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Instruction Manual

Model 6001-1763

Sample Conditioning Drawer
with 530SS Cooler



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RECEIVING & STORAGE

Carefully inspect the unit 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.

SAFETY INSTRUCTIONS



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

DEFINITION OF SYMBOLS

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.

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

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.



DESCRIPTION AND PRINCIPAL OF OPERATION

APPLICATION

The Universal Analyzers Model 6001-1763 is a cooler sample conditioner and calibration gas handler, mounted in a 19" rack mountable drawer (6U rack size). The cooler conditioner is ideally suited to remove moisture from the sample stream and provide dry sample at 4 °C

GENERAL DESCRIPTION

The Universal Analyzers Model 6001-1763 with a 530 Thermoelectric gas sample cooler contains stainless steel impinger type heat exchangers. These are mounted within heat transfer blocks, which are cooled by thermoelectric elements utilizing the "Peltier Effect", discovered in France over half a century ago. Where high water content may be encountered, it is efficient to remove the condensate in multiple stages, first by cooling to the temperature of the air in the vicinity of the heat exchanger ("Ambient Pre-cooler"), then by passing the sample into a heat exchanger cooled to 4 °C by the thermoelectric elements.

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 moisture sensor is provided to sense the presence of condensate, should any exist in the tubing following the chiller. This WCO (Water Carry-Over) sensor will provide an early warning if liquid is detected in the sample stream. If water carry-over is sensed, the Chiller Malfunction contacts will open, sending an alarm signal to the attached sample system electronics. The Sample Pump will also be stopped, assuming power to start the Sample Pump has been supplied at TB1-1.

A Vacuum switch is provided to monitor and alarm high inlet vacuum. If there is high inlet vacuum, the Vacuum Switch contacts on TB2 will be opened, signaling a high vacuum condition to the attached sample system electronics.

A Pressure switch alarms on low pressure. If there is low pressure on the Sample Pump discharge, the Pressure Switch contacts on TB2 will be opened, signaling a low pressure condition.

The sample pump (a dual head oil-less diaphragm pump) is placed in the sample line after the 4 °C cooler. Two heads are used to increase the throughput of the system.

The condensate is removed from the heat exchanger(s) by a continuously running peristaltic pump that 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. A preventative maintenance step of replacing the tubing every 6 months is a good practice.

Finally, a means of controlling the flow of the sample to the analyzers must be considered. This can be as simple as providing a flow meter with a flow control needle valve to regulate the sample flow causing the sample pump to pump higher on the pump curve. One option which is used is to provide an adjustable back-pressure regulator between the inlet and outlet of the sample pump. This allows a portion of the gas pumped to be re-circulated back to the inlet if discharge pressure exceeds the back-pressure control point. Some analyzers have their own sample pump which may be sufficient to supply the analyzer but insufficient to pull the sample through the chiller, sample line and heated stack filter. These can be supplied by piping the sample from the external sample pump into an atmospheric tee with a flow meter that registers the flow of excess sample from the branch of the tee to the atmosphere. The internal analyzer sample pump can then withdraw the sample from the opposite run of the tee which is essentially at atmospheric pressure and unaffected by pressure changes within the sample line, due to changes in filter pressure drop or sample pump efficiency. In this case, care must be taken to ensure the Sample Conditioning Drawer (SCD) supplies more sample to the analyzer than it needs, to ensure ambient air is not drawn into the analyzer.

The 6001-1763 has a handling system for calibrations gases. Up to 6 gases may be supplied to the drawer, which can then direct them to the probe for system calibrations, or directly to the analyzers for direct calibration. A low pressure switch is connected to the calibration gas inlet line. This low pressure switch can provide an alarm via an open contact on the user interface connection.

The user interface connection consists of two 16 terminal plug-in connections. The first terminal block provides for user sample pump control, and for control of the solenoid valves that control the calibration gases. The second terminal block provides a set of open contacts for a number of previously mentioned alarm signals generated by the drawer.



INSTALLATION

Thermoelectric Sample Coolers should be installed away from heat sources in a well-ventilated area of an instrument rack or enclosure. Completely enclosing any instrument generating 720 watts of energy will cause the temperature of the interior of the enclosure to rise to too great a level for the sample cooler to perform reliably. Universal Analyzers can supply NEMA 12, 4 or 4X type enclosures modified to duct outside air directly into the heat sink. The heated air is then exhausted to the outside of the enclosure with fans, thermostatically controlled. The interior of the enclosure can also be insulated to reduce the solar heat loading in case the enclosure is mounted in the sun.

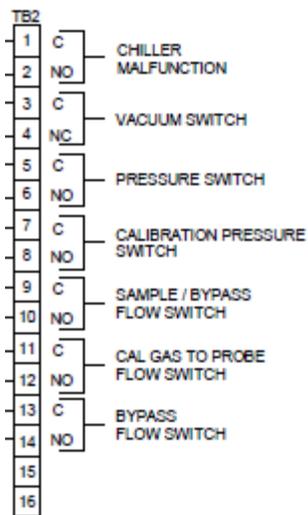
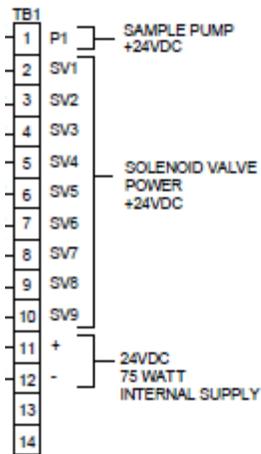
The sample inlet is a 3/8" compression fitting at the rear of the drawer. The heat insulation on the heated tube bundle should be stripped no more than 3" to avoid plugging the exposed line. The sample outlets are 1/4" compression fittings on the rear of the drawer. Calibration gas connections are also 1/4" compression fittings on the rear of the drawer, 6 connections for the calibration gas into the drawer, and 1 connection for calibration gas from the drawer to the probe for system calibration.

3/8" tubing from the condensate drain is provided. The dual head peristaltic pump is used to withdraw the condensate from each Impinger. Care must be taken to drain the condensate into a safe drain because of the possibility of acid in the condensate drain.

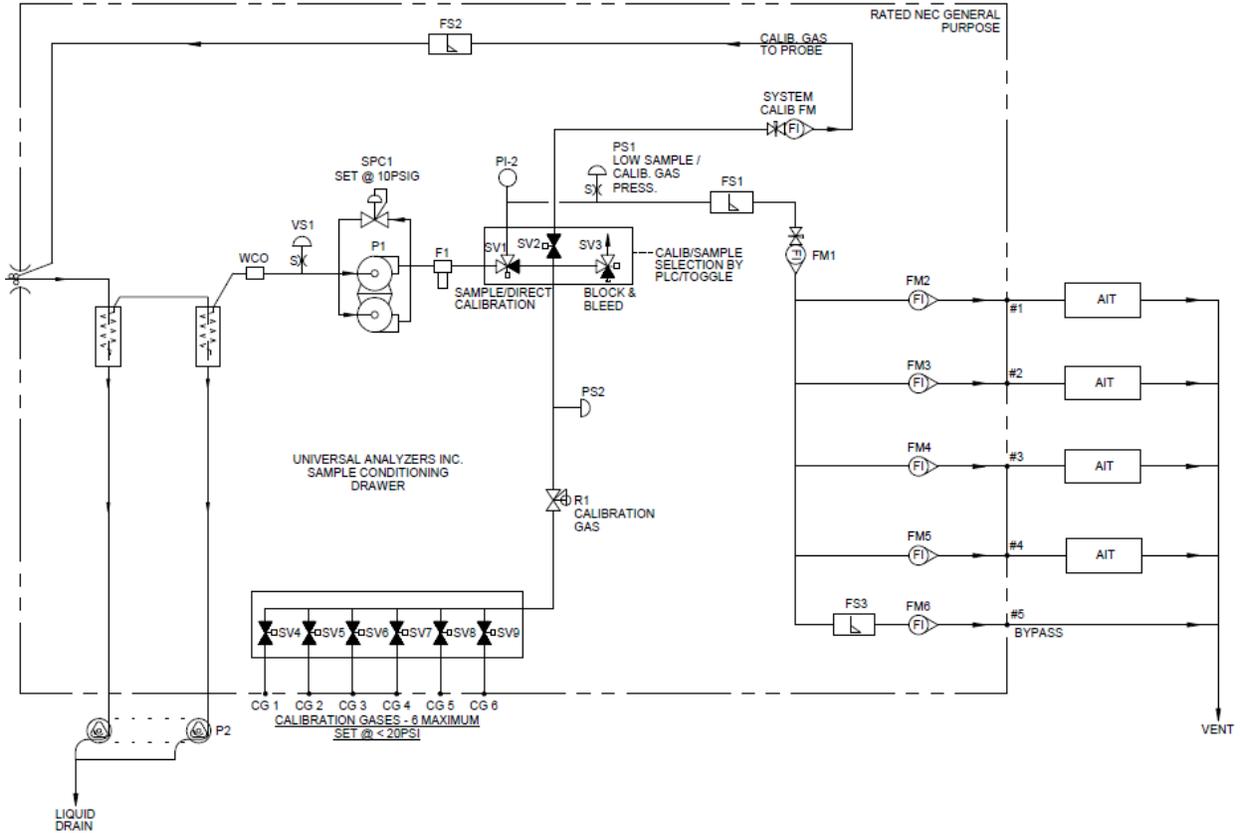
Power is provided to the drawer via a standard power in module at 115 VAC/60 Hz.

Control signals are provided to the drawer via the plugs for terminal blocks 1 and 2. Refer to the system drawings for more details on the available connections. 24 VDC must be supplied to TB1-1 for the sample pump to operate.

ELECTRICAL CONNECTIONS



PROCESS AND PIPING CONNECTIONS





START UP

Note: It is important that the Heated Probe and Sample should be at operating temperature before starting the chiller and sample pump.

Apply power to the sample 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 4 °C.), the rate at which the temperature drops will be reduced. It will stabilize between 3 °C and 4 °C.

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

The (DRY) light should remain on as dry gas is transported to the analyzer(s).

Turn on the analyzer(s) and calibrate as required.



SHUT DOWN

Before removing power from the unit, ensure the system has been purged of any potentially hazardous components. To purge the system, perform the following:

1. If equipped, perform a manual blowback operation.
2. If feasible, provide instrument air to the probe via a cal gas line. If not, disconnect the sample line.
3. Allow the system to run for at least 10 minutes.
4. After purging is complete, follow the maintenance procedure to change the filter.
5. Cap the sample outlet tube connection and disconnect power from the unit. *Note: If electrical wires are to be disconnected, follow applicable 'Lock Out/ Tag Out' requirements.*

MAINTENANCE

Before performing any maintenance on the cooler, ensure that all plant safety procedures are followed. As with any electrical device, ensure power is removed before performing any procedures.

The 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 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

REPLACEMENT OF PERISTALTIC TUBING

- Please refer to manufactures website for instructions:
http://www.masterflex.com/catalog/product_view.asp?sku=0701520
- YouTube:
http://www.youtube.com/watch?v=zC1INbSnf8o&feature=player_embedded#at=242

REPLACEMENT OF SAMPLE PUMP DIAPHRAGM

- Please refer to manufactures website for instructions: <http://www.airdimensions.com>

INSTALLING OR REPLACING HEAT EXCHANGERS

Removing the heat exchanger

- Remove the inlet and outlet tubes by loosening the compression fittings. Always use a backup wrench on the fitting body to ensure no damage to the heat exchanger occurs.
- Remove the drain fitting using the same procedure as the inlet/ outlet. Remove the drain fittings from the exchanger. Use a backup wrench on the lower heat exchanger hex to prevent damage to the exchanger.

Replacing the heat exchanger

- Dry and clean the heat exchanger opening in the heat transfer block using a dry, lint-free cloth (If reusing the heat exchanger, clean the outside as well.) Dried heat transfer paste can be removed by using a very fine abrasive pad wrapped around a drill bit
- Smear the outer diameter of the heat exchanger with heat transfer paste.
- Gently push the heat exchanger into the heat transfer block until the head is fully seated against the insulation on top.
- Reinstall the drain fitting. Ensure pipe tape is used on the pipe threads before installation. Use a backup wrench on the heat exchanger lower hex to prevent damage to the exchanger.
- Reconnected the drain, inlet and outlet tubes.

INSPECT/ CLEAN HEAT SINK FINS

The cooler heat sink is used to dissipate heat away from the heat transfer block/ Peltier elements. Over time in an industrial environment, dust/ debris can build up between the fins on the heat sink. This buildup will reduce the efficiency of the cooler and can cause premature failure of the Peltier elements.

Inspect heat sink fins

Using a flash light (or other light source), shine a light through the heat sink fins. If the fins are unobstructed, you should be able to see the exhaust fan. If the fan is not visible or partial obstruction exists, clean the heat sink fins.

Clean heat sink fins

Using a soft bristled brush, gently remove debris from the heat sink. Alternatively, a computer safe aerosol cleaner can be used to remove the debris.

Clean any loose debris from the enclosure and blower motor using a vacuum or compressed air.

ADJUSTMENT OF THE COOLER SETPOINT

The cooler's control setpoint can be adjusted if necessary. The SCD must be powered up to conduct this procedure.

To adjust the setpoint, move the jumper on the Display/Control card from the TEMP to the SET position. The display will now show the control setpoint vice the cooler temperature. Using the SET potentiometer just below the TEMP/SET jumper, adjust the setpoint. NOTE: The



setpoint indicated is actually about 1 °C above the temperature that will actually be controlled to.

The high cooler temperature alarm is hard wired at 10 °C. This means the maximum control setpoint can be no higher than about 9 °C, to allow for reset of the high temperature alarm. If a higher setpoint is chosen, the cooler may not get cold enough to reset the alarm.

After the desired setpoint has been reached, move the TEMP/SET jumper back to the TEMP position.

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).

Caution: Troubleshooting should only be done by an Experienced Technician.

Error	Possible reason	Check/Repair
No Display, no fans	Loss of AC Power	Reestablish AC Power
No Display, no cooling Power Supply PLC	15 VDC Supply Fuse Blown Loose connector Cable PLC Failure	Replace Power Supply Replace Fuse Check cable connections Contact Factory for replacement
No Heat Sink Fan	Fan Failure	Replace Fan
Sample Pump not working	System Offline Water Carry-Over Alarm High Temp Alarm Sample Pump malfunction	Place System Online See Below See Below Repair/replace pump
Water Carry-Over	Liquid in WCO Chiller BTU Load high Peristaltic Pump Failure High Ambient Temperature	Clean WCO Sensor Reduce Sample Flowrate Replace Peristaltic Tubing Replace Peristaltic Pump Cool Enclosure < 40°C
High System Vacuum	System Inlet Vacuum >5"HG	Blowback Heated Filter Replace Heated Filter Check Heated Sample Line for restriction
Low Sample Flow	Pump Failure	Rebuild or replace sample pump
T/C Failure	Faulty T/C or connection	Check cable and wiring connections Replace T/C
High Ambient Temp	Temperature in Electronics Enclosure exceeds 50 °C	Reduce ambient temperature in shelter



NOTES:

The presence of water in liquid form after the sample cooler is an indication of a fault in the system. Reasons for the presence of condensate in the system after the sample cooler could be one or more of the following:

1. Overloading of the cooling capacity of the cooler due to too much water vapor in the sample OR too great a sample flow rate.
2. The condensate removal equipment (peristaltic pump, eductor, or drain pot) may be faulty. The heat exchanger(s) may be full of condensate.
3. An air leak may be in the condensate removal system allowing air to enter and blow the condensate back into the heat exchanger. (This assumes the heat exchanger is under a slight vacuum.)
4. The temperature of the air passing through the cooler to cool the heat sink is too high. This could be due to placement of the cooler in a tightly sealed box.



SPARE PARTS

(W/ FILTER OVEN TEMPS BELOW +400°F)

Level A, Consumable Parts:

Part No	Description	2 Yr Recommended
4980-0007	Ceramic Filter Cartridge, 2 micron	6
9515-0018	ADI Mini Dia-Vac Sample Pump Rebuild Kit	4
9216-0002	Peristaltic Pump Tubing, #15, 5 ft. length	9
3010-0005	6 Amp S.B. Fuse for Power Entry Module (PEM)	4

Level B, Basic Parts:

4904-0013	O-ring, 2-021, Viton, Heat Exchanger and filter	10
8010-0001	Heat Sink Paste, 0.1 ounce container	1
4904-0006	O-ring, 2-030, Viton, Filter Bowl Seal	1
4904-0002	O-ring, 2-113, Viton, WCO Moisture Sensor Body	1
5101-0001	WCO sensor assembly	
4980-0011	Lexan Filter Bowl	

Level C, Critical Repair Parts:

3016-0001	Peltier Element, 15VDC 8.5Amp 40mm	
9515-0001	Insulation Kit for 5" Heat Transfer Block	
1150-0016	Thermocouple, Type K	1
4800-0003	Heat Sink Fan, 1000 Series Chiller	
3600-0011	Power supply card, 500 W	
3600-0012	Display/Control Card, Single channel	
5200-S050	Heat Exchanger, 5", SS	

Level D, In Depth Parts:

4958-0026	Sample Pump, 115VAC Dual Head Mini Dia-Vac	
4955-0246	Sample Pressure Control, Adjustable 3-32 psig	1
6020-0005	Moisture Sensor Assy Complete For Pass Thru Panel Application	
8200-0008	Regulator, Calibration Gas	
4958-0028	Peristaltic Pump Motor, 115VAC	1

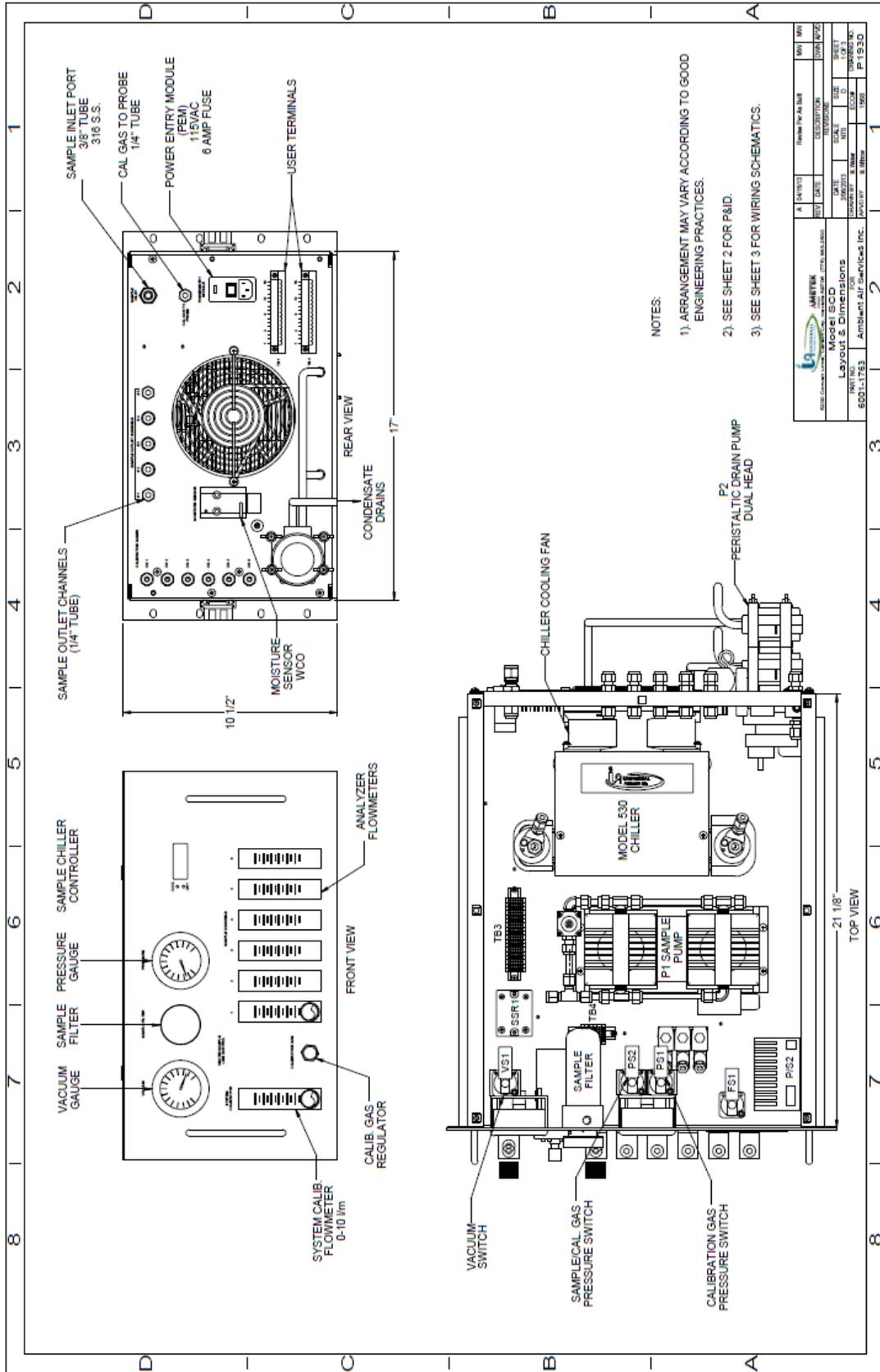


4958-0006	Peristaltic Pump Head for #15 Tubing	2
4955-0040	Solenoid valve, 2-Way / 24 VDC	1
4955-0041	Solenoid valve, 3-Way / 24 VDC	2
4955-0247	Solenoid Valve, 2-way / 24 VDC, manifold mount	6
3103-0017	Vacuum Switch, 0-29" Hg, Sample Inlet Vacuum	
3103-0018	Pressure Switch, 0-15 PSIG, Sample/Calibration Pressure	
3019-0009	Vacuum Gauge, Glycerin Filled, 0-29" Hg,	
3019-0008	Pressure Gauge, Glycerin Filled, 0-15 PSIG	
4965-0007	Flowmeter, 0-10 liters/min. w/ SS Needle Valve	
4965-0008	Flowmeter 0-5 liters/min w/ SS Needle Valve	
3152-0002	Relay Solid State, 3-32V Cntrl. 230VAC Drv. 25Amp	
3019-0017	Pressure Gauge, 0-15 psig, 1-1/2"	
3103-0039	Flow Switch	



STANDARD DRAWINGS

P1930 – 6001-1763 SCD 530 Sample Conditioning Drawer with 530 Cooler



REV	DATE	DESCRIPTION	BY	CHK
1	01/20/03	REVISED	AMETEK	AMETEK
2	02/03/03	REVISED	AMETEK	AMETEK
3	02/03/03	REVISED	AMETEK	AMETEK
4	02/03/03	REVISED	AMETEK	AMETEK
5	02/03/03	REVISED	AMETEK	AMETEK
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LIMITED WARRANTY

1. 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 therefore. 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 1. are further subject to those warranty exclusions set forth below in Section 2.

2. Limited Warranty Exclusions. Excluding the warranties provided for in Section 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 therefore; (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.

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 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.

Limitations on UAI Liability

8. 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.

9. 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.

10. 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.