfibre
Seal	Viton® O-ring
Material Housing/Cap	Stainless Steel 1.4571
Inlet Fitting	Swagelok®, 1/4", 316 SS
Outlet Fitting	Swagelok®, 1/8", 316 SS

<u>Sample Pump</u>	
Type	Diaphragm
Material Head	Stainless Steel 1.4571
Material Chamber	Stainless Steel 1.4571
Material Diaphragm	Viton®
Material Valves	Viton®
max. Flow (unrestricted)	2,5 Liters/Minute

<u>Air Pump</u>	
Type	Diaphragm
Material Head	Polyamid 11
Material Chamber	Polyamid 11
Material Diaphragm	Viton®
Material Valves	Viton®
max. Flow (unrestricted)	2,5 Liters/Minute

continued on next page

Technical Data (cont.)

Oven

Heater	500 Watts
Temperature	190°C (374°F)
Temperature Sensor	Thermocouple Type "J" (Fe-CuNi)

Supply Gas Plumbing

Solenoid Valves	Brass
Plunger	Stainless Steel/Viton®
Seal	Viton® O-ring
Supply Voltage	24 VDC
Tubing	PA / Teflon® / Viton®
Fittings	Brass, Brass Ni-plated

Sample Gas Plumbing

Sample Inlet Fitting	Swagelok®, 1/4", 316 SS
Tubing	Stainless Steel 1.4571, 1/4" & 1/8"
Oven Fittings	Swagelok®, 1/4" & 1/8", 316 SS

Electrometer

Supply voltage	+/- 15 VDC
Input Impedance	$5 \times 10^{12} \Omega$
Noise	$5 \times 10^{-14} \text{ A}$
Electrical Drift	0,02% / Week
Sensitivity	10^{-12} A FSD

Signal Display

Supply Voltage	+5 VDC
6 digit	Engineering Unit

continued on next page

Technical Data (cont.)

<u>Detector</u>	
Dynamic Range	10 ⁶ to 10 ⁷
Sensitivity	1 ppb
Voltage	-300 VDC
Material Burner	Stainless Steel 1.4571
Material Nozzle	Stainless Steel 1.4571
Igniter	Platinum Coil 3V / 1A
O ₂ -Synergism	< 1.2%
Burner Air Flow	70 - 250 cc/min (depending on fuel gas)
Sample Flow	25 cc/min (standard analyzer)
Fuel Consumption 100% H ₂	17 - 25 cc/min
Fuel Consumption 60%He/40%H ₂ (Option)	80 - 120 cc/min
<u>Measuring ranges</u>	
5 Ranges (ppm, o. mgC/m ³)	10/100/1.000/10.000/100.000
6 Ranges (ppm, o. mgC/m ³)	25/100/250/1.000/2.500/10.000
Other Range Configuration	Upon Request, see page 38
<u>Signal Output</u>	
Voltage	0-10 VDC (or 0-5 VDC instead or 0-1 VDC instead; see page 38)
Current	either 4-20 mA (Standard), or 0-20 mA instead (Option; see page 38)
Serial (ASCII)	RS 232 output
<u>Supply Gases</u>	
Fuel Gas	1,5 bar (0.15 MPa, 21 psig)
Span Gas	1 bar (0.1 MPa, 15 psig) @ 2.8-3.3 liters/minute free overflow
Zero Gas	1 bar (0.1 MPa, 15 psig) @ 2.8-3.3 liters/minute free overflow
Sample	NO PRESSURE!
<u>Analyzer Results</u>	
Response Time (90% FSD)	< 1.2 seconds
Linearity	Up to 10.000 ppm within 1% FSD

Viton® is a registered trademark of DuPont Dow Elastomers; Teflon® is a registered trademark of DuPont; Swagelok® is a registered trademark of the Crawford Fitting Company

16. Replacement Parts List

Description	Part No.
Sample Pump (dual head sample & air)	3.512.223
Pump Motor	3.533.025
Single Use Sample Filter Cartridge	3.505.789
Sample Filter O-ring	3.503.020
Pump Diaphragm	350.006
Pump Valves (set of 2)	350.007
FID Detector	3.520.708
Sample Capillary	358.945
Bypass Capillary	358.946
Electrometer Amplifier	3.529.676
Power Supply +/- 15 VDC	350.553
Main Transformer 24 Volt	352.843
Ignition Transformer 3Volt/300Volt	352.831
FID Igniter #4	350.404
FID Igniter #5	350.405
FID Igniter #6	350.406
Oven Overtemp. Module	3.503.125
Front panel meter, 6 digit	3.543.471
Fan	3.504.350

continued on next page

Replacement Parts List (cont.)

Description	Part No.
Push Button	3.503.000
LED green	3.503.120
LED dual color (green/red)	3.503.153
Fuse 4,0A	3.504.000
Fuse 6.3A	3.506.300
Air Purifier	3.503.713
Refill for Air Purifier	3.513.027
Repair Kit, unheated pump head	35.000.679
Repair Kit, heated pump head	35.012.679
Viton® tubing 6/4, 1 Meter	3.506.302
Fan for Pump Motor (Impeller)	3.500.045

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Important for analyzers with PID-temperature controller: Due to the lengthy an complex adjustment and optimization process of the temperature controller this part is not available as a replacement part. PID-controller replacement is only done at the factory.



Important: Always state complete serial number, part number and part description when ordering parts.

When ordering an air purifier refill the used unit has to be returned within 10 days otherwise the cost for the complete air purifier will be charged.



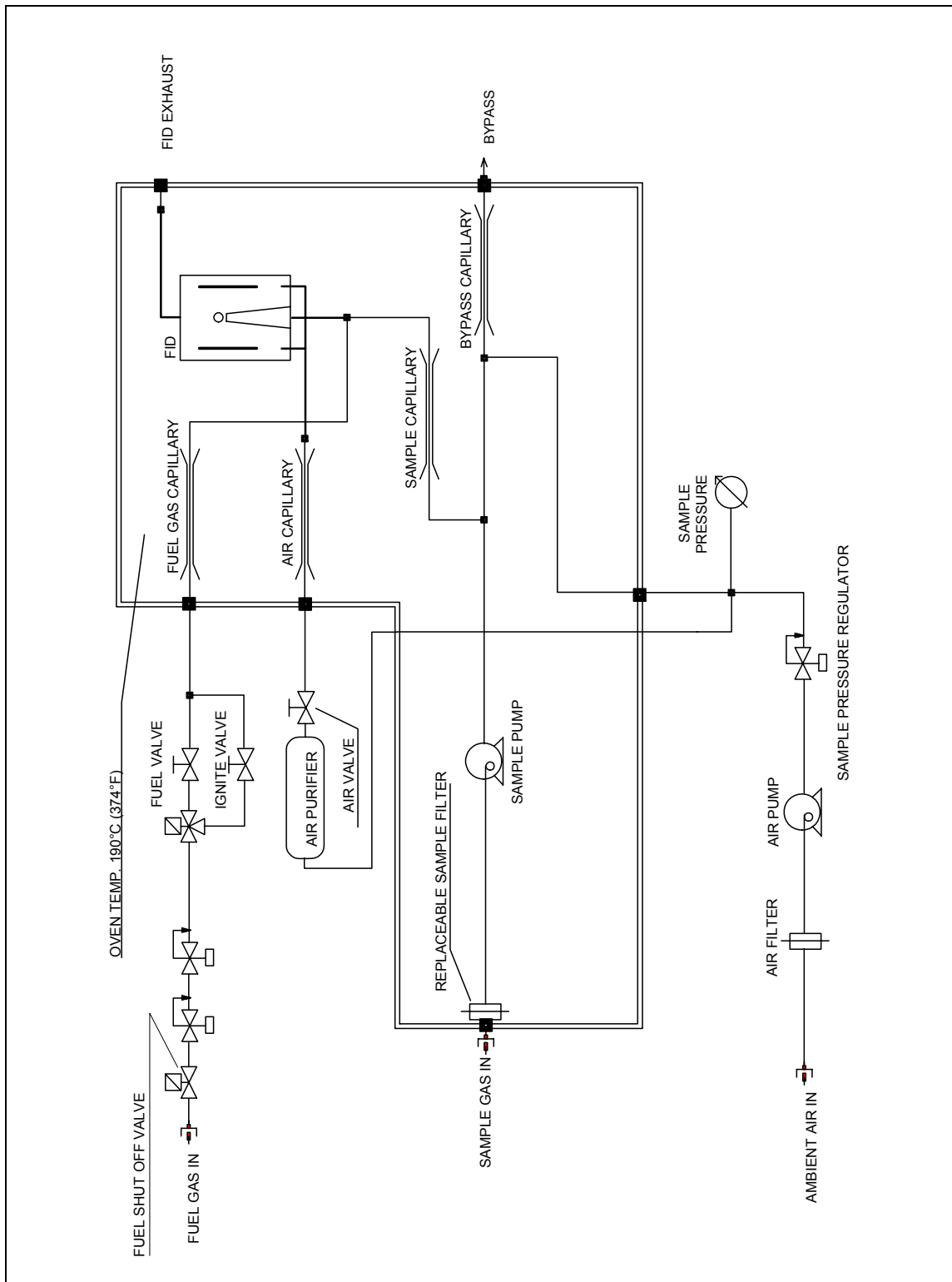
17. Application Data Sheet

Representative	:	
Customer	:	
Serial Number	:	
Line Voltage	:	
Measuring Ranges	:	
Fuel Gas	:	
Span Gases used during Check Out	:	
Zero Gas used during Check Out	:	
Initial Zero Pot Setting	:	
Initial Span Pot Setting	:	
Voltage Output	:	
Current Output	:	
RS 232 Output	:	
Flame Out Alarm	:	
Fuel Gas Shut-Off Valve	:	
External Range Select (RCC 35)	:	
Autom. Range Change (AMU 35)	:	
Internal Bypass Pump (MBP 35)	:	
Autom. Ignition (AZM 35)	:	
Sample Pressure Alarm (PDA 35)	:	
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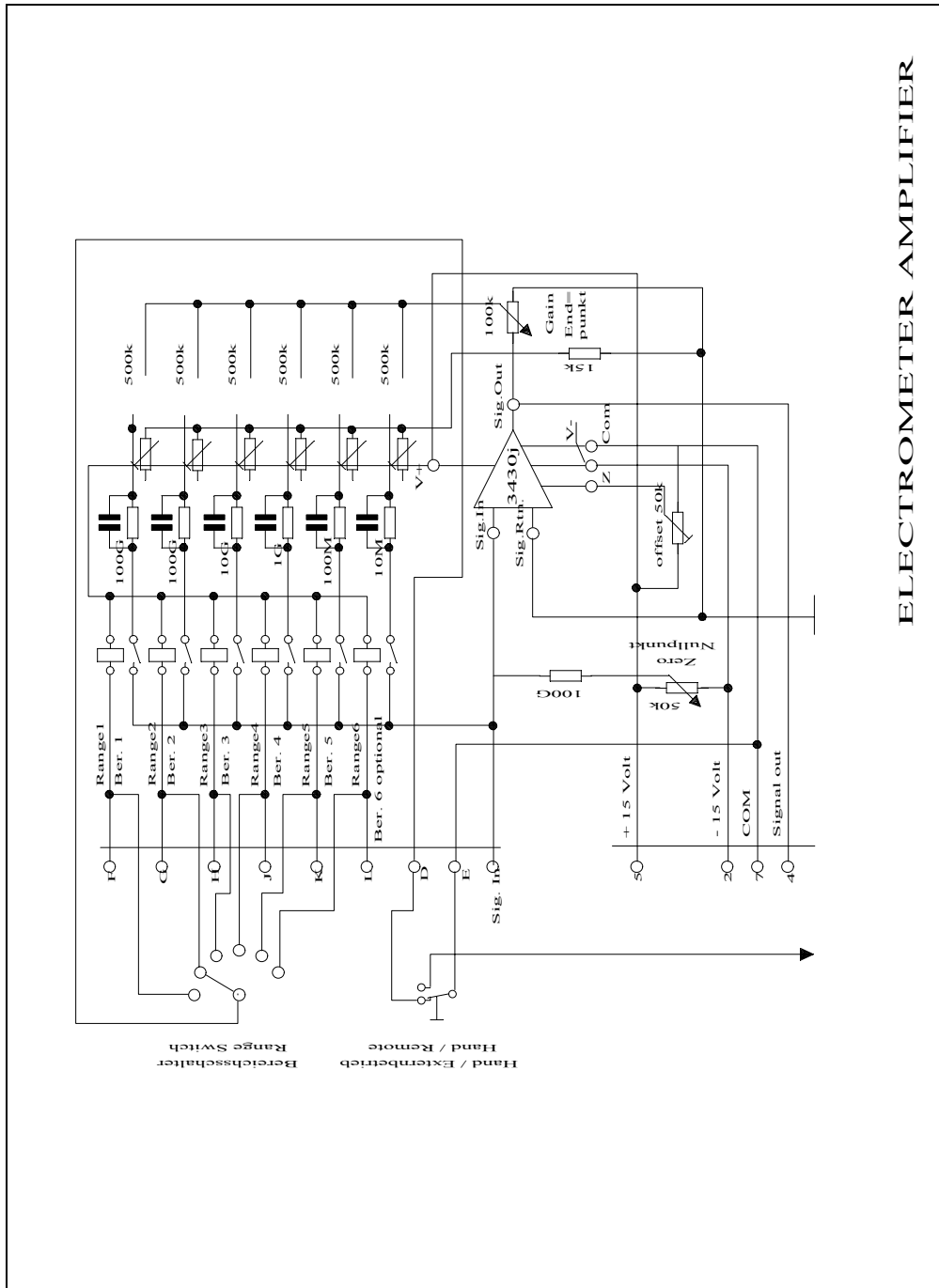
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18. Drawings

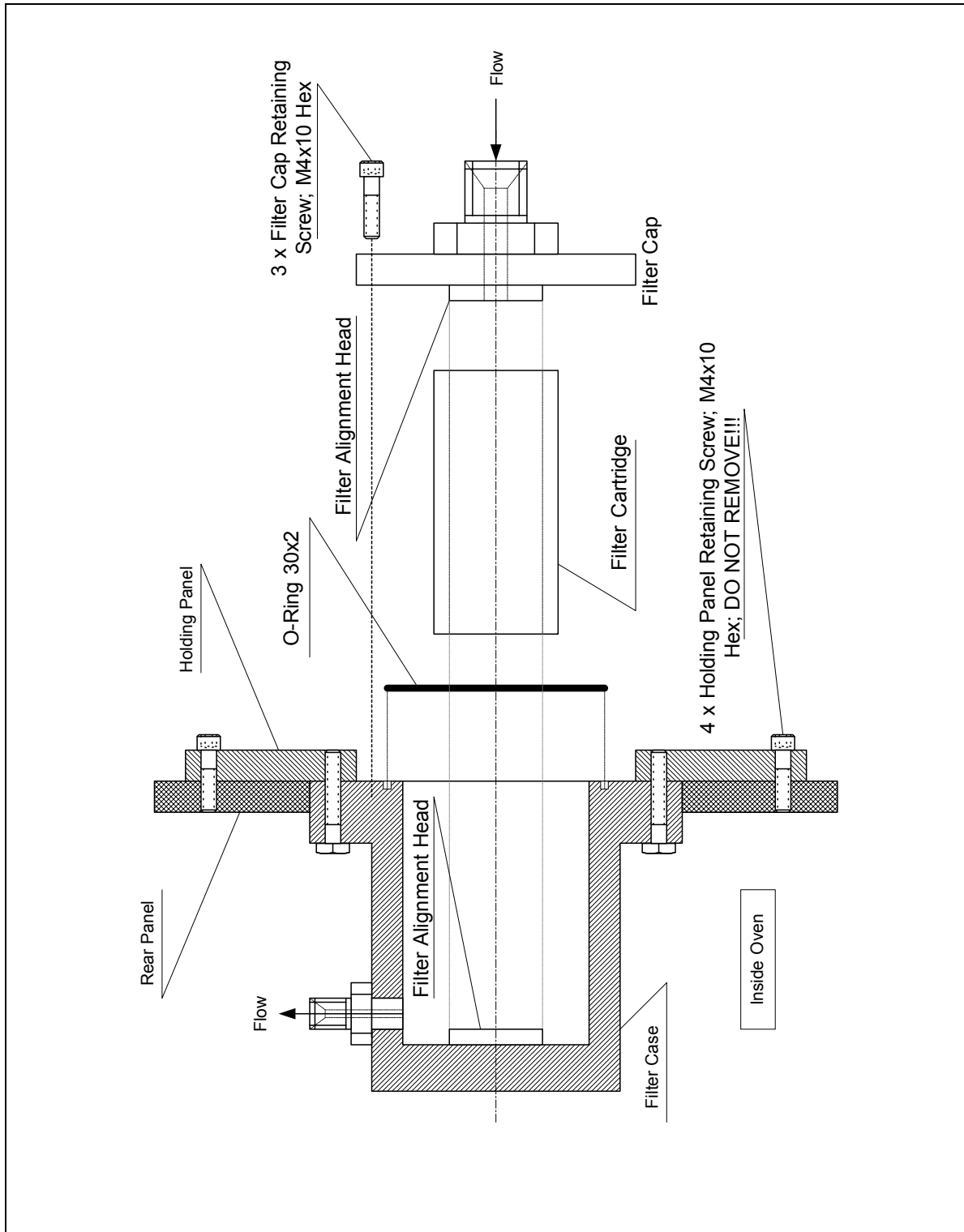
18.1 Flow Diagram



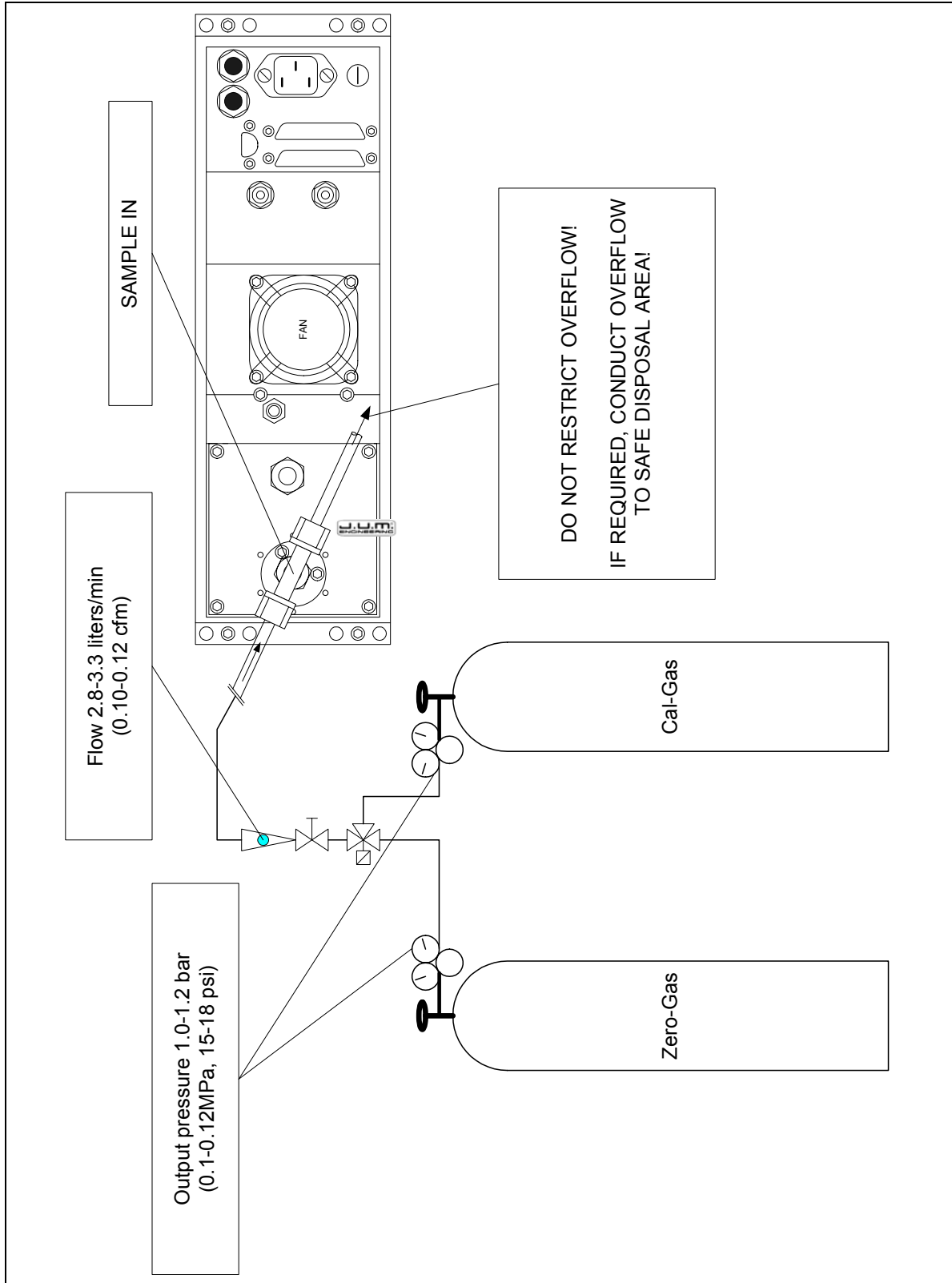
18.2 Electrometer Amplifier



18.3 Sample Filter, Exploded View



18.4 Basic Overflow Calibration Setup



19. Conversion Chart

To Convert	Into	Multiply By
ppm C ₃ H ₈	mgC/m ³	1.6
ppm CH ₄	mgC/m ³	0.54
MPa	psi	145
psi	MPa	0.006897
bar	psi	14.5
psi	bar	0.06897
Hg"	psi	0.4912
psi	Hg"	2.036
H ₂ O"	psi	0.03613
psi	H ₂ O"	27.6778
H ₂ O"	HG"	0.7355
HG"	H ₂ O"	13.5962
inches	mm	25.4
mm	inches	0.394
°C	°F	°F= [°C x 9/5] + 32
°F	°C	°C= [°F - 32] x 5/9
.		

20. Oxygen Synergism Effect

It has long been recognized that the presence of oxygen in the sample gas can affect the hydrocarbon ionization in a FID. The reason for this oxygen synergism is still not fully understood, but it appears to arise for a partial oxidizing and/or thermal cracking of the hydrocarbons in the sample as they pass through the preheated flame zone immediately prior to combustion.

The most significant parameters that influence this phenomenon have, however, been isolated. They include the burner and electrode design, the fuel type, the organic species and the oxygen content of the sample. The organic species and the oxygen content of the sample cannot, of course, be controlled by the instrument manufacturer. On the other hand, the careful design of the burner and the electrodes to suit a particular fuel gas can largely negate the oxygen synergism.

J.U.M. Engineering has used the latest burner technology in the design of the 3-500 we then complete a very stringent setting-up and calibration procedure to ensure that the oxygen synergism level is reduced to a minimum. The analyzer should not need re-setting, but if the oxygen synergism increases, it is strongly recommended to have the instrument re-optimized. Re-optimization should only be performed by especially trained and authorized personnel. Please contact your sales representative or J.U.M..

Oxygen Synergism manifests itself as reading lower THC Than actual present in the presence of high oxygen concentrations. The Model 3-500 is optimized for the lowest possible oxygen error of 1,2% or better.

21. Limited Warranty

J.U.M. Engineering Ges.m.b.H., Karlsfeld, the Manufacturer, (J.U.M.[®]), warrants your Total Hydrocarbon Analyzer Model 3-500 against any defect in material and workmanship, under normal use, for a period of twenty-four (24) months from the date of purchase. In the event this product is found to be defective within the warranty period, J.U.M.[®] will, at its option, repair or replace the defective product.

This warranty is void if: a) the instrument was operated or stored under condition of abnormal use or maintenance; b) the instrument has been repaired, modified or altered in any way, unless such repair, modification or alteration is expressly authorized in writing by J.U.M.[®]; c) the instrument was subject to abuse, neglect, lightning strike, electrical fault, improper packaging/shipping or accident; d) if the instrument was installed improperly; e) the serial number of the instrument is defaced or missing; f) if the broken part is a replacement part such as a pump motor, pump diaphragm, pump valve, O-ring, gasket, sample filter cartridge, dust filter plate, valve plunger etc.; g) if the analyzer or broken part was damaged due to contaminants in the sample gas such as salt, oils, resins, metal oxides, chlorine or other corrosive substances; h) if the sample and/or bypass capillary was clogged or damaged due to contaminants in the sample gas such as salt, oils, resins, metal oxides, chlorine or other corrosive substances; i) if any of the seals (lacquer, label or lead wire tag) inside of the instrument is defaced, damaged or missing;

J.U.M.[®] will not, under any circumstances, be liable for direct, special or consequential damages such as, but not limited to, damage or loss of property or equipment, loss of profits or revenues, cost of replacement goods, or expense or inconvenience caused by service interruptions. Under no circumstances will any party or entity be entitled to any sum greater than the purchase price paid for the instrument.

To obtain warranty service, you should first contact the vendor from whom you purchased your instrument. You may be asked to furnish proof of purchase to confirm that the instrument is still under warranty.

Notes

Notes

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