



Instruction Manual

600 Series

*Mini Thermoelectric Gas Coolers
(Units sold prior to 07-01-2015)*



AMETEK®

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Receiving and Storage

The Universal Analyzers 600 Series Mini Thermoelectric Gas Cooler is a complete pre-installed unit. No assembly is necessary when received on-site.

Carefully inspect the product and any special accessories included with it immediately on arrival by removing them from the packing and checking for missing articles against the packing list!

Check the items for any damage in transit and, if required, inform the shipping insurance company immediately of any damage found!

Storage Location should be protected from the elements. Although all components provided are designed to resist corrosion, additional protection from heat (>140°F/60°C) and humidity is recommended.

Definition of Symbols



WARNING - EXPLOSION HAZARD - DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NON-HAZARDOUS.

WARNING - EXPLOSION HAZARD - SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR HAZARDOUS AREA INSTALLATION.

THE SUPPLY POWER CIRCUIT MUST INCLUDE AN OVERPROTECTION DEVICE WITH A MAXIMUM RATING OF 20A. A DISCONNECT SWITCH MUST BE LOCATED IN CLOSE PROXIMITY TO THE PROBE.

IF THE EQUIPMENT IS USED IN A MANNER NOT SPECIFIED BY THE MANUFACTURER, THE PROTECTION PROVIDED BY THE EQUIPMENT MAY BE IMPAIRED PER CLAUSE 5.4.4(i) IN STANDARD EN 61010-1

CAUTION, RISK OF DANGER SYMBOL INDICATES INJURY MAY OCCUR IF MANUFACTURER'S INSTRUCTIONS ARE NOT ADHERED TO. PLEASE READ MANUAL CAREFULLY WHEN SYMBOL IS DISPLAYED



CAUTION, HOT SURFACE SYMBOL INDICATES EXPOSED SURFACE TEMPERATURE CAN CAUSE BURNS OR PERSONAL INJURY. CARE SHOULD BE TAKEN WHEN CONTACT IS REQUIRED.



CAUTION, RISK OF ELECTRICAL SHOCK SYMBOL INDICATES ELECTRICAL SHOCK MAY OCCUR. CAUTION SHOULD BE TAKEN BEFORE DISCONNECTING OR CONTACTING ANY ELECTRICAL CONNECTIONS.



PROTECTIVE CONDUCTOR TERMINAL SYMBOL INDICATES THE TERMINAL LOCATION FOR THE PROTECTIVE CONDUCTOR. FAILURE TO CONNECT TO THE PROTECTIVE CONDUCTOR TERMINAL MAY RESULT IN A SHOCK HAZARD.

Product Identification

Lead Time	Cooler (Part Number Configurator: 600)		
3 wks	622	One (1) Sample Point - One 5" Heat Exchanger, (1) Active	
	632	One (1) Sample Point - Two 5" Heat Exchangers, (1) Passive, (1) Active	
	642	One (1) Sample Point - Two 5" Heat Exchangers, (2) Active	
	624	One (1) Sample Point - One 5" Heat Exchanger, (1) Active	
	634	One (1) Sample Point - Two 5" Heat Exchangers, (1) Passive, (1) Active	
	644	One (1) Sample Point - Two 5" Heat Exchangers, (2) Active	
	5" Heat Exchanger Material (Price per Heat Exchanger)		
	SS	316SS	
	PV	Glass/Kynar	
	C	Hastelloy C276	
+1 wk	ST	Teflon Coated 316SS	
	SW	316 Welded SS (High Pressure)	
	SN	Sulfinert [®] coated 316SS	
	KK	Kynar/Kynar	
	N	No Heat Exchangers Included	
	Water Carry-Over Sensor		
	WCOF	with 2µm Ceramic Filter	
	WCO	without Filter	
	N	None Selected	
	Options		
	TCK	New Jersey Option - Type K T/C	
	TCJ	New Jersey Option - Type J T/C	
	N	No Options Included	
	644	-SS -WCOF -N -N	Sample Part #

NOTE: LEAD TIMES ARE NOT COMPOUNDED. LEAD TIME IS COOLER + LONGEST OPTION

Flow Capacity l/m									
600 Series	620			630			640		
Ambient Temperature (°F)	77°	90°	105°	77°	90°	105°	77°	90°	105°
12% H ₂ O Vol.	2.5	2	1.5	4	3	2	5	4	3
15% H ₂ O Vol.	2	1.8	1.2	4	3	2	4	3.5	2.5
30% H ₂ O Vol.	1	0.9	0.6	4	3	2	2	1.8	1.3
50% H ₂ O Vol.	0.6	0.5	0.3	4	3	2	1	0.9	0.7
Exit Dew Point (C°)	4	4	4	4	4	4	4	4	4

Standard Features

- Water Carry-Over Input
- Alarm Contact: Moisture
- LED Status Indicators: Moisture, Cooling

Specifications

OPERATING SPECIFICATIONS	
Sample Flow Rate	0 to 5 l/m
Maximum Inlet Temperature	
Stainless Steel Heat Exchanger	700°F (370°C)
Kynar/Glass Heat Exchanger	300°F (149°C)
Maximum Inlet Gas Dew Point	180°F (82°C)*
Maximum Inlet Water Concentration	50%*
Minimum Ambient Temperature	32°F (0°C)
Maximum Ambient Temperature	105°F (41°C)*
Maximum Cooling Power	126 BTUs per hour (120 kJ/hr)
Outlet Sample Dew Point	39°F (4°C), adjustable
Maximum Input Power (Model/Wattage)	622/78 watts 632/78 watts 642/150 watts 624/108 watts 634/108 watts 644/150 watts
Voltage	12VDC (Model 6X2) or 24VDC (Model 6X4)
Electrical Classification	General Purpose/Safe Area
Dimensions	9 1/4" H x 8 7/8" W x 6 3/8" D
Weight	18 lbs (8kg)
Soluble Gas Removal Rates	NO 0% loss NO ₂ <10% loss SO ₂ < 2% loss CO 0% loss CO ₂ < 2% loss

* AT REDUCED FLOW RATES, SEE CAPACITY CHART.

Description and Principle of Operation

Universal Analyzers 600 Series Mini Thermoelectric Gas Cooler is the least expensive, compact Thermoelectric Cooler. The 600 Series Mini Cooler is available as either a Single or Double Sample Stream providing a self-regulated 4.0°C Dewpoint Sample Gas ready for Analysis. The 600 Series Cooler provides a Signal output 0-1VDC representing 0-50°C. An externally mounted 12, or 24VDC Power Supply is required and is offered as an Accessory.

In order to analyze combustion products or incinerator effluents utilizing a direct extractive sampling technique, it is important to remove the water vapor without removing the water soluble fraction(s) from the gas sample. The heat exchangers (impingers) used in the Universal Analyzers gas sample coolers are designed to minimize the gas/condensate area and time of contact to reduce to a minimum, the amount of mass transfer of those water soluble components from the gas phase into the liquid phase. The result is a dry gas sample which has the same composition on a dry basis before and after passing through the chiller.

A gas sample is usually taken from a stack with a probe extending into the center of the stack mounted onto or adjacent to a heated filter. The heated filter is maintained at a temperature above the dew point of the stack gas, usually 300° to 400°F. in order to avoid cementing the filtered particulates to the filter medium with condensate. A means is usually provided to automatically blow the particulates trapped by the filter, back into the stack on a periodic basis.

The stack gas sample is clean but "wet" after passing through the filter assembly. The moisture in the gas sample comes from the fuel as a product of combustion, from the humidity in the air which supports the combustion and from the water content which was trapped in the fuel. This latter source of water in the sample can be from burning moist coal, wet garbage, or from water injected into the fire box. Water from all of these sources will remove the water soluble gasses from the sample stream if allowed to condense in the sample line prior to the controlled separation within the Universal Analyzers' heat exchangers in the sample cooler.

In order to maintain the temperature of the gas sample above the dew point as it is transported to the gas sample cooler, a heat traced sample line is usually employed. The heat traced sample line can be very short if the gas sample cooler is located close to the heated stack filter or it could be several hundred feet long if the gas sample cooler is located in the analyzer shack some distance from the stack.

The Universal Analyzers gas sample cooler contains the special impinger type heat exchanger(s). These are mounted within heat transfer blocks which are either passively cooled by ambient air or thermoelectrically cooled using Peltier elements. Where high water contents are encountered, it is efficient to remove the condensate in two stages, one at the temperature using a passive heat exchanger and then by pushing the sample into a thermoelectrically cooled heat exchanger. The passive heat exchanger can remove water which will condense at the temperature of the environment. In high water content samples, this could be as much as 80% of the water in the sample. The thermoelectrically cooled stage is temperature controlled at a factory setting of 5°C. This temperature can be adjusted with a set point potentiometer.

The gas sample conditioning system should contain additional components to insure that a clean, dry sample is presented to the analyzer panel for minimum analyzer maintenance. A sensor should be provided to sense the presence of condensate, should any exist in the tubing following the chiller. This is the optional WCO (Water Carry-Over) sensor which can be provided with a Universal Analyzers chiller. A visible coalescing filter which collects particulates on the outside of the cylindrical filter, surrounded by a transparent bowl will allow the operator to inspect the condition of the heated stack filter. The WCO sensor can be provided with the sensing elements in the bottom of the filter bowl to provide an early warning if the coalescing filter removes liquid from the sample stream. This combination filter/moisture sensor is called the "WCOF".

The location of the sample pump (usually an oil-less diaphragm pump) within the sampling system is the subject of much debate. If the pump is located upstream from the chiller, it should have a heated head to avoid the presence of a two phase mixture which shortens the life of a diaphragm and causes maintenance problems. It can be shown that passing the gas sample through the chiller under a slight positive pressure will result in a lower gas dew point than if the gas were at a slight vacuum. A common location for the sample pump is in the sample line after the chiller. This allows the sample pump to handle a cool, dry sample with much reduce maintenance problems. Some design engineers have taken the approach to use a sample cooler having two chilled heat exchangers. The pump is placed in the sample line between

the two heat exchangers. The first chilled heat exchanger takes enough of the water vapor from the sample to protect the pump. The second heat exchanger is under a slight pressure and the dew point is at its minimum because it is on the discharge side of the pump. The sample pump location within the sample system is a matter of choice and good engineering.

The condensate must be removed from the heat exchanger(s) using one of the following methods:

1. A continuously running peristaltic tubing pump can be used with the heat exchanger either under pressure or vacuum. This is an easy solution which lends itself to leak testing because of the positive displacement nature of the peristaltic pump. It is, however, a device which requires periodic maintenance to replace the tubing.
2. Condensate can be removed from the heat exchanger using an eductor with a flow limiter to draw some of the hot, wet sample through the heat exchanger along with the condensate. This method utilizes the heat exchanger as a bypass condenser and serves the purpose of reducing the time lag in the sample line without loading the chiller with the water vapor in the bypassed sample.
3. A float drain trap can be used to collect the condensate running out of the bottom of the heat exchanger(s) if the heat exchangers are at a slight positive pressure with respect to the atmosphere. The float drain trap functions like a steam trap. The float rises to discharge the condensate when there is enough to lift the float.
4. A small drain tank can be provided with a dual level, conductivity type level control to collect the condensate. When the tank is full, the level controller will start a pump to remove the condensate until it reaches to the lower electrode. When contact is lost, the pump stops and the condensate continues to fill the tank. Typically, a peristaltic pump is used to remove the condensate. The advantage is that the pump only runs occasionally and bypasses no gas sample. The peristaltic pump requires less maintenance because it does not run continuously.

Installation



TO COMPLY WITH HAZARDOUS AREA STANDARDS, UNIT MUST BE INSTALLED IN A MINIMUM IP54 ENCLOSURE AND PROTECTED FROM DUST/ WATER INGRESS. ADEQUATE VENTILATION MUST BE PROVIDED FOR DISSIPATION OF A MINIMUM OF 1200 BTU/hr (1265 kJ/hr)

Universal Analyzers 600 Series Mini Thermoelectric Gas Cooler should be installed away from heat sources in a well ventilated area of an instrument rack or enclosure. The Cooler relies on the ambient temperature as a coolant, too high a level will cause it to perform unreliably. Contact the factory for recommendations. Air purging an enclosure does not provide enough ventilation to remove the heat which will be generated internally by the sample chiller. On the other hand, there are air conditioners and vortex coolers which can provide the necessary cooling for enclosing thermoelectric chillers.

The 600 Series Mini Cooler has mounting taps on the top and bottom to allow it to be wall mounted or mounted to rails in an instrument rack. Accessories mounted on the side can be supported by the mounting flange on the cooler.

A 3/8" tubing fitting is provided at the top of the heat exchanger as the sample inlet. The dry sample outlet from the cooler is the 1/4" Kynar tube fitting exiting out of the top of the heat exchanger at an angle. The gas sample should be further conditioned with an additional filter as a safety measure before it enters the analyzer(s). The WCOF visible filter which incorporates a safety moisture sensor is designed for this purpose. A similar filter without the moisture sensor is also available from Universal Analyzers. A separate moisture sensor, the WCO, can also be provided where the user prefers that form factor. Contact the factory for information, pricing, and drawings.

A sample pump is normally required to pull the sample through the sample cooler and to force it through the visible filter. The moisture sensor, if not a part of the visible filter should be located ahead of the visible filter. There must be a method to remove the condensate from the heat exchanger. Accessories available from Universal Analyzers include a peristaltic pump, eductor, or drain pot, which must be run to sewer, a container, or other drain that heads out of the instrument enclosure, to avoid collecting water (condensate) on the floor.

If an eductor is utilized to remove the condensate, the outlet tube length should be no longer than two feet in order to maintain low back pressure at the outlet of the eductor. The outlet tube can be placed in a larger pipe to channel the condensate to a drain.

An external power supply must be used with the 600 series chiller. See the table below for power supply wattage recommendations. Installation shall be in accord with the manufacturer's instructions and the National Electrical Code (ANSI/NFPA 70). Tampering and replacement with non-factory components may adversely affect the safe use of the system. See the wiring diagram in drawing P0327. The alarm relay has two sets of dry contact alarms at TB2 and TB3. One set is typically used to control the power to the sample pump (when wired as shown in P0327, power is only provided to the pump when the cooler is not in an alarm state).

Suggested Power Supply Wattage		
	12VDC	24VDC
Model(s)	622, 632, 642	624, 634, 644
Suggested Power Supply Wattage	150 watt	300 watt



NOTE: THE SUPPLY POWER CIRCUIT MUST INCLUDE AN OVERPROTECTION DEVICE WITH A MAXIMUM RATING OF 20 A. A DISCONNECT SWITCH MUST BE LOCATED IN CLOSE PROXIMITY TO THE COOLER. IF THE EQUIPMENT IS USED IN A MANNER NOT SPECIFIED BY THE MANUFACTURER, THE PROTECTION PROVIDED BY THE EQUIPMENT MAY BE IMPAIRED PER CLAUSE 5.4.4(I) IN STANDARD EN 61010-1.

THE MOISTURE SENSOR CAN BE CONNECTED TO THE "VIKING" CONNECTOR MOUNTED ON THE EXTERIOR OF THE ENCLOSURE NEXT TO THE HEAT EXCHANGERS.

Start-Up

Apply power to the Universal Analyzers 600 Series Mini Thermoelectric Gas Cooler. The indicated temperature will start to drop immediately. It should be below the over-temperature set point in approximately four minutes and the "COOL" green LED lamp should light. When the temperature reaches the control point (set at 5°C), the rate at which the temperature drops will be reduced. It will stabilize between 4° and 5°C.

Start the sample gas flow. Water should be observed to be removed from the bottom of the heat exchanger when steady state conditions are established.

If moisture sensors are installed, the (DRY) light should remain on as dry gas is transported to the analyzer(s). Turn on the analyzer(s) and calibrate as required.

Shutdown

Stop sample gas flow to the Universal Analyzers 600 Series Mini Thermoelectric Gas Cooler by turning off the sample pump. Allow the drain pump to run for several minutes to remove any remaining condensate from the heat exchangers. After all condensate has been drained, turn off power to the cooler.

Maintenance

Before performing any maintenance on the Universal Analyzers 600 Series Mini Thermoelectric Gas Cooler, ensure that all plant safety procedures are followed. As with any electrical device, ensure power is removed before performing any procedures.

The Mini Cooler is designed for maintenance free operation but if any is required, ensure power has been removed before maintenance or repair is performed.

For the best performance of the Mini Cooler, the following maintenance schedule is recommended:

Maintenance Activity	Frequency
Peristaltic Pump	Replace Tubing every 3 months
Diaphragm Sample Pump	Replace Diaphragm every 6 months
Clean Heat Exchanger	Annually
Inspect Heat Sink Fins	Monthly

Troubleshooting

The following table should give an overview of possible errors and an instruction to check and to repair them (is not valid for the starting-up period of cooler).

Error	Possible reason	Check/Repair
The presence of water	<p>Overloading of the refrigeration capacity of the cooler due to too much water vapor or too great a sample flow rate.</p> <p>A fault in the condensate removal equipment. The heat exchanger has become full of condensate.</p> <p>An air leak in the condensate removal tubing.</p> <p>The temperature of the air passing through the heat sink is too high due to the cooler being in an enclosed box.</p> <p>Failure of the sample cooler.</p>	
No sample gas flow	<p>Heat exchanger plugged</p> <p>Alarm shutoff</p> <p>No power on cooler</p>	<p>Check for an obstruction</p> <p>Remove heat exchanger from unit and disassemble</p> <p>Verify cool & dry indicators are illuminated</p> <p>Ensure cooler has power supplied</p>
Water carry over	<p>Inadequate drain apparatus</p> <p>Excessive flow rate</p> <p>High ambient temperature</p> <p>Defective cooler</p>	<p>Verify drain tubing is unobstructed and equipment is functioning satisfactory</p> <p>Reduce the flow rate</p> <p>Reduce the ambient temperature (Increase ventilation or relocate cooler)</p> <p>Verify air flow across the heat sink</p> <p>Hold hand in front of heat sink fins and ensure air movement.</p>

Troubleshooting

<p>High oxygen readings/low pollutant readings</p>	<p>Leak</p>	<p>Loose connection</p> <p>Verify all fittings are leak free</p> <p>Defective peristaltic pump tubing</p> <p>Replace tubing</p> <p>Broken or leaking heat exchanger</p> <p>Remove heat exchanger and replace if broken or repair (replace O-Ring) if leaking.</p>
<p>'Dry' light is not illuminated</p>	<p>Water carry over</p> <p>Faulty water carry over IC</p>	<p>See "water carry over" error</p> <p>Disconnect/ unplug the 2 wire cable from the WCO terminals, located on the power supply board. If the dry light does not illuminate, consult the factory</p>
<p>'Cool' light is not illuminated</p>	<p>Ambient temperature too high flow rate/ water content too high</p> <p>Failed peltier element</p>	<p>Reduce the ambient temperature (Increase ventilation or relocate cooler)</p> <p>Lower the flow rate through the cooler and observe the results. If condition corrects itself, consult the factory for further troubleshooting</p> <p>Measure resistance between the red & black peltier leads. A failed peltier element will read high resistance or 'Open'</p> <p>Consult wiring diagram for wire location details</p>

Spare Parts

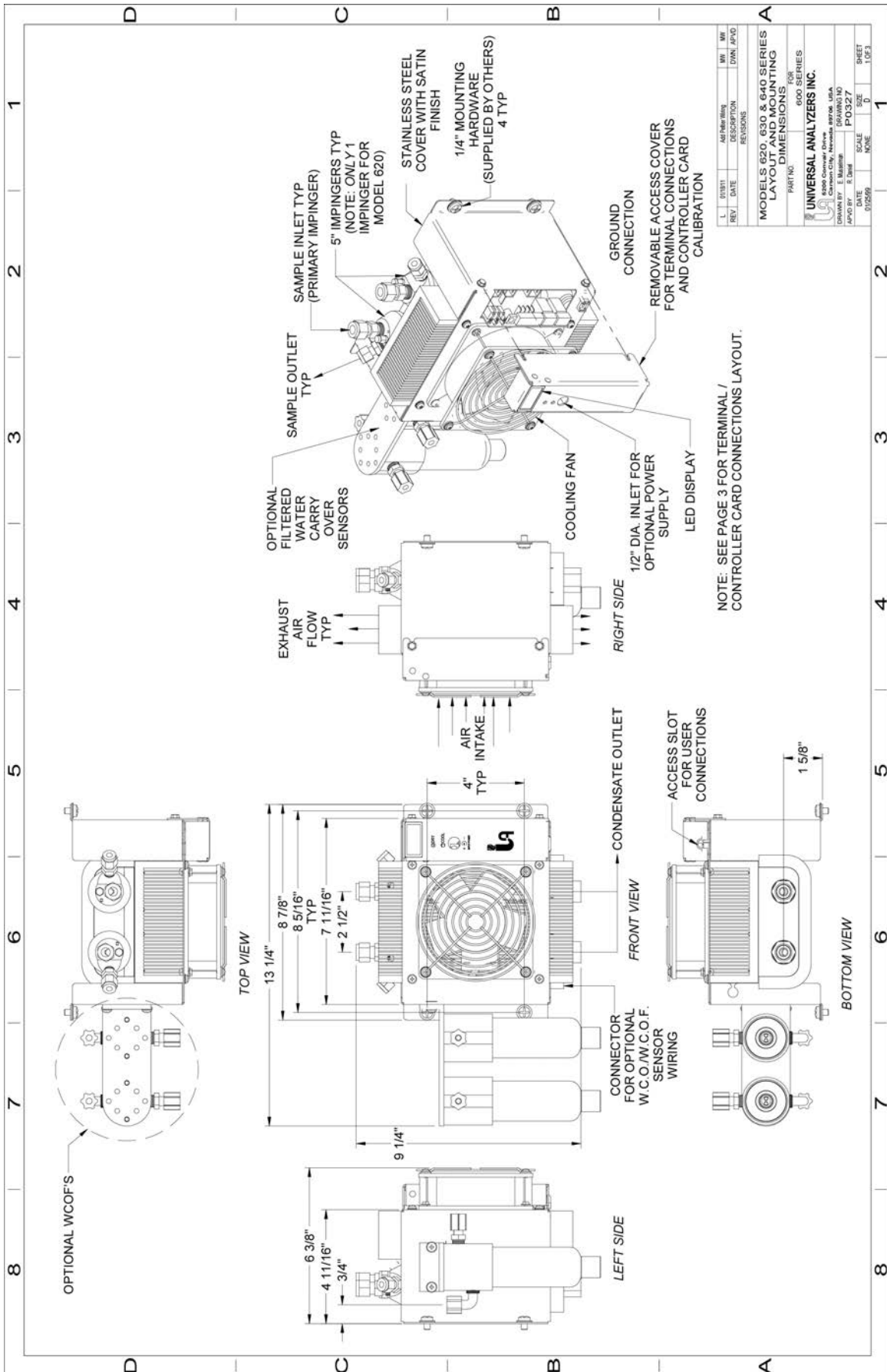
Consumable Spare Parts	
Part	P/N
UHMW Polyethylene Filter, 5 µm	4980-0006
ADI Mini Dia-VAC Sample Pump Rebuild Kit	9515-0018
Peristaltic Pump Tubing, #15, 5 ft. length	9216-0002
Heat Sink Paste, 0.1 ounce container	8010-0001
Ceramic Filter Element, 2 µm	4980-0007

Common Spare Parts	
Part	P/N
Glass/Kynar Heat Exchanger/Impinger, 5"	5200-K050
316SS, Heat Exchanger/Impinger, 5"	5200-S050
Glass Tube, Outer – Replacement for 5" Heat Exchanger	5201-0002
O-Ring, 2-018, Viton, Glass Heat Exchanger, bottom	4904-0003
O-Ring, 2-120, Viton, Glass Heat Exchanger, top	4904-0004
O-Ring, 2-030, Viton, Filter Bowl Seal	4904-0006
O-Ring, 2-021, Viton, 316SS Heat Exchanger	4904-0013

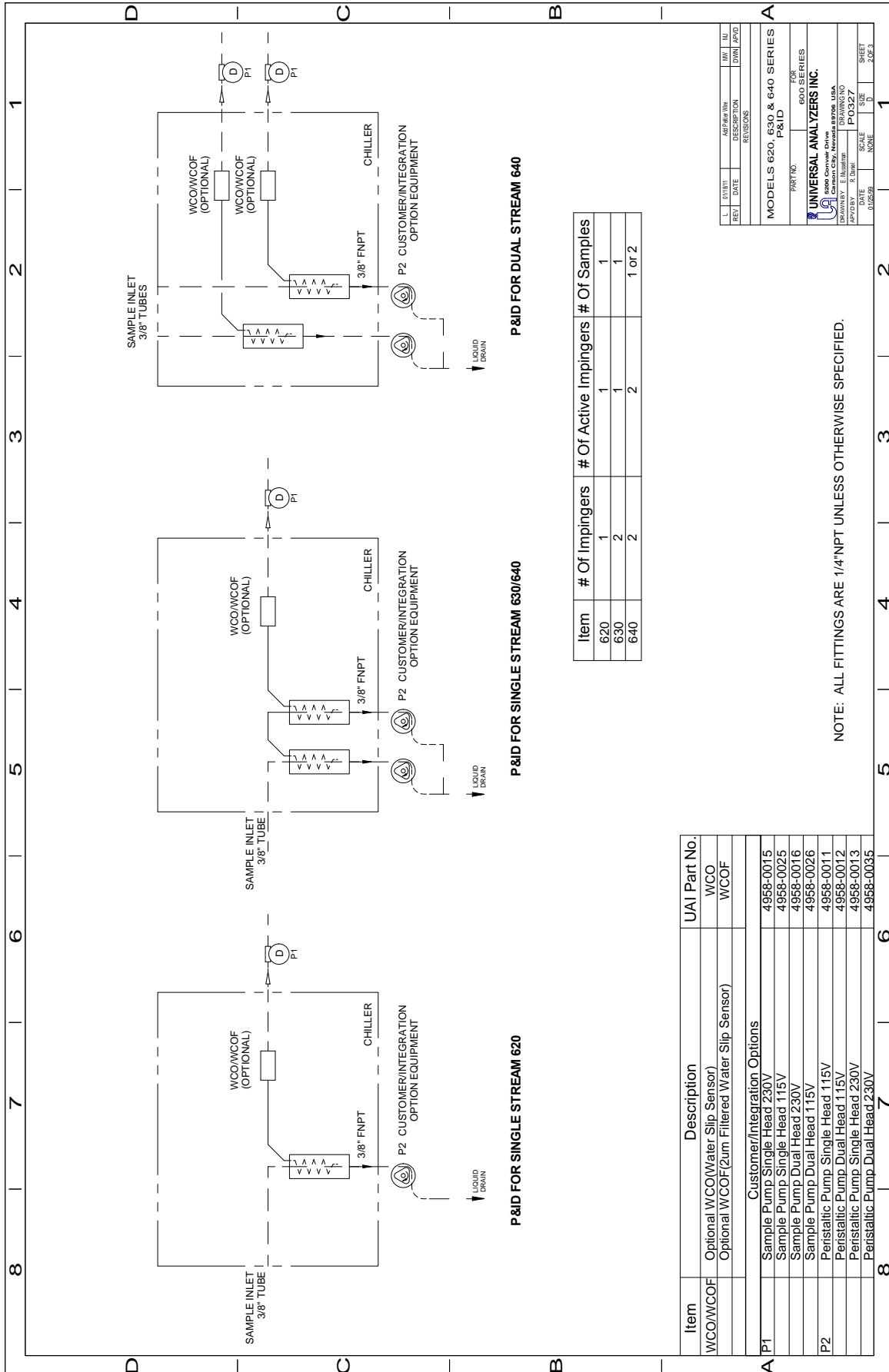
Critical Failure Parts	
Part	P/N
Peltier Element, 15VDC 8.5 Amp 40mm (Models 622, 632, 642, 644)	3016-0001
Peltier Element, 15VDC 3.9 Amp 30mm (Models 624 & 634 Only)	3016-0003
Insulation Kit for Heat Transfer Block	9515-0024
Temperature Sensor, AD592 (Chiller Control)	1150-0017
Temperature Switch, Limit 185°F (Over Temp)	3103-0006
Heat Sink Cooling Fan, 12VDC	4800-0002
Heat Sink Cooling Fan, 24VDC	4800-0008

In Depth Repair Parts	
Part	P/N
Power Supply, 12VDC, 156 Watt	5400-1015
Power Supply, 24VDC, 300 Watt	5400-0007
Controller/Alarm Circuit Board, 600 Series, 12VDC	3600-0035
Controller/Alarm Circuit Board, 600 Series, 15-24VDC	3600-0036
Single Head Sample Pump, TFE/Al Head, Mini Dia-VAC	4958-0025
Dual Head Sample Pump, TFE/Al Head, Mini Dia-VAC	4958-0026
Back Pressure Regulator, Plastic Adjustable PSIG, Sample Pump	4955-0246
Peristaltic Pump Motor, 120VAC with Chassis	4958-0003
Peristaltic Pump Head for #15 Tubing	4958-0006
WCOF Moisture Sensor Bowl Assembly with Cable	5205-0006

Drawings Models 620, 630, 640



Drawings Models 620, 630, 640



Item	# Of Impingers	# Of Active Impingers	# Of Samples
620	1	1	1
630	2	1	1
640	2	2	1 or 2

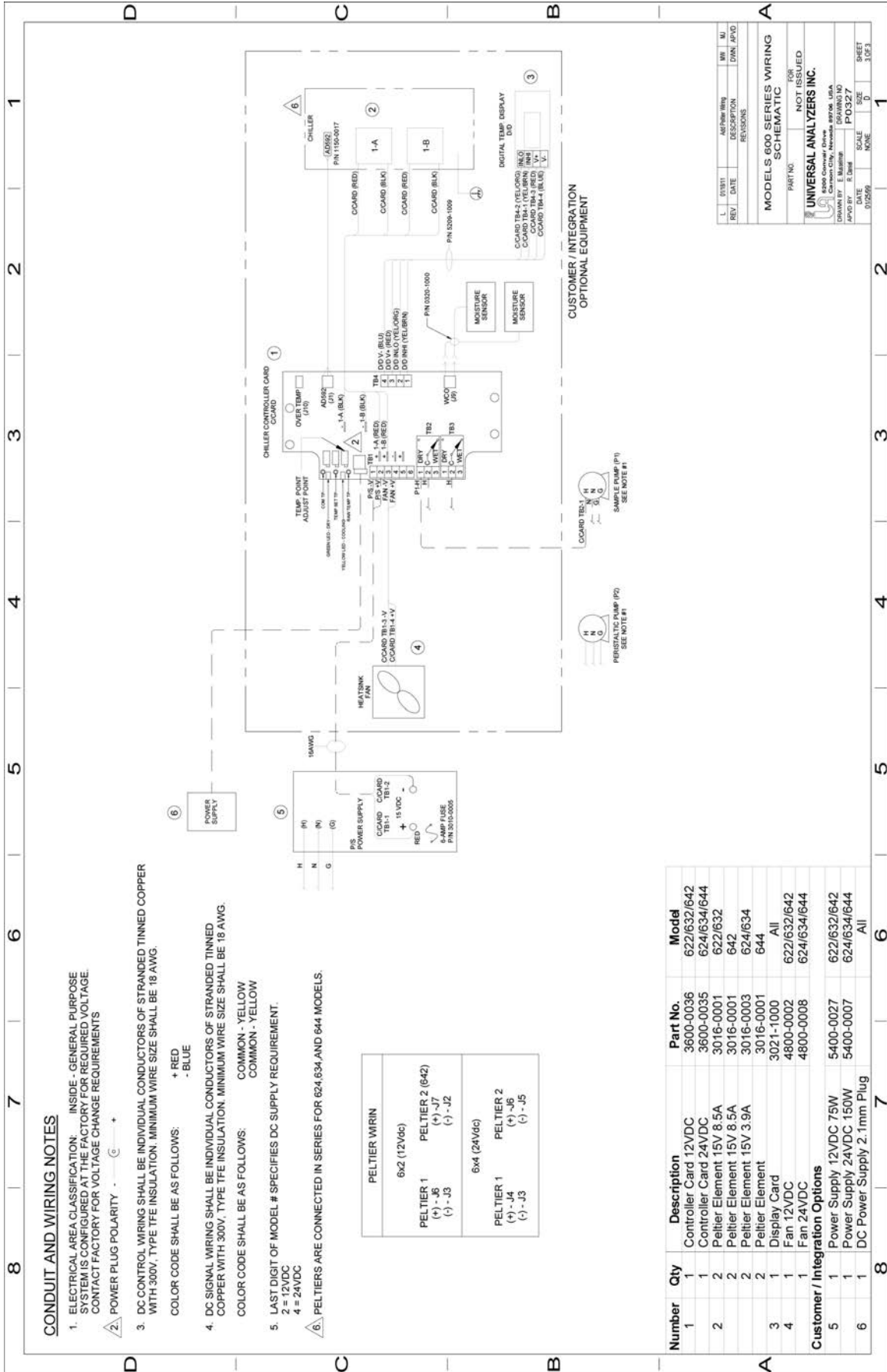
Item	Description	UAI Part No.
WCO/WCOF	Optional WCO/Water Slip Sensor	WCO
	Optional WCOF(2um Filtered Water Slip Sensor)	WCOF
Customer/Integration Options		
P1	Sample Pump Single Head 230V	4958-0015
	Sample Pump Single Head 115V	4958-0025
	Sample Pump Dual Head 230V	4958-0016
	Sample Pump Dual Head 115V	4958-0026
P2	Peristaltic Pump Single Head 115V	4958-0011
	Peristaltic Pump Dual Head 115V	4958-0012
	Peristaltic Pump Single Head 230V	4958-0013
	Peristaltic Pump Dual Head 230V	4958-0035

L	DATE	DESCRIPTION	REV	DATE	DESCRIPTION	REV	DATE	DESCRIPTION

MODELS 620, 630 & 640 SERIES
PART NO. 600 SERIES FOR P&ID
UNIVERSAL ANALYZERS INC.
3000 Conover Drive
Houston, Texas 77058 USA
UNIVERSAL ANALYZERS INC. DRAWING NO. POS27
APP'D BY: R. D. W. DATE: 01/26/99 SCALE: NONE SIZE: D SHEET: 2 OF 3

NOTE: ALL FITTINGS ARE 1/4"NPT UNLESS OTHERWISE SPECIFIED.

Electrical Connections Models 620, 630, 640



CONDUIT AND WIRING NOTES

- ELECTRICAL AREA CLASSIFICATION: INSIDE - GENERAL PURPOSE SYSTEM IS CONFIGURED AT THE FACTORY FOR REQUIRED VOLTAGE. CONTACT FACTORY FOR VOLTAGE CHANGE REQUIREMENTS
- POWER PLUG POLARITY - C +
- DC CONTROL WIRING SHALL BE INDIVIDUAL CONDUCTORS OF STRANDED TINNED COPPER WITH 300V. TYPE TFE INSULATION. MINIMUM WIRE SIZE SHALL BE 18 AWG. COLOR CODE SHALL BE AS FOLLOWS:
+ RED
- BLUE
- DC SIGNAL WIRING SHALL BE INDIVIDUAL CONDUCTORS OF STRANDED TINNED COPPER WITH 300V. TYPE TFE INSULATION. MINIMUM WIRE SIZE SHALL BE 18 AWG. COLOR CODE SHALL BE AS FOLLOWS:
COMMON - YELLOW
COMMON - YELLOW
- LAST DIGIT OF MODEL # SPECIFIES DC SUPPLY REQUIREMENT.
2 = 12VDC
4 = 24VDC
- PELTIERS ARE CONNECTED IN SERIES FOR 624, 634 AND 644 MODELS.

L	REV	DATE	DESCRIPTION	BY	CHK	APP'D

MODEL'S 600 SERIES WIRING SCHEMATIC

PART NO. NOT ISSUED

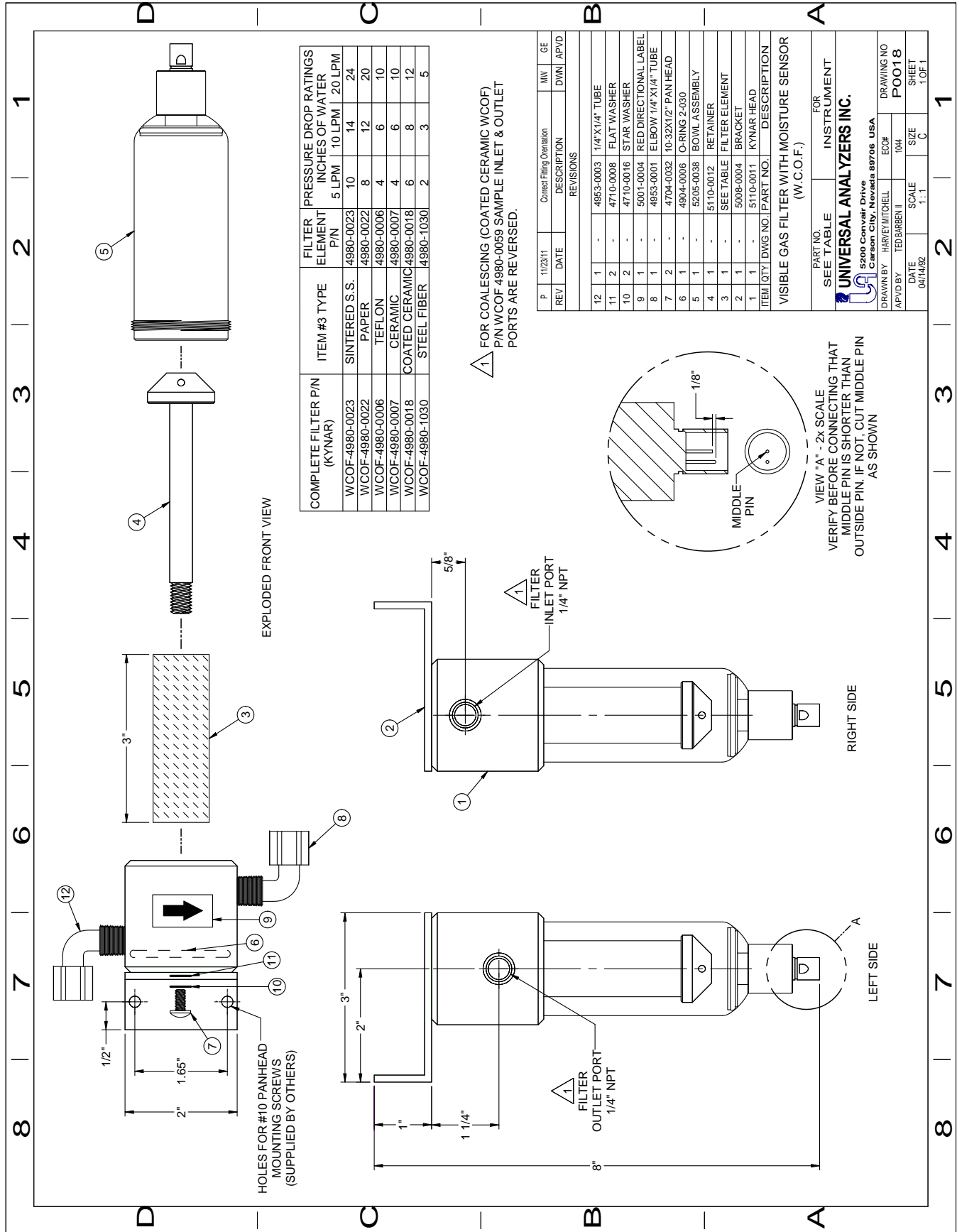
UNIVERSAL ANALYZERS INC.
8200 Conover Drive
Rockville, Maryland 20850, USA
DRAWN BY: E. BLANK
CHECKED BY: R. SMITH
PART NO. P0327

DATE: 05/05/99 SCALE: NONE SIZE: D SHEET: 3 OF 3

Number	Qty	Description	Part No.	Model
1	1	Controller Card 12VDC	3600-0036	622/632/642
1	1	Controller Card 24VDC	3600-0035	624/634/644
2	2	Peltiler Element 15V 8.5A	3016-0001	622/632
2	2	Peltiler Element 15V 8.5A	3016-0001	642
2	2	Peltiler Element 15V 3.9A	3016-0003	624/634
2	2	Peltiler Element	3016-0001	644
3	1	Display Card	3021-1000	All
4	1	Fan 12VDC	4800-0002	622/632/642
4	1	Fan 24VDC	4800-0008	624/634/644
Customer / Integration Options				
5	1	Power Supply 12VDC 75W	5400-0027	622/632/642
5	1	Power Supply 24VDC 150W	5400-0007	624/634/644
6	1	DC Power Supply 2.1mm Plug		All

Drawings - Water Carry Over Filter

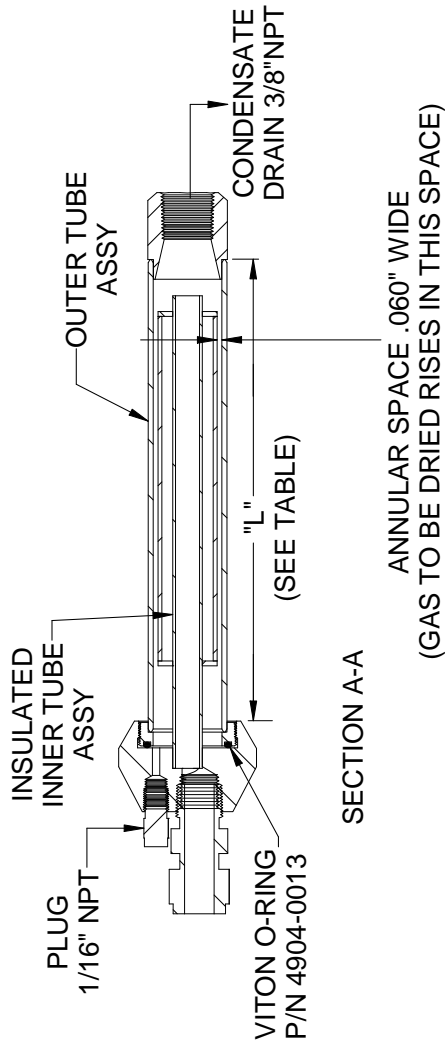
Models 620, 630, 640



Drawings - Heat Exchangers

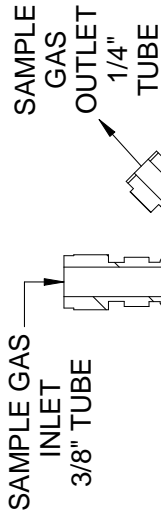
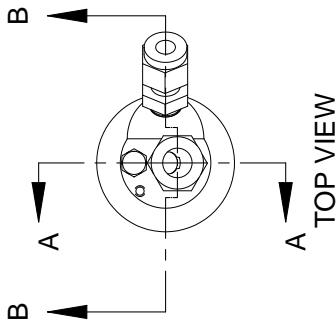
Metallic Heat Exchangers (Non-Temperature Sensing)

Models 620, 630, 640



SECTION A-A

ANNULAR SPACE .060" WIDE
(GAS TO BE DRIED RISES IN THIS SPACE)



SECTION B-B

APPROX LENGTH "L"	HEAT EXCHANGER P/N	OUTER TUBE MATERIAL	UNIVERSAL ANALYZERS SERIES
5"	5200-S050	316 S.S.	400/500
5"	5200-C050	HASTELLOY C-276	400/500
5"	5200-S05T	TEFLON COATED 316 S.S.	400/500
10"	5200-S010	316 S.S.	800/1000/1100/3000
10"	5200-C010	HASTELLOY C-276	800/1000/1100/3000
10"	5200-S01T	TEFLON COATED 316 S.S.	800/1000/1100/3000

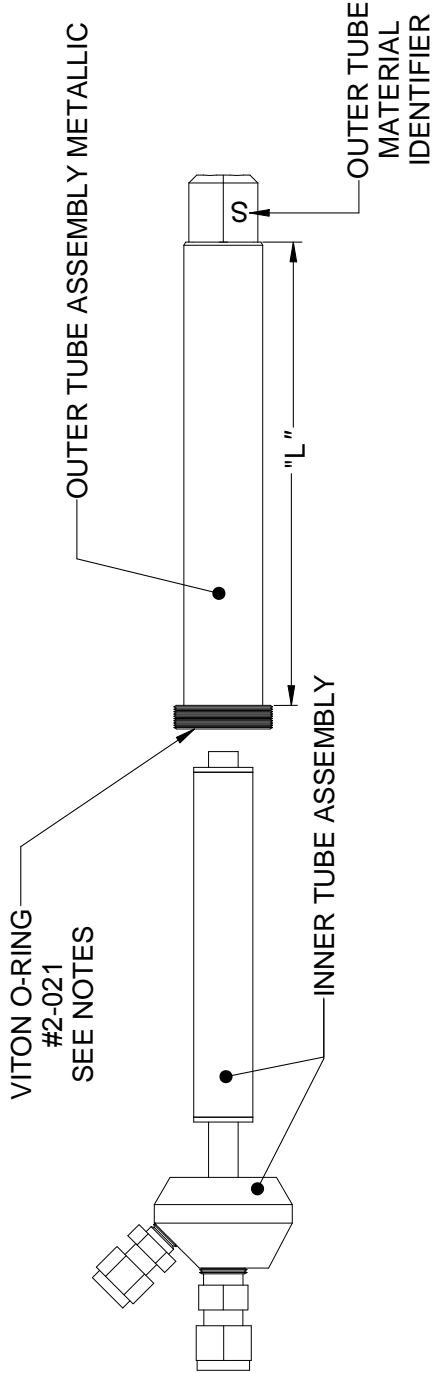
C	01/08/13	Revised Assy Notes	WC	GE
REV	DATE	DESCRIPTION	D/WN	APVD
REVISIONS				
HEAT EXCHANGER METALLIC NON-TEMPERATURE SENSING OUTLINE				
PART NO. SEE TABLE		FOR SEE TABLE		
5000 Cornwall Drive Calverton, NY 11916 Ph: (716) 883-2600 Fax: (716) 883-8088				
AMETEK				
O'BRIEN				
DRAWN BY	E. MUISSELMAN	ECO	DRAWING NO	P0147
APVD BY	H. MITCHELL	1531	SIZE	C
DATE	12/11/95	SCALE	NONE	SHEET 1 OF 2

1). SEE SHEET 2 FOR ASSEMBLY INSTRUCTIONS.

Drawings - Heat Exchangers

Metallic Heat Exchangers (Non-Temperature Sensing)

Models 620, 630, 640



NOTES:

1. O-RING IS FACTORY INSTALLED IN METALLIC OUTER TUBE.
2. LIGHTLY LUBRICATE O-RING WITH SILICONE GREASE BEFORE ASSEMBLY.
3. ANTI-SEIZE ON OUTER TUBE THREADS.

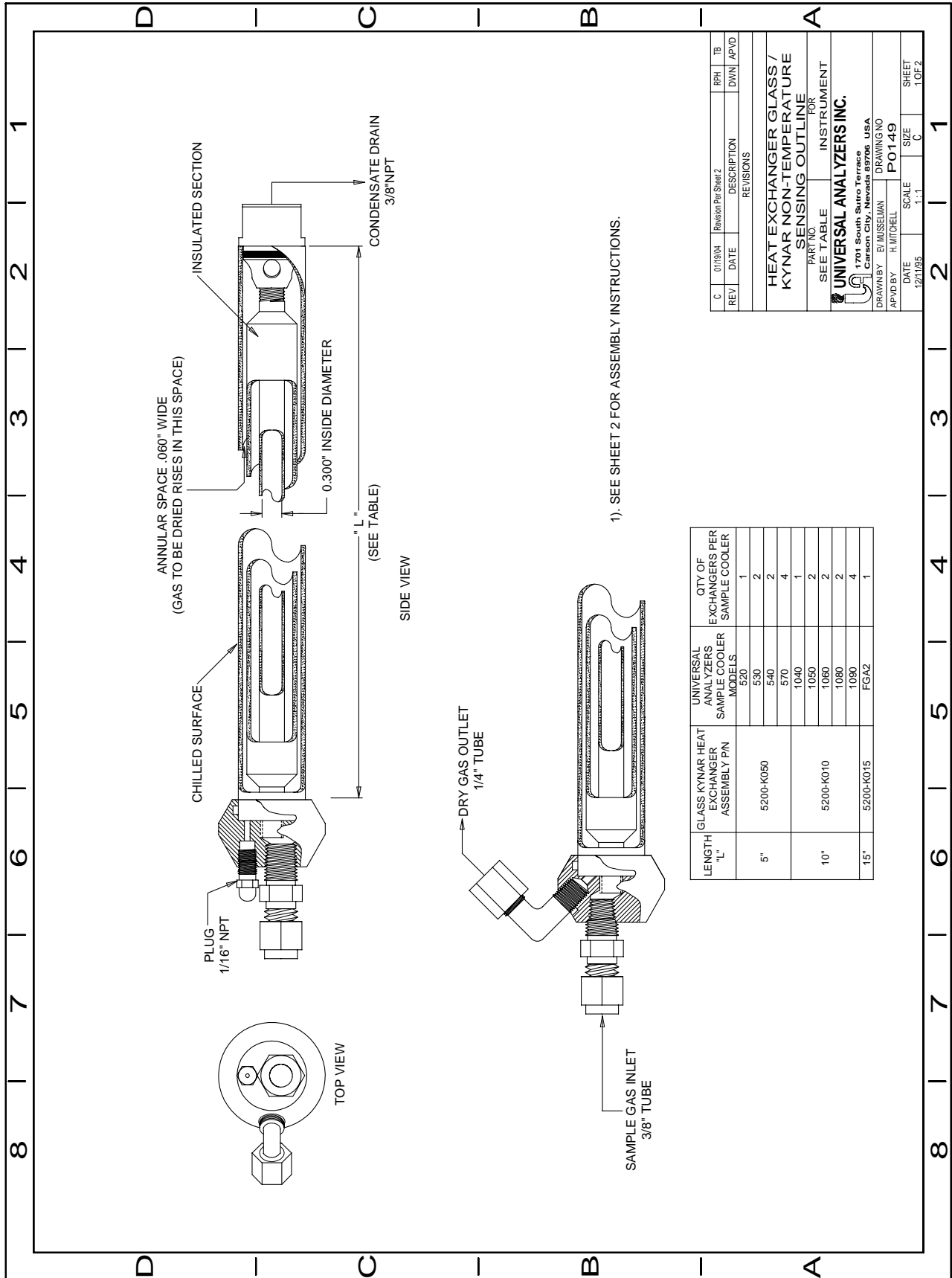
HEAT EXCHANGER SEPERABLE	SPARE PARTS LIST				
	P/N	INNER TUBE ASSY P/N	OUTER TUBE ASSY P/N	VITON O-RING #2-021 P/N	PLUG 1/16"NPT P/N
5"	5200-S050	5201-0015	5201-0012	4904-0013	4951-0058
5"	5200-C050	"	5201-0020	"	"
5"	5200-S05T	5201-0041	5201-0043	"	"
10"	5200-S010	5201-0016	5201-0013	4904-0013	4951-0058
10"	5200-C010	"	5201-0021	"	"
10"	5200-S01T	5201-0042	5201-0044	"	"
15"	5200-S015	5201-0107	5201-0055	"	"

C	01/08/13	Revs: Assy Notes	WC	GE
REV	DATE	DESCRIPTION	DWGN	APVD
REVISIONS				
HEAT EXCHANGER ASSEMBLY NON-TEMPERATURE SENSING METALLIC				
PART NO. FOR SEE TABLE			INSTRUMENT	
 AMETEK O'BRIEN ECO 1531				
DRAWN BY	EY/MUSSELMAN	DRAWING NO	PO147	
APVD BY	H. MITCHELL	SCALE	SIZE	SHEET
DATE	12/11/95	SCALE	NONE	C
		SCALE		2 OF 2

Drawings - Heat Exchangers

Glass Kynar (Non-Temperature Sensing)

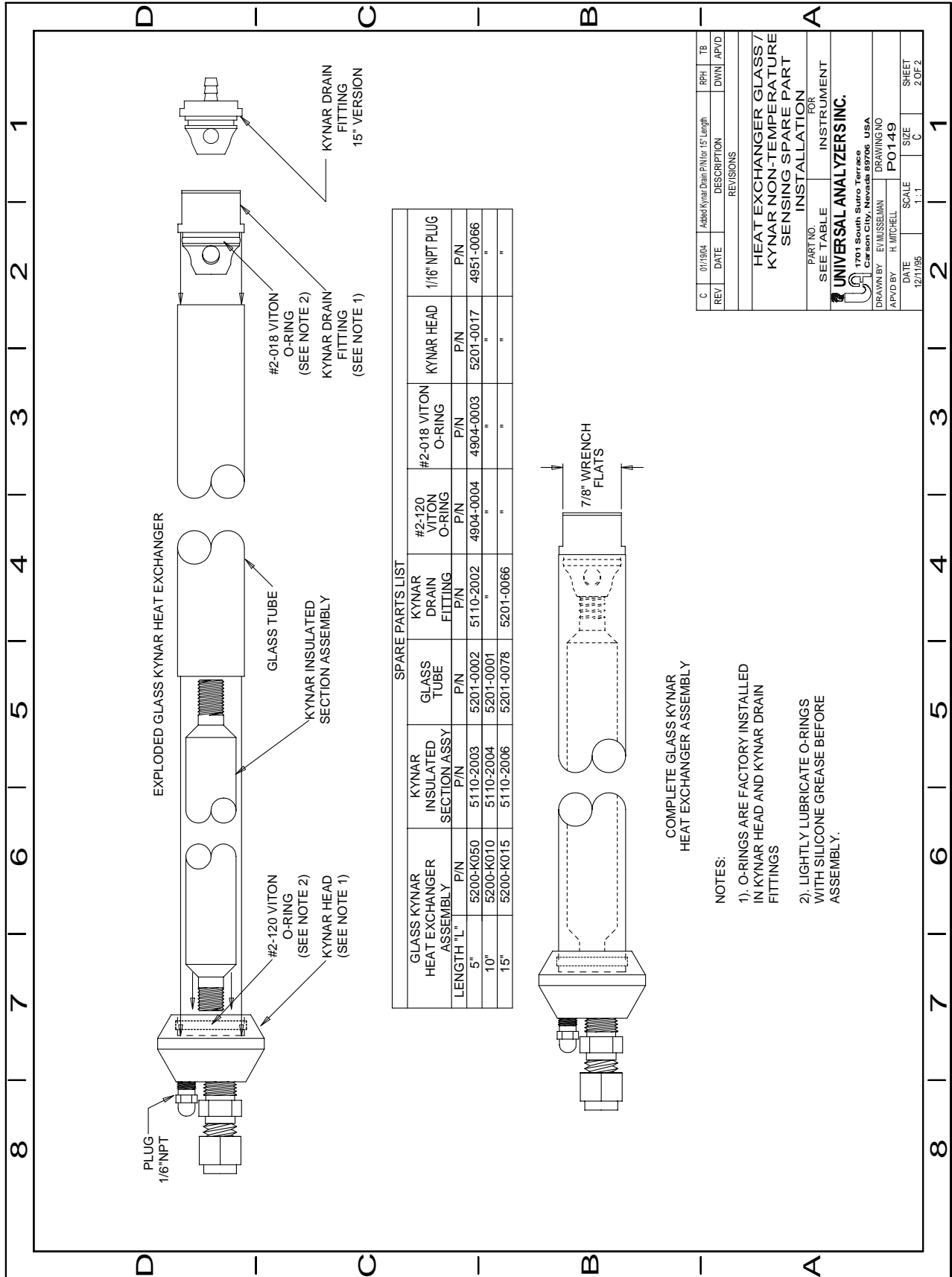
Models 620, 630, 640



Drawings - Heat Exchangers

Glass Kynar (Non-Temperature Sensing)

Models 620, 630, 640



SPARE PARTS LIST

GLASS KYNAR HEAT EXCHANGER ASSEMBLY	KYNAR INSULATED SECTION ASSY	GLASS TUBE	KYNAR DRAIN FITTING	#2-120 VITON O-RING	#2-018 VITON O-RING	KYNAR HEAD	1/16" NPT PLUG
LENGTH "L"	P/N	P/N	P/N	P/N	P/N	P/N	P/N
5"	5200-K050	5201-0002	5110-2002	4904-0004	4904-0003	5201-0017	4951-0066
10"	5200-K010	5110-2004	"	"	"	"	"
15"	5200-K015	5110-2006	5201-0066	"	"	"	"

- NOTES:
- O-RINGS ARE FACTORY INSTALLED IN KYNAR HEAD AND KYNAR DRAIN FITTINGS
 - LIGHTLY LUBRICATE O-RINGS WITH SILICONE GREASE BEFORE ASSEMBLY.

C	01/19/04	Address Kynar Drain P/N for 15" Length	RPH	TB
REV	DATE	DESCRIPTION	DWIN	APVD
REVISIONS				
HEAT EXCHANGER GLASS / KYNAR NON-TEMPERATURE SENSING SPARE PART INSTALLATION FOR INSTRUMENT				
SEE TABLE				
UNIVERSAL ANALYZERS INC.				
1701 South Suro, Terrace Carson City, Nevada 89706 USA				
DRAWN BY: EMMISSEMAN				
DRAWING NO: P0149				
APVD BY: H MITCHELL				
DATE	SCALE	SIZE	SHEET	2 OF 2
12/1/85	1:1	C	1	

Limited Warranty

I. Limited Warranty

1. Limited Warranty. Universal Analyzers, Inc (UAI) offers a limited warranty on each of its products against failure due to defects in material and workmanship for a period ending the earlier of (i) fifteen (15) months from the date of the invoice relating to the sale of the product and (ii) twelve (12) months from the date of installation of the product (collectively, the "Initial Warranty"). During the Initial Warranty, UAI offers a limited warranty against failure due to defects in material and workmanship on each part of a product repaired or replaced by an authorized service person for a period ending the later of (a) the remaining term of the Initial Warranty of the product and (b) ninety (90) days from the date of such repair or replacement. After expiration of the Initial Warranty, UAI offers a limited warranty against failure due to defects in material and workmanship on each part of a product repaired or replaced by an authorized service person for a period ending ninety (90) days from the date of such repair or replacement. UAI further offers a limited warranty that the products and parts it sells will conform to UAI's written specifications therefor. The foregoing limited warranties cover parts and labor only and UAI does not warrant and will not reimburse the buyer of its products ("Buyer") for any costs relating to the access by service persons of UAI to the product at issue. The foregoing limited warranties cover only the repair or replacement of defective parts and such determination will be in the sole discretion of UAI. In its sole discretion, UAI may make repairs or replacements under these limited warranties with either new or refurbished parts. To the extent Buyer's product cannot be remedied under these limited warranties through repair or replacement of parts, Buyer may return the product for a refund of the purchase price, less a reasonable reduction in such purchase price equal to the depreciation expense incurred by Buyer relating to such product. The limited warranties of this Section I.1. are further subject to those warranty exclusions set forth below in Section I.2.

2. Limited Warranty Exclusions. Excluding the warranties provided for in Section I.1., UAI provides all products to Buyer "as-is," without any other warranty of any kind. UAI disclaims any and all express or implied warranties of merchantability, fitness for a particular purpose and non-infringement of the intellectual property of others. UAI makes no warranty, express or implied, as to the design, sale, installation or use of its products. UAI's warranties will not be enlarged by, nor will any obligation or liability of UAI arise due to UAI providing technical advice, facilities or service in connection with any product. There is no warranty by UAI with respect to any product's: (i) uninterrupted or error-free operation; (ii) actual performance, other than the product's capability to meet UAI's specifications therefor; (iii) removal or installation from a worksite or process; (iv) electronic components or associated accessories (including without limitation circuit boards and integrated circuits); (v) maintenance (including without limitation gasket and seal replacements, adjustments, minor repairs and other inspection requirements, preventative or otherwise); (vi) use under inappropriate conditions or not in accordance with operating instructions; or (vii) use in connection with the operation of a nuclear facility. There is no warranty for labor expenses associated with field repairs or the repair or replacement of defective parts in the engine or power unit of any product if such product has been in the possession of the owner or operator for greater than twelve (12) months. There is no warranty for products determined to be, in UAI's sole discretion, damaged as a result of (a) misuse, neglect or accident; (b) improper application, installation, storage or use; (c) improper or inadequate maintenance or calibration; (d) operation outside of the published environmental specification; (e) improper site preparation or maintenance; (f) unauthorized repairs or replacements; (g) modifications negligently or otherwise improperly made or performed by persons other than UAI; (h) Buyer-supplied software or supplies; (i) use in conjunction with or interfacing with unapproved accessory equipment; (j) use of ABC-style or dry powder fire suppression agents; or (k) leaked sample materials. To the extent a UAI product is used in connection with the operation of a nuclear power facility, Buyer agrees to indemnify and hold UAI harmless from any and all actions, claims, suits, damages and expenses arising from such use. UAI provides no warranty on the oral representations made by its personnel while they are attempting to assist Buyer in the operation of a product. This Standard Limited Warranty does not apply to items consumed by the products during their ordinary use, including but not limited to fuses, batteries, paper, septa, fittings, screws, fuses, pyrolysis, dryer or scrubber tubes, sample boats, furnaces or UV lamps.

3. Non-UAI Products. UAI does not in any way warrant products it does not manufacture except to the extent the warranty of the manufacturer of the product at issue passes through or is otherwise assigned to UAI. If a manufacturer warranty is so assigned to UAI, UAI will only be bound to comply with the length of time associated with such warranty. All other terms of such warranty will be governed by this Standard Limited Warranty and UAI's General Terms and Conditions incorporated herein by reference.

Limited Warranty

4. Expenses on Non-Warranty Work. All repairs or replacements by UAI after the expiration of any applicable limited warranty period will be performed in accordance with UAI's standard rate for parts and labor. Further, if upon UAI's inspection and review, UAI determines the condition of the products is not caused by a defect in UAI's material and workmanship, but is the result of some other condition, including but not limited to damage caused by any of the events or conditions set forth in Section I.2., Buyer shall be liable for all direct expenses incurred by UAI to conduct the inspection and review of the product.

5. Exclusive Remedy. The foregoing limited warranty constitutes Buyer's exclusive remedy with respect to products sold by UAI and UAI's liability shall be exclusively limited to the written limited warranty specified herein. No employee, representative or agent of UAI is authorized to either expressly or impliedly modify, extend, alter or change any of the limited warranties expressed herein to Buyer.

6. Procedure and Costs. All limited warranty claims must be made in writing promptly following discovery of any defect. Buyer must hold defective products for inspection by UAI. If requested by UAI, Buyer must send the product to UAI for inspection. Any such returns by Buyer will be at Buyer's expense and Buyer will remain liable for any loss of or damage to the product during such product's transportation to UAI. No products will be sent to UAI for inspection unless UAI has authorized Buyer to do so.

7. Terms and Conditions. UAI's General Terms and Conditions are incorporated herein by reference and Buyer accordingly agrees to be bound by the terms thereof.

II. Limitations on UAI Liability

1. In General. Buyer agrees UAI shall not be liable for any direct, indirect, incidental, punitive or consequential damages, including lost profits, lost savings or loss of use, whether Buyer's claim is based in contract, tort, warranty, strict liability or otherwise, which Buyer may suffer for any reason, including reasons attributable to UAI. Buyer agrees these limitations on UAI's liability are reasonable and reflected in the amounts charged by UAI for its products.

2. Force Majeure. This Standard Limited Warranty does not cover and UAI shall not be liable for either direct or consequential damage caused, either directly or indirectly, as a result of: (i) any act of God, including but not limited to natural disaster, such as floods, earthquakes, or tornadoes; (ii) damages resulting from or under the conditions of strikes or riots, war, damages or improper operation due to intermittent power line voltage, frequency, electrical spikes or surges, unusual shock or electrical damage; or (iii) accident, fire or water damage, neglect, corrosive atmosphere or causes other than ordinary use.

3. Limitation on Warranty Claims. Prior to any obligation of UAI to perform any limited warranty service as set forth herein, Buyer must have: (i) paid all invoices to UAI in full, whether or not they are specifically related to the product at issue; and (ii) notified UAI of the limited warranty claim within sixty (60) days from the date Buyer knew or had reason to know of the defect

