

Maintenance and Instruction Manual

Analyzer Catalytic Convertor

Fugitive Emissions Eliminator

The Analyzer Hydrocarbon Catalytic Converter is designed to eliminate fugitive emissions exiting analyzer sample vents. This is accomplished without producing backpressure excursions, eliminating upsets of the analyzer calibration. The products of this catalytic hydrocarbon conversion process are CO₂ and water vapor. The unit has a maximum capacity of one liter per minute and/or 2,000 BTU/HR.

Utilizing tees and other piping connections, any number of analyzers may be vented to the unit provided the total flow rate is not greater than one liter per minute and the maximum heat throughput does not exceed 2,000 BTU/HR. A method of preventing cross flow between the analyzers is recommended, such as rotometers for each input. Mounting of the unit may be accomplished by numerous means, but it is recommended the cylindrical outer housing be at the top, with the junction box at the bottom.

Initial efficiency of the catalytic converter is 99.9% hydrocarbon elimination. Aging of the catalyst and contamination decrease the efficiency, with rating decreasing to approximately 96% after one year of operation. The catalyst is rated for two years of continuous use; however, to maintain optimum efficiency, it is recommended changing the catalyst cartridge annually.

Oxygen for the combustion of hydrocarbon products is provided by ambient air and additional oxygen or air is not required. The products of conversion are emitted through the outer housing.

Following are instructions for installing the catalytic converter:

- (1) Determine a position for mounting the unit. Metal clamps, brackets, or piping may be utilized. The outer surface of the housing may reach a temperature of 300° F. (depending on stream composition and the quantity of hydrocarbons present). The unit should be placed 12" from any walls or other flammable materials to avoid combustion. If mounted in high traffic areas, a shield (P/N HSSXC) may be utilized to reduce the risks of accidental burns. Units are to be mounted in an outdoors location.
- (2) Following mounting of the device, remove the junction box cover. Power connection wires should be routed through the open bottom port. Conduit seals may be required for the incoming power leads to meet area classifications and to preserve the integrity of the catalytic converter area classification. The 120 VAC power leads connect to the two open screw terminal posts in the junction box. Connect the ground wire to the grounding screw in the junction box. The heating element must be inserted into the thermowell housing until it contacts the upper end. The element is held in place with the leads. Excess lead length should be wound inside the junction box, assuring the heating element is in place. If marks are on the leads of the heating element, insert the element until the marks are at the bottom of the thermowell housing. Replace the cover of the junction box.
- (3) Connect the analyzer sample vent to the open port (3/4" FNPT, 3/4" MNPT with Flame Arrestor) of the street tee on the unit. Reducers or adapters may be required to complete this connection, depending on the type of piping. If multiple analyzers are connected, tees will be required to provide the required number of connections. Check valves between analyzers may be used to prevent cross-flow between connected units.
- (4) Apply power to the unit. Power should always be supplied to the unit to provide heating in the event of intermittent analyzer flow or intermittent hydrocarbon presence in the

sample. Approximately twenty minutes to one hour are required for the unit to reach optimum efficiency.

Exercise care when attaching or removing the outer housing of the unit and the body. The stainless-steel threads are susceptible to nicking and cross-threading, rendering the unit difficult or impossible to disassemble and reassemble. This junction is not intended as a gas-tight connection, avoid over-tightening of threads. A Teflon[®] compound may be used on threads to enhance outer housing removal.

Streams containing hydrogen require caution. Concentrations above 10% hydrogen in the vent stream will lead to excessively high temperatures and cause malfunctioning of the unit, leading to replacement of internal parts. Use of the standard unit for vent streams containing greater than 10% hydrogen is not recommended and will require the use of a modified internal probe. Contact **MTI Analytical Technology (MerTech Incorporated www.mertechinc.com)** for additional information on the modified internal probe for use with high concentrations of hydrogen. Most gas chromatographs are now utilizing hydrogen as the carrier gas causing premature failure of the standard sintered stainless-steel inner probe.

Changing the Catalyst Cartridge

Remove power and flow from the unit and allow the device to cool. This may require several minutes. When the unit is cool enough to handle, remove the upper, outer housing. The catalyst cartridge will then be exposed and appears as a wool-like material. Slide the catalyst cartridge from the inner probe. The new, replacement catalyst cartridge can then be installed in place of the previous unit.

Power and flow may then be restored. Efficiency of the unit will also be restored once the internal heating element has heated the internals and has reached operating temperature.

Warranty

The units shall be free from defects in workmanship and materials, when used in accordance with applicable specifications and with appropriate maintenance, for a period of one year from the date of shipment to customer, unless otherwise specified in writing.

MTI Analytical Technology products which malfunction may be returned, shipment prepaid, for test and evaluation. Products determined to be defective, and in warranty, will be repaired or replaced at no charge to customer. Products out of warranty will be tested and evaluated. If the product does not meet original specifications, the customer will be notified of cost before repairs/replacement. Repaired products will be warranted for 90 days from date of shipment to customer or for the balance of the original warranty, whichever is longer.

Failures due to shipping damage, accident, misuse, improper installation, or operation are excluded from warranty coverage.

No other statement or claim by any employee, agent, or representative shall constitute a warranty or give rise to any liability or obligation of **MTI Analytical Technology**.



Applications

Chemical Processing &
Manufacturing Facilities

Gas Processing Facilities

Refineries

Transportation Pipelines

Specifications

Dimensions:

13" high
3" diameter
(19" h with junction box;
junction box 3.75"
diameter)

Weight:

10 pounds
(4.5 kilograms)

Flow Rate:

1 liter / minute
(0.035 scfm)
(2,000 btu / hour
maximum)

Back Pressure:
nil

Power Consumption:

100 watts (max)
(110/120 vac, 50/60 hz)

End Products:

Water Vapor, CO₂

Analyzer Hydrocarbon Catalytic Convertor

P/N 1211-010-120

Most hydrocarbon processing plants and transportation pipelines require the use of chemical analysis instrumentation. These analytical instruments require a stable outlet vent pressure referenced to atmospheric pressure for proper operation. This reference may be achieved by venting the sample to atmosphere. Some of the vented samples contain hydrocarbons, referred to as fugitive emissions. Fugitive emissions are air pollutants and contribute to worldwide environmental concerns.

The focus of the Analyzer Hydrocarbon Catalytic Convertor is the use of a catalytic conversion process to oxidize vented samples while maintaining an atmospheric pressure reference. The device utilizes a continuous heat source to allow effective conversion of intermittent as well as continuous vent streams.

In hazardous locations, the unit is designed, not certified, to provide explosion resistance. Canadian Standards Association (CSA) approval ratings are available, specify P/N 1211-021-120.



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Analytical Instrumentation



Analyzer Hydrocarbon Catalytic Convertor Specifications (ver 2001)

PART NUMBER: 1211-010-120

BACKPRESSURE: Nil @ 1 liter/minute

HYDROCARBON EMISSION PRODUCTS: Water Vapor, Carbon Dioxide
(Nil NO_x formation due to low temperature operation)

SURFACE TEMPERATURE CLASSIFICATION: T6 – 185° F (T3B - 330° F maximum operation)

CATALYST LIFE: Recommend catalyst replacement each year of operation to ensure efficiency of operation (P/N 0146-900)

MAXIMUM CONCENTRATION: 2,000 BTU/HR and/or 1 liter per minute

ELECTRICAL CLASSIFICATION: Designed, not certified, for Class 1, Division 2, Groups B, C, & D. (CSA Approval available for Class 1, Division 1, Groups B, C, and D, T3B – Specify P/N 1211-021-120)

MATERIALS of CONSTRUCTION: Stainless Steel, Aluminum, Platinum Catalyst

SAMPLE INLET CONNECTION: ¾" FNPT

**AVAILABLE WITH OPTIONAL TYPE J INTERNAL THERMOCOUPLE
TEMPERATURE SENSING ELEMENT:** Specify P/N 1211-010TCJ-120

MTI Analytical Technology is available to assist with **Analytical Application** requirements. Should there be questions or additional information required, please advise.

Email: dcmerriman@mertechinc.com



Applications

Chemical Processing &
Manufacturing Facilities

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Specifications

Dimensions:

13" high
3" diameter
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10 pounds
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1 liter / minute
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(2,000 btu / hour
maximum)

Back Pressure:
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Power Consumption:

100 watts (max)
(110/120 vac, 50/60 hz)

End Products:

Water Vapor, Carbon
Dioxide

Analyzer Hydrocarbon Catalytic Convertor

P/N 1211-021-120

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The focus of the Analyzer Hydrocarbon Catalytic Convertor is the use of a catalytic conversion process to oxidize vented samples while maintaining an atmospheric pressure reference. The device utilizes a continuous heat source to allow effective conversion of intermittent as well as continuous vent streams.

In hazardous locations, the unit is approved by the Canadian Standards Association for US Class 1, Division 1, Group B, C, and D, T3B classification.



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Analytical Instrumentation



Analyzer Hydrocarbon Catalytic Convertor Specifications (ver 2001)

PART NUMBER: 1211-021-120

BACKPRESSURE: Nil @ 1 liter/minute (<0.1" H₂O @ 3 liters/minute)

HYDROCARBON EMISSION PRODUCTS: Water Vapor, Carbon Dioxide
(Nil NO_x formation due to low temperature operation)

SURFACE TEMPERATURE CLASSIFICATION: T6 – 185° F (T3B – 330° F maximum operation)

CATALYST LIFE: Recommend catalyst replacement each year of operation to ensure efficiency of operation (P/N 0146-900)

MAXIMUM CONCENTRATION: 2,000 BTU/HR and/or 1 liter per minute

ELECTRICAL CLASSIFICATION: Canadian Standards Association (CSA (US))
Approved for Class 1, Division 1, Groups B, C, and D, T3B
(Suitable for Class 1, Zone 1, Ex Group IIB + H²)

MATERIALS of CONSTRUCTION: Stainless steel, Aluminum, Platinum Catalyst
(Other materials available as options)

SAMPLE INLET CONNECTION: ¾" MNPT (with Flame Arrestor)

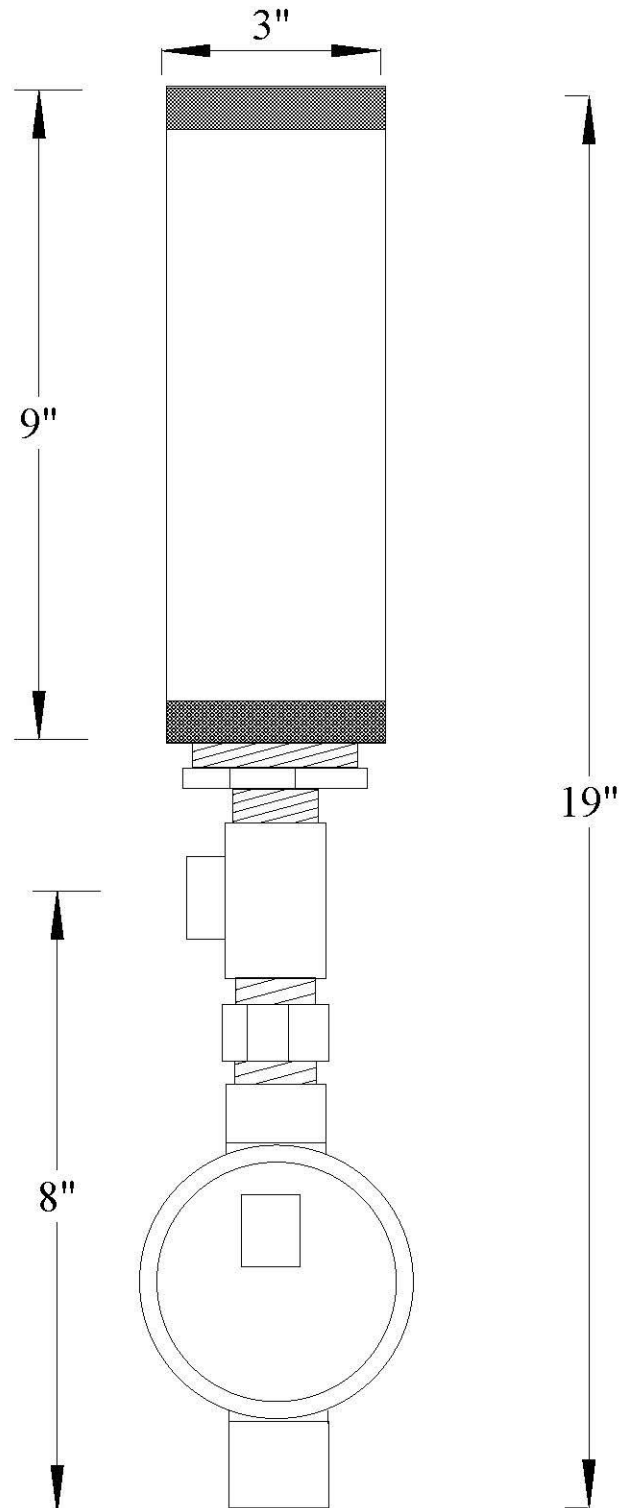
AVAILABLE WITH OPTIONAL TYPE J INTERNAL THERMOCOUPLE

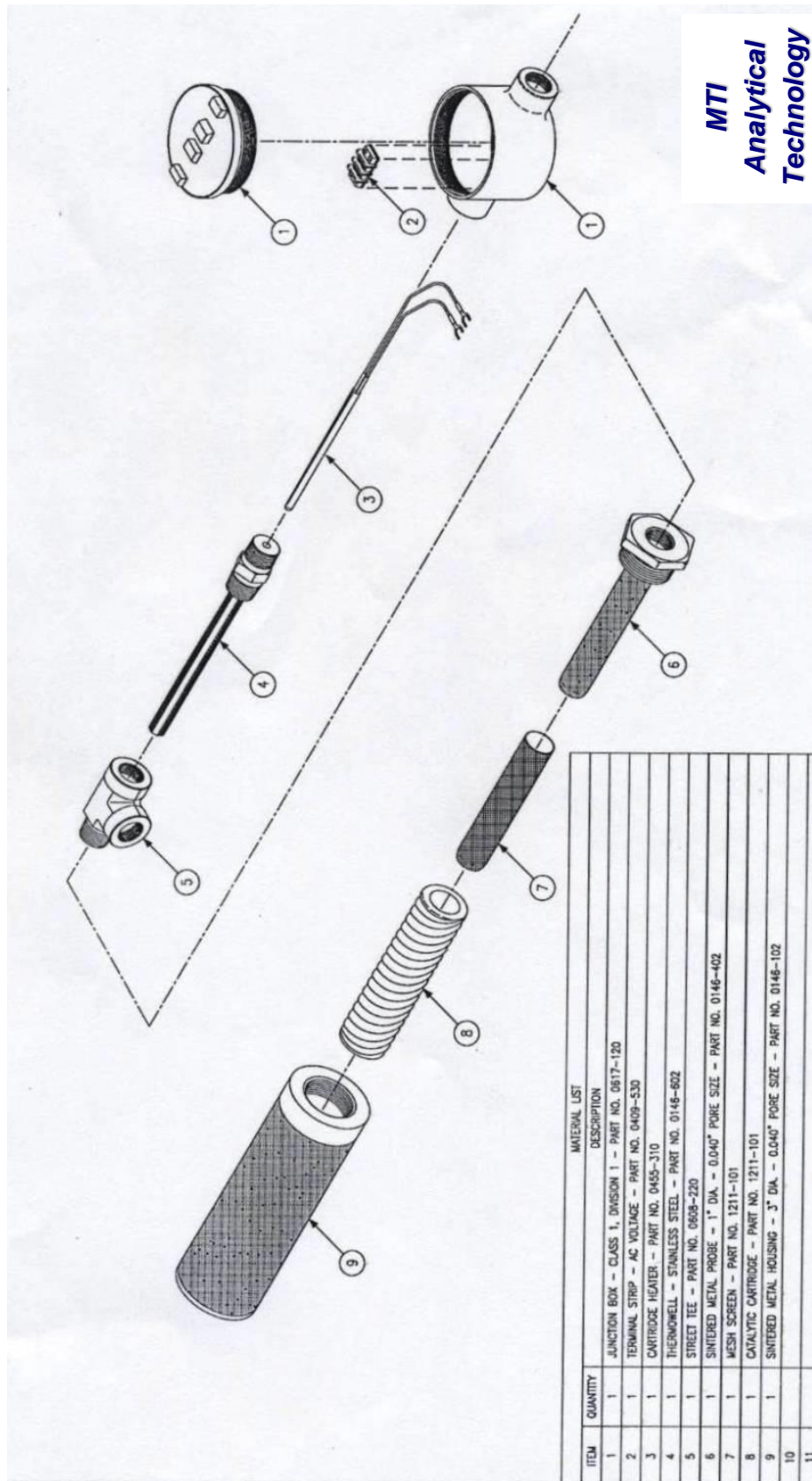
TEMPERATURE SENSING ELEMENT: Specify Part Number 1211-021TCJ-120

MTI Analytical Technology is available to assist with **Analytical Application** requirements. Should there be questions or additional information required, please advise.

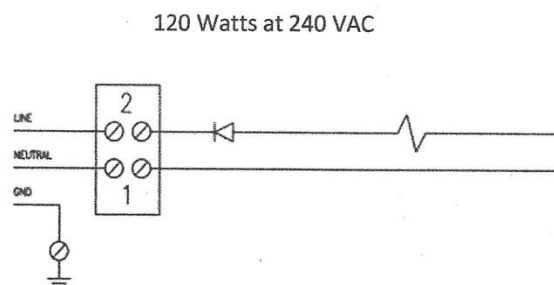
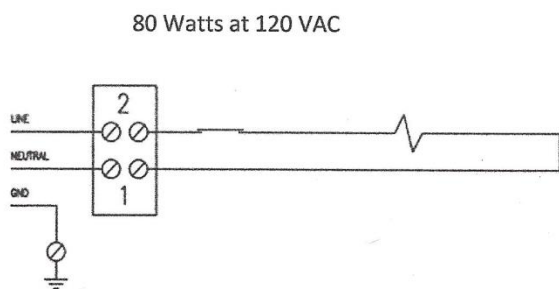
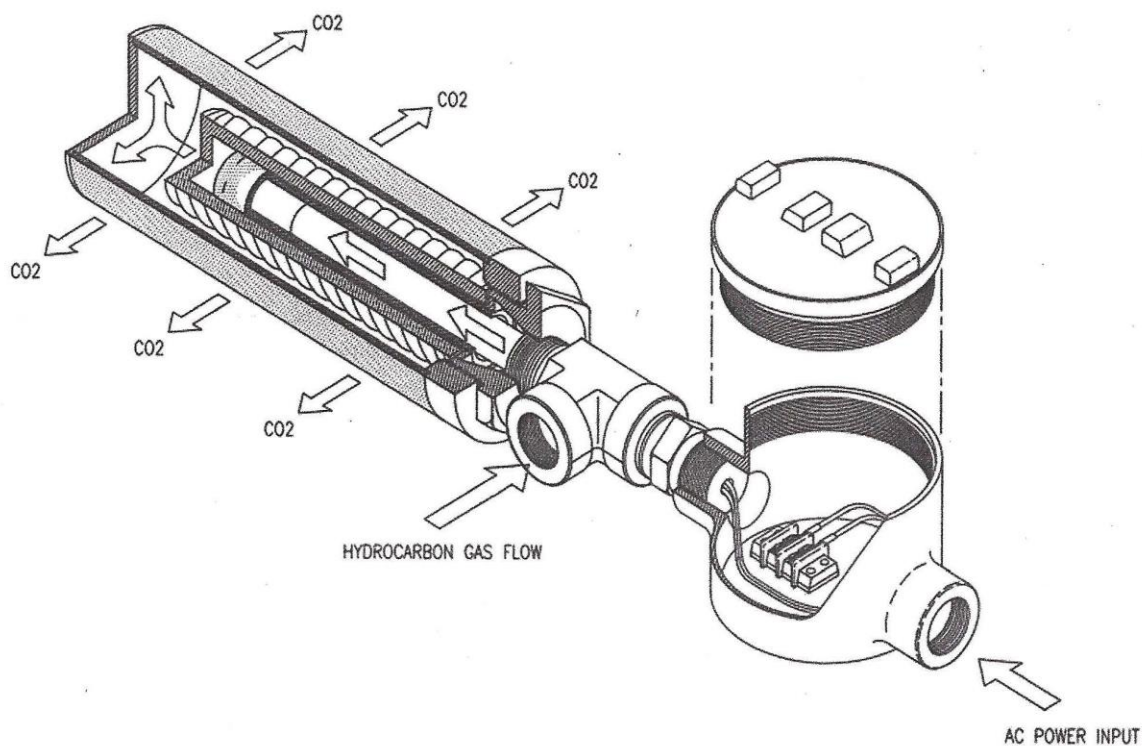
Email: dcmerriman@mertechinc.com

Catalytic Convertor Dimensional Data





Catalytic Convertor Wiring Diagram

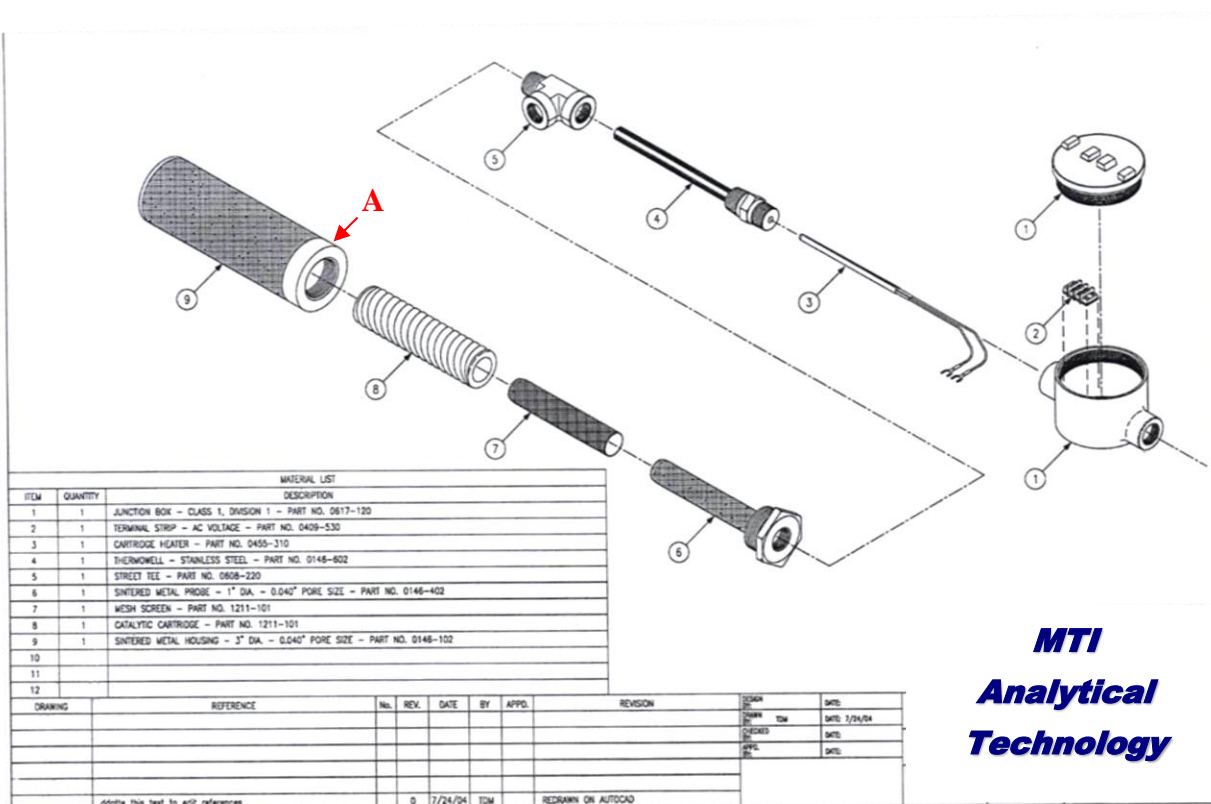


A two terminal strip is provided in the junction box for power wiring of the cartridge heating element. If an optional integral temperature detector is included, the 14" leads from the temperature detector will be coiled in the junction box for termination by the user.

Analyzer Hydrocarbon Catalytic Convertor Replacement of Catalyst Cartridge (ver2004)

To maintain conversion efficiency, it is recommended to change the Catalyst Cartridge annually.

1. Deenergize electrical circuit power.
2. Interrupt flow of gas to the Catalytic Convertor.
3. Allow the unit to cool as it will be warm to hot to the touch.
4. Remove Catalytic Convertor Outer Housing (Item #9). (Remove at juncture labeled "A")

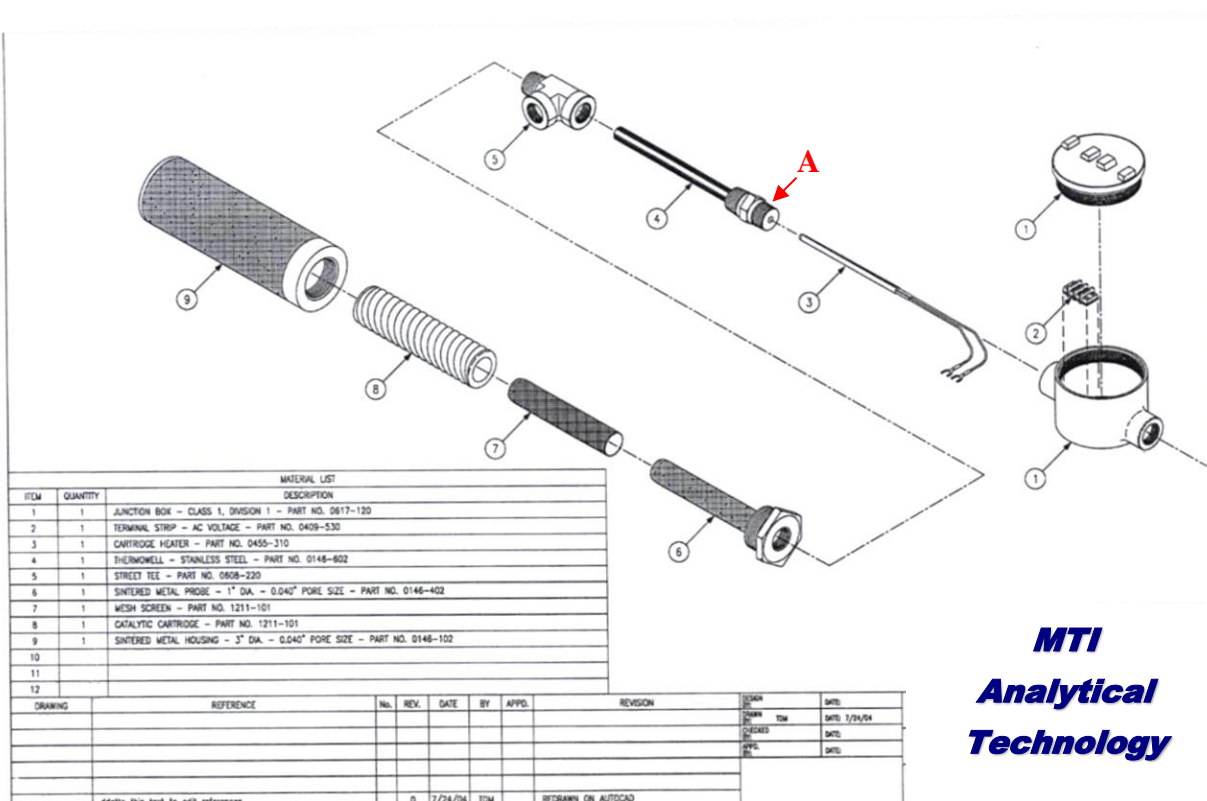


5. Slide Item #8 up and away from Item #6. (Item #7 is an integral part of Item #8 and will be removed with Item #8)
6. Place the new catalyst cartridge (Item #8 which contains Item #8 as an integral part) over the Probe (Item #6).
7. Replace the Outer Housing (Item #9)
8. Reenergize power to circuit.
9. It will take 15-20 minutes for the unit to be fully operational.

Items referenced in this document were manufactured in the United States of America.

Analyzer Hydrocarbon Catalytic Convertor Replacement of Cartridge Heating Element (ver 1910)

1. Remove electrical junction box cover (1) after deenergizing circuit power.
2. Disconnect cartridge heating element leads (with space lugs) from terminal strip (2) in electrical junction box.
3. Remove Catalytic Convertor upper assembly from the electrical junction box. (Remove at juncture labeled “A”) This will entail disconnecting sample inlet piping.



4. Extract cartridge heating element (3) from thermowell housing and replace with new unit.
5. If integral, optional type J Thermocouple (P/N 0455-310TCJ-120) is supplied; the red (non-magnetic, negative) and white (magnetic, positive) leads are for the thermocouple.
If integral, optional Type K Thermocouple (P/N 0455-310TCK-120) is supplied, the red (non-magnetic, negative) and yellow (magnetic, positive) leads are for the thermocouple.
6. Reassemble the upper assembly onto the electrical junction box (“A”).
7. Attach the cartridge heating element to the terminal strip (2) in the electrical junction box.
8. Extend the thermocouple wires, if supplied, to customer supplied terminal.
9. Replace the electrical junction box cover (1) and reenergize power to circuit.

Temperatures more than 500° F above ambient indicate functioning of the cartridge heater and greater than the base temperature above ambient indicate functioning of the catalyst cartridge. Actual temperatures above base will depend upon heat content of gases exhausted to the Catalytic Converter unit.

Items referenced in this document were manufactured in the United States of America.

Use of an MTI Analytical Technology Modified Probe in Analyzer Hydrocarbon Catalytic Convertors

v1910

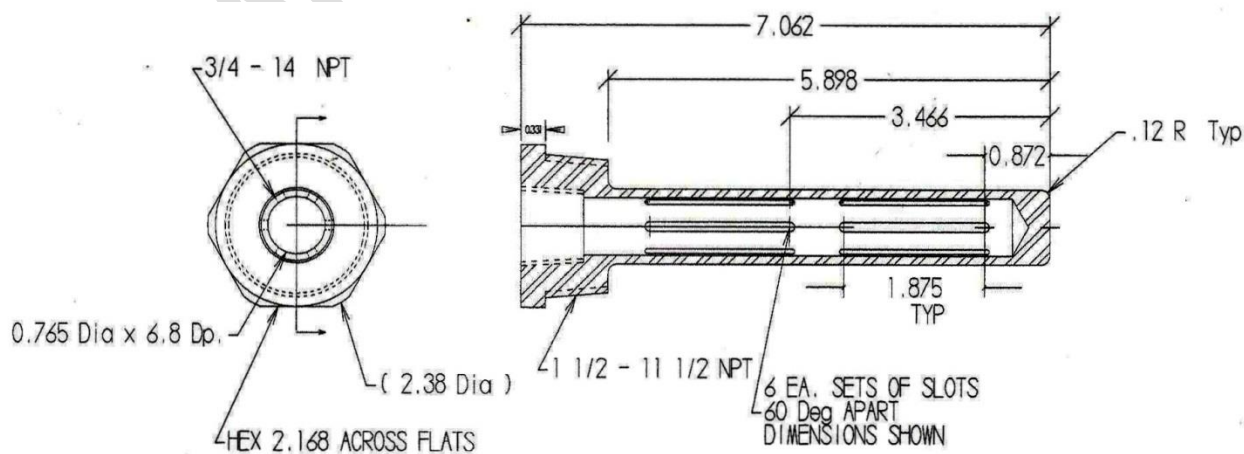
Analyzer manufacturers have historically utilized inert gases as the carrier gas in gas chromatography for analyzing chemical properties. This practice is now changing, with manufacturers choosing hydrogen as the carrier.

The standard **Analyzer Hydrocarbon Catalytic Converter** employs a sintered (porous) stainless steel probe through which the gases from the analyzer are diffused into the catalyst cartridge. As hydrogen is very volatile and flammable, deterioration of the standard internal probe in catalytic converter units has been reported.

MTI Analytical Technology designed and manufactures a patented probe machined of

Alloy 20 bar stock to provide a more robust configuration with numerous perforations providing vent gas exposure to the catalyst cartridge. The modified probe has been evaluated by petrochemical companies and has greatly increased operational life with no significant deterioration from exposure to the higher temperatures and flammability of the hydrogen carrier gas. The modified probe is easily and quickly changed in existing units. Catalytic Converter units may also be ordered from **MTI Analytical Technology** with the modified probe installed.

Dimensional information for the modified probe is indicated below. Production dimensions and details may have been modified.



Patent #9,162,181 B1

Analyzer Catalytic Convertor

Heat Shield

MTI

Applications

Chemical Processing &
Manufacturing Facilities

Gas Processing Facilities

Refineries

Transportation Pipelines

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Specifications

Dimensions:

15" high
5" diameter
(expanded stainless steel,
welded construction
provides atmospheric
protection)

Weight:

2 pounds
(1 kilograms)

Back Pressure:

nil

P/N HSSXC

Most catalytic convertors are mounted on the top of structures and do not pose a possibility of contact with personnel. However, some installations are in the vicinity of personnel contact. The conversion of hydrocarbons to inert gases produces heat and may be of a temperature to be uncomfortable or cause injury.

The Heat Shield provides a barrier between the elevated temperature of the exterior of the Analyzer Hydrocarbon Catalytic Convertor and personnel to eliminate the possibility of injury. No tools are required for installation or removal of the Heat Shield. A sleeve inside the structure slides over the outer housing of the catalytic convertor and secures the shield in place.

In locations where personnel contact is possible, the heat shield is designed to provide protection from the heated surface.



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***Analytical
Instrumentation***



Analyzer Hydrocarbon Catalytic Convertor

Parts List (ver 2001)

Complete Assembly (SS, 110/120 VAC)	P/N 1211-010-120
Complete Assembly (SS, 220/240 VAC)	P/N 1211-010-220
Complete Assembly (SS, 24 VDC)	P/N 1211-010-24VDC
Complete Assembly (SS, 110/120 VAC, Modified Alloy 20 Inner Probe)	P/N 1211-010MA20-120
Complete Assembly (SS, 110/120 VAC, Modified Alloy 20 Inner Probe w/ Integral Type J Thermocouple)	P/N 1211-010MA20TCJ-120
Complete Assembly (SS, 110/120 VAC w/ Integral Type J Thermocouple)	P/N 1211-010TCJ-120
Complete Assembly (SS, 110/120 VAC w/ Integral Type K Thermocouple)	P/N 1211-010TCK-120
Complete Assembly (SS, 110/120 VAC w/ Integral Type T Thermocouple)	P/N 1211-010TCT-120
Complete Assembly (Monel, 110/120 VAC)	P/N 1211-011M-120
Complete Assembly (SS, 110/120 VAC, CSA Certified)	P/N 1211-021-120
Complete Assembly (SS, 220/240 VAC, CSA Certified)	P/N 1211-021-220
Complete Assembly (SS, 110/120 VAC, CSA Certified w/ Modified Alloy 20 Internal Probe)	P/N 1211-021MA20-120
Complete Assembly (SS, 110/120 VAC, CSA Certified w/integral Type J Thermocouple)	P/N 1211-021TCJ-120
Complete Assembly (SS, 110/120 VAC, CSA Certified w/ Modified Alloy Internal Probe & Integral Type J Thermocouple)	P/N 1211-021MA20TCJ-120
Complete Assembly (Monel, 110/120 VAC, CSA Certified)	P/N 1211-025M-120
Probe, Sintered Metal (Stainless Steel)	P/N 0146-402
Probe, Sintered Metal (Monel)	P/N 0146-422
Probe (Inconel)	P/N 0146-XXX
Probe (Hast X)	P/N 0146-XXX
Probe, Machined (Alloy 20)	P/N 0146MA20-402
Thermowell (Stainless Steel)	P/N 0146-602
Thermowell (Monel)	P/N 0146-622
Outer Housing, Sintered Metal (Stainless Steel)	P/N 0146-102
Terminal Block (2 Terminal)	P/N 0409-530
Heating Element (110/120VAC)	P/N 0455-310-120
Heating Element (110/120VAC w/ integral Type J Thermocouple)	P/N 0455-310TCJ-120
Heating Element (110/120 VAC w/integral Type K Thermocouple)	P/N 0455-310TCK-120
Heating Element (110/120VAC w/ integral Type T Thermocouple)	P/N 0455-310TCT-120
Heating Element (220/240 VAC)	P/N 0455-311-220
Tee, 3/4" Street (Stainless Steel)	P/N 0608-220
Junction Box, 3/4" NPT	P/N 0617-120
Catalyst Cartridge (Includes Mesh Screen, Item #7)	P/N 0146-900
(Previous Catalyst Cartridge P/N 1211-101)	
Mounting Plate, 3/4" NPT	P/N 0146-702

Flame Arrestor (Inlet)
Heat Shield (Expanded SS Mesh)

P/N 0146-750
P/N HSSXC

MTI Analytical Technology Parts List

*** Analysis Instrumentation ***

Foxboro (Invensys) Analytical – pH, ORP, Conductivity Analyzers www.foxboro.com/echem
TRACE Technology, Inc. – Lead Acetate H₂S and Total Sulfur Portable & Process Analyzers

*** Analyzer Sensors / Electrochemical ***

Foxboro (Invensys) Analytical – DolpHin pH and ORP Sensors www.foxboro.com/echem

*** Analyzer Vent Catalytic Convertor ***

TRACE Technology, Inc. – TRACERase Analyzer Vent Hydrocarbon Emission Eliminators

*** Gas Detection Sensors & Systems ***

Otis Instruments Inc. – WireFree™ Gen² Gas Detection Products www.otisinstruments.com

*** Manufacturers ***

Foxboro (Invensys) Analytical
Otis Instruments Inc.

TRACE Technology, Inc.

MTI Analytical Technology is available to assist with environmental, laboratory, and process monitoring applications. Design, fabrication, installation, and commissioning may be accomplished, assuring integrity and performance of component parts.

Contact **Dale C. Merriman** at the address below or email: dcmerriman@mertechinc.com